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# Tat will tell: Tattoos and time preferences

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ABSTRACT

Survey and experimental evidence documents discrimination against tattooed individuals in the labor market and in commercial transactions. Thus, individuals' decision to get tattooed may reflect short-sighted time preferences. We show that, according to numerous measures, those with tattoos, especially visible ones, are more short-sighted and impulsive than the non-tattooed. Almost nothing mitigates these results, neither the motive for the tattoo, the time contemplated before getting tattooed nor the time elapsed since the last tattoo. Even the expressed intention to get a(nother) tattoo predicts increased short-sightedness and helps establish the direction of causality between tattoos and short-sightedness.



## 1. Introduction

We show that tattooed individuals, especially those with visible tattoos, are more short-sighted and impulsive than non-tattooed individuals. These findings are highly robust and supported by an incentivized time-preferences experiment, numerous self-report behaviors in the financial, health and social domains and a well-known measure of impulsivity. Almost nothing mitigates these results: regardless of the motive for getting a tattoo, the time contemplated before getting one's first tattoo or the time elapsed since one's last tattoo, those with hidden tattoos and especially visible ones are more impulsive and less future-oriented than the non-tattooed. The lone exception is women with only hidden tattoos: they are no more present-oriented or impulsive than non-tattooed women. Even the stated intention to get a(nother) tattoo within the coming year predicts short-sightedness, both among those already tattooed and the non-tattooed. This finding provides evidence of the direction of causality between tattoos and short-sightedness: tattoos do not lead to short-sightedness, rather they are an expression of short-sightedness.

The rise in popularity of tattoos constitutes one of the most significant cultural trends in the West. A mere two generations ago, tattoos were largely reserved for criminals, sailors and circus freaks (see Drimmer, 1985). Today, 40% of Americans aged 26–40 have at least one tattoo.[1] The embrace of tattoos among younger generations may be understood as a fashion trend, though its consequences are markedly more permanent than most fads. A tattoo engenders potentially long-lasting implications for employability, earnings and career success. Although tattoos are becoming less predictive over time of de-

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[1] Reported by Statistic Brain based on August 2015 survey conducted by Pew Research Center, http://www.statisticbrain.com/tattoo-statistics/

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0167-2681/

viant behavior as they become more commonplace (see Swami et al., 2016), *stereotypes* of the tattooed have not dissipated as quickly.

Indeed, whether based on the belief that the tattooed are less qualified (statistical discrimination) or are simply not liked (taste-based discrimination) ample evidence points to discrimination against the tattooed in the workplace and in commerce. Based on a correspondence study in the German banking sector, Jibuti (2018) finds employer callback rates are 13 percentage points lower for otherwise-identical visibly tattooed applicants versus non-tattooed ones. To explain these findings, Jibuti presents evidence consistent with taste-based discrimination. Brallier et al. (2011) show that after having seen an applicant's resume and photograph, restaurant managers prefer to hire non-tattooed male and female servers than their tattooed counterparts. Likewise, Baumann et al. (2016) find that consumers prefer to do business with the non-tattooed, although tattooed individuals actually exhibit higher trust and are more willing to work with tattooed salespersons than those without tattoos (Arndt and Glassman, 2012). Based on fictitious LinkedIn profiles with digitally modified images, Henle et al. (2018) show that in hypothetical hiring scenarios, visibly tattooed applicants are less likely to be hired, offered lower starting salaries and perceived as less competent than the non-tattooed. Similarly, Timming et al. (2017) present experimental evidence that a visible tattoo reduces hireability judgments, especially for public-facing positions, complementing past qualitative research revealing similar observations from managers and employees (Timming, 2015). Finally, Doleac and Stein (2013) present compelling evidence that whites with a wrist tattoo are less trusted and face discrimination of a similar magnitude to African Americans in commercial transactions.

Despite considerable evidence of the potential for employment discrimination, several recent papers assessing the role of tattoos in actual employment outcomes suggest that tattoos may have little impact on actual labor-market outcomes. Using U.S. and Australian national longitudinal surveys, French et al. (2016) find that the tattooed (assessed with a binary yes/no question) report higher rates of unemployment and lower earnings than the non-tattooed, but differences become small and non-significant after controlling for educational attainment, social status, occupational, lifestyle and health-related characteristics. French et al.'s (2019) follow-up study examines other tattoo features (e.g., visibility/offensiveness) and finds that tattooed individuals earn less per hour but employment outcomes again become non-significant after controlling for a host of related variables (including education, socio-economic status, risk-taking behaviors, criminal record). Further, based on a longitudinal panel data from a Dutch sample, Dillingh et al. (2018) find that having a tattoo in the current or previous year is unrelated to the current year's income, though they do find the likelihood of being employed is lower for the visibly tattooed. These findings can be interpreted in two ways. On one hand, they may suggest that the disadvantage of tattoos in the workplace is limited after controlling for related variables. On the other hand, they also reveal that tattoos are indeed linked to lower educational attainment and lower self-assessments of physical and mental health (Dillingh et al., 2018), and more risk-taking behavior including greater likelihood of a criminal record (French et al., 2016, 2019; see also Laumann and Derick, 2006).

A visible tattoo may still evoke some of these negative associations and stigmatize the tattooed applicant whether or not these negative characteristics actually apply to them. Along these lines, York College of Pennsylvania (2013) conducted a national random survey of 401 human resource professionals, asking them to identify the qualities that are "the best way[s] not to get hired for a job." In response, 60.2% of the sample indicated a "visible tattoo".

Given the continued potential both for negative stereotypes and taste-based discrimination against the tattooed, tattooing can be seen as a relatively puzzling behavior from an economic perspective.[2] Unlike more commonly studied forms of discrimination based on an innate characteristic such as gender or ethnicity, tattoos are a choice or mutable trait. The choice to get a visible tattoo can be viewed as the willing affixation of a visible stigma to one's identity. In light of the evidence of discrimination against the tattooed, one would want to consider carefully the decision to get a tattoo. A person weighs the desire to get a tattoo with the projected long-term economic disadvantage of navigating a workplace in which many employers could discriminate against them on the basis of stereotypes. In this respect, the tattoo decision represents a classic intertemporal tradeoff, where immediate desires and benefits are weighed against future benefits and costs. Because of the (relative) permanence of tattoos, a decision to get one possesses the potential to influence distant future outcomes more than virtually any other aesthetic or fashion choice. Thus, individuals pursuing a career who disregard these widely held negative stereotypes among their potential employers and choose nonetheless to get a tattoo may be acting impulsively and may be revealing short-sightedness and a lack of future orientation. We provide direct evidence on the time preferences and impulsivity of the tattooed and non-tattooed.

Our paper is the first to examine the relationship between time preferences and tattoos. Past research has found that relative to the non-tattooed, the tattooed report higher impulsivity (Swami et al., 2016), lower educational attainment and higher levels of risk-taking behavior (French et al., 2016, 2019, Kertzman et al., 2013, Laumann and Derick, 2006). Some of these tendencies may well signify short-sighted time preferences, but none of the research to date has examined tattoos and time preferences using an incentivized task. We construct a unique dataset that covers numerous facets of tattoos with the goal of comparing the time preferences and impulsivity of the tattooed and non-tattooed. Our dependent measures include an incentivized experiment measuring time preferences, numerous self-report questions on short-sighted behaviors across different domains and the cognitive reflection task (Frederick, 2005), a well-known measure of impulsivity. We hypothesize

[2] Alternatively, Akerlof and Kranton's (2000) economics of identity posits that the tattooed may perceive benefits associated with their group association that outweigh other economic disadvantages. We also acknowledge but do not address in this paper other, non-economic motivations for getting a tattoo such as cultural or evolutionary reasons (e.g., tattoos may be viewed as a signal of health or virility; see Lynn et al. 2019).

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**Table 1**
Incentivized time-preferences experiment.

| Pair | Option A | Option B |
|---|---|---|
| 1 | $1 in 18 h | $1 in 3 weeks |
| 2 | $1 in 18 h | $1.05 in 3 weeks |
| 3 | $1 in 18 h | $1.10 in 3 weeks |
| 4 | $1 in 18 h | $1.20 in 3 weeks |
| 5 | $1 in 18 h | $1.30 in 3 weeks |
| 6 | $1 in 18 h | $1.45 in 3 weeks |
| 7 | $1 in 18 h | $1.65 in 3 weeks |
| 8 | $1 in 18 h | $1.90 in 3 weeks |
| 9 | $1 in 18 h | $2.20 in 3 weeks |
| 10 | $1 in 18 h | $2.50 in 3 weeks |

that tattooed subjects, particularly visibly tattooed ones, will display more short-sightedness and impulsivity than the non-tattooed subjects.

In total, 1104 Amazon Mechanical Turk (MTurk) participants completed our 30-min study. Seven-hundred eighty-one reported having no tattoo, 255 have one or more tattoos, all of which can be readily hidden with clothing, and the remaining 68 have at least one visible tattoo (e.g., face, neck, hands). Respondents reported number and location of tattoos, their reasons for getting each of their tattoos; how long they contemplated their first tattoo; the time elapsed since their last tattoo; and whether they intend to get a first or another tattoo in the coming year. They also reported their views on the prevalence and acceptability of tattoos. Combined with the short-sightedness and impulsivity measures, our dataset permits us to explore the robustness of our findings to various aspects of tattooing and to test plausible directions of causality. In particular, we present compelling evidence that short-sightedness predisposes people to get tattoos.

Do those who choose to get a (visible) tattoo, despite its permanence and potentially adverse labor-market consequences, not care about what others think of them or do they overestimate the normativeness of tattoos in society? We present evidence that the tattooed care about what others think of them just as much as the non-tattooed, but they overestimate the prevalence and degree of acceptance of tattoos in society at large.

## 2. Methods

### *2.1. Experimental and survey design*

We recruited registered Amazon Mechanical Turk (MTurk) users to participate in our 30-min study. The recruitment notice made no mention of tattoos and was relatively nondescript, indicating simply that "we [the researchers] are interested in the decisions and judgments people make in settings not unlike those encountered in everyday life."

The study consists of three incentivized experiments followed by an extensive survey. The first incentivized experiment, originally developed by Coller and Williams (1999), elicits subjects' time preferences and is summarized in Table 1. In each of the ten pairs, the subject chooses between Option A and Option B. Option A remains the same throughout all ten pairs: the payment of $1 USD in 18 h. Option B pays an exponentially increasing amount across the pairs in three weeks. In Pair 1, Option B also pays $1 USD, like Option A. Thus, most subjects are likely to prefer Option A in order to receive the $1 sooner. Pair 2 already poses a dilemma for subjects since Option B's payment increases to $1.05. Those who prefer Option B are relatively future-oriented and have a comparatively low rate of discount. If $1.05 is insufficient to persuade the subject to switch to Option B, Pair 3 increases the payment to $1.10, Pair 4 to $1.20 and so forth. By Pairs 9 and 10, the subject compares $1 in 18 h (Option A) to $2.20 and $2.50 in 3 weeks, respectively (Option B). One of the ten pairs is randomly chosen and the subject's preferred option for this pair determines his/her payment. Our dependent measure is the pair at which the subject switches from the lower, more immediate payment (Option A) to the larger, more temporally distant one (Option B). The later the switching pair, the more impatient or present-oriented the subject is.[3]

Next, subjects participated in two consecutive incentivized tasks that evaluate their honesty (part of a different project reported in Ruffle and Wilson, 2018), followed by a questionnaire composed of the following intermingled varieties of questions: (i) self-report behaviors reflecting far-sightedness in the financial, health and social domains; (ii) four cognitive-reflection-task questions (Frederick, 2005; Thomson and Oppenheimer, 2016) used to evaluate subjects' impulsivity; (iii) the typical spate of socio-demographic questions. Finally, the study concludes with a detailed questionnaire on tattoos and attitudes toward tattoos.

Recognizing that our incentivized elicitation task is but one (commonly used) method to measure time preferences and focuses on a specific trade-off between time and money, we sought to develop other measures of short-sightedness. Inspired by Weber et al. (2002) who devised domain-specific questions for assessing risk perceptions and behaviors in financial, health/safety, recreational, ethical and social decisions, we crafted a series of questions to evaluate subjects' time horizons

[3] The Appendix displays the experiment as seen by the MTurk subjects.

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in the three domains of financial, health and social decisions. For the financial domain, we composed three questions about the respondents' saving for retirement, tendency to make late credit-card payments, and ability to manage their finances and debt.[4] Our measures of short-sightedness in the health domain consist of four questions about the tendency to overeat to the point of not feeling well, exercise frequency, alcohol consumption and smoking behavior. For the social domain, we created three questions. One is a general question about the respondents' desire to have a good time socially even at the expense of their future. The other two questions are specific to social media posts. Because online posts are virtually permanent, their effects can be long-lasting. At least anecdotally, new social media realities have resulted in some individuals being called out for inappropriate online behavior, sometimes from the relatively distant past.[5] In this same vein, Enriquez (2013) refers to online behavior as a "digital tattoo" for its permanent implications. We ask respondents two questions about how likely they are on a ten-point scale to post: (i) personal or private information, (ii) online statements or opinions that may be controversial. Regular engagement in these behaviors can be viewed as a form of social short-sightedness.

Frederick (2005) developed the cognitive-reflection task (CRT), three questions designed to test subjects' ability to overcome the intuitive but incorrect answer in order to think through the problem to arrive at the correct answer. Poor performance on the CRT has come to be interpreted as an indication of impulsiveness and predicts a wide range of behaviors, including low trust (Corgnet et al., 2016), susceptibility to the base-rate fallacy and other cognitive biases that involve a correct solution (Hoppe and Kusterer, 2011). Most relevant for our study, Frederick (2005) and Oechssler et al. (2009) both find that subjects with higher CRT scores are more likely than low-CRT subjects to choose a later, larger reward over the more immediate, smaller reward.

Because the decision to get a permanent-ink tattoo, particularly a visible tattoo, may have been made impulsively with little thought given to future employment consequences, we hypothesize that a tattoo will be associated with fewer correctly answered CRT questions.

The widespread use of the CRT in academic studies, including those on MTurk, means that many have become familiar with the questions. We took several measures to combat this. First, we disguised two of the original three questions by changing both the numbers and the context (e.g., instead of the prices of a bat and ball, ours involves a fast-food vendor's costs of a hamburger and fries combo meal). Second, we also included a version of a newer, less familiar, fourth CRT question introduced by Thomson and Oppenheimer (2016).[6] Finally, for each CRT question, we asked subjects at the end of the survey whether they had previously seen the question, thereby allowing us to control for familiarity when evaluating their CRT performance.[7]

Our questionnaire concludes with an in-depth portion on tattoos. For each tattooed subject, we learn how many tattoos they have in total, of which how many can be readily hidden with clothing and how many are visible; on which body parts they have tattoos; the motives for getting the hidden and visible tattoos; how long they contemplated their first tattoo; when they got their most recent tattoo; whether they have removed or considered removing any tattoos; and how likely they are to get a tattoo within the next year. For the non-tattooed, we also ask this latter question in addition to questions about how much thought they have given to getting a tattoo and the considerations relevant to their choice not to get one.

### 2.2. Procedures

Upon completion of the experiment, a flat payment of $1.25 USD was credited to each participant's MTurk account and one of the ten pairs from the time-preferences experiment was independently and randomly selected. The option chosen by the subject for the randomly selected pair determined the amount and timing of this additional payment. The payment from the two honesty experiments (not reported here) was always made within 18 h of completion, along with the time-preferences payment if Option A was selected for the randomly chosen pair; otherwise, the amount from Option B was deposited in the subject's account three weeks later.

One noteworthy feature of our time-preferences experiment that is commonplace although by no means ubiquitous is the front-end delay associated with payment of Option A. Instead of offering the $1 payment immediately, we incorporated an 18-h delay in order to generate variance in our dependent measure by avoiding the well-documented and overwhelming preference for immediate smaller rewards over larger distant ones (see, e.g., Thaler, 1981; Horowitz, 1991 for experimental evidence on immediacy effects) and to equalize the perceived risk of non-payment (see Coller and Williams, 1999, Harrison et al., 2002), which may be particularly relevant in online experiments in which the researchers are anonymous vis-à-vis the participants. To convey our genuine intent to carry out the payments as described, we reassure subjects in the first page of instructions. Specifically, we write, "Please be assured that everything stated in the instructions is accurate and true, including the method to determine your payment. Deception is strictly forbidden in economic research." In the event that

[4] All three questions as well as the questions for the health and social domains appear in the Appendix.

[5] Examples include the resignations of New Hampshire Rep. Robert Fisher and Liberal Party candidate for member of the Canadian parliament, Ala Buzreba. The former was found to be the creator of the misogynistic Reddit forum "The Red Pill", while the latter had posted offensive tweets as a teenager.

[6] In this question, subjects are told that they are competing in a five-mile race and, in the final mile of the run, have passed the person in 96th position (2nd position in the original). "In which position did you finish?" See the Appendix for this and the other three questions.

[7] In line with Stagnaro et al. (2018), we find that familiarity with the CRT questions does not improve performance.

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they do not receive their promised payment on time, we invited subjects to contact one of the researchers (Ruffle) by email or telephone.[8]

## 3. Results

### 3.1. Summary statistics

One thousand one hundred four (1104) respondents who all live in the U.S. participated in our study. Seven hundred eighty-one (781) reported having no tattoos (abbreviated henceforth as "non-tattooed"), while 255 indicated having one or more tattoos, all of which can be easily hidden with clothing (e.g., a long-sleeve shirt or long pants) (referred to as "hidden tattooed" or simply "hiddens"). The remaining 68 subjects reported having at least one visible tattoo (e.g., face, neck, hand) (referred to as "visibly tattooed" or "visibles"). This amounts to 30% of our sample being tattooed. If we restrict attention to ages 26–40 years old for comparability with the (40%) statistic cited in our opening paragraph, 34% of our sample is tattooed.

Nearly twice as many women are tattooed (39%) as men (21%).[9] This holds true for the rates of both hidden (30.2% vs. 16.7%) and visible tattoos (8.5% vs. 4.1%). Moreover, the visibly tattooed report 9.6 tattoos on average (median of 3.5 tattoos), four times more than the mean number of tattoos (2.4) for those with only hidden tattoos (median of 1 tattoo).

There is some modest regional variation with 33.5% tattooed in Midwestern states, 29.1% in Northeastern states and about 27.5% in Southern and Western states. Summary statistics appear in the left column under each tattoo status of Table 2, Panel A for all of the other socio-demographic controls included in our regression analyses (to be discussed in Section 3.2). Although the age, income and employment status distributions of the non-tattooed, hiddens and visibles are not statistically different from one another at conventional significance levels,[10] the visibles report significantly lower educational attainment.[11] The visibly tattooed report higher levels of religiosity than the non-tattooed and hidden tattooed on all three measures collected. In particular, the visibly tattooed report significantly stronger beliefs in God than the non-tattooed and hidden tattooed (Wilcoxon $p$-values .05 and .02, respectively) and stronger religious beliefs than the hidden tattooed ($p = .08$).[12] Finally and consistent with evidence that the tattooed are more likely to engage in risky behaviors (e.g., Deschesnes et al., 2006), we find that the visibly tattooed report a significantly higher willingness than the non-tattooed to take risks ($p = .02$).

With some notable differences, the characteristics of our sample broadly reflect those of the U.S. population. Specifically, the geographic dispersion of our subjects (17.8% Northeast vs. actual 17.4%; 23.8% Midwest vs. 21.0%; 41.1% South vs. 37.9%; 17.3% West vs. 23.7%) and the percentage of whites in our sample (77.4% vs. 76.9%) mirror closely those of the U.S. population more generally, according to 2016 U.S. census data. The most obvious dimension along which our sample differs from the broader population is its exclusion of the 13% of Americans who do not use the internet. In addition, women, blacks, Hispanics and especially seniors are under-represented in our sample, whereas men, Asians and 25–44 year-olds are slightly over-represented. With 99.6% of our sample having completed high school and 55.5% with a college degree (vs. 86.7% and 29.8%, respectively, in the U.S. population), our sample is considerably more educated than the U.S. population as a whole.[13] Finally, our sample is considerably less Christian (37.3%), with much higher percentages claiming to be atheist (20.1%), agnostic (19.0%) or no religion (9.2%) than the findings of the American Religious Identification Survey (2008), which reports 76.0% Christian and only 15.0% atheist, agnostic or no religion (see Kosmin et al., 2009).

The first three rows of Table 2, Panel B display the distribution of subjects' choices in the time-preferences task by tattoo status according to whether they switch to Option B and remain there through Pair 10, never switch to Option B or switch to Option B and irrationally back to Option A at least once. While similar percentages of non-tattooed and hiddens (about

[8] Andreoni and Sprenger (2012) employ a similar procedure to enhance the experimenters' trustworthiness in the eyes of their subjects.

[9] The higher incidence of tattoos among women finds support in a poll conducted by the U.S. TV network behind the show "Best Ink" and Lightspeed Research according to which women are about 50% more likely than men to have one or more tattoos (Sinha-Roy 2012).

[10] We also mapped each participant's indicated occupation into one of the 16 career clusters (industries) used by the Bureau of Labor Statistics. The Kruskal-Wallis test cannot reject that the sample industry distributions of the non-tattooed, hiddens and visibles are drawn from the same population distribution ($p = .88$).

[11] French et al. (2016) find that the tattooed report lower earnings, higher unemployment and lower educational attainment than the non-tattooed in national longitudinal datasets from the U.S. and Australia. See Tables 1 and 4 in their paper. Based on a representative Dutch panel, Dillingh et al. (2018) show that the (visibly) tattooed have lower educational outcomes and a higher chance of being unemployed, but not significantly lower earnings.

[12] This is striking in light of the views of traditional Judaism and Islam which forbid tattoos and many Christians who take exception to tattoos citing Leviticus 19:28: "Do not cut your bodies for the dead or put tattoo marks on yourselves. I am the Lord." Moreover, Degelman and Price (2002) find that the tattooed are perceived as less religious. Koch et al. (2004) show that, among students at a southwestern U.S. university, religious faith has a weak negative correlation with having a tattoo, whereas church attendance or frequency of prayer did not predict tattoo incidence. Both studies were conducted more than a decade ago when tattoos were considerably less mainstream. Dillingh et al. (2018) find that the tattooed are, on the one hand, less likely to believe in God and pray less often, but, on the other hand, just as likely to believe in the afterlife and possess stronger beliefs in reincarnation and karma. None of these studies distinguishes between hidden and visible tattoos, although the latter study has the data to do so.

[13] Sources: The comparative U.S. population data for age, sex, geographic distribution, ethnicity and education comes from the U.S. Census Bureau, 2016 Annual Social and Economic Supplement. For a summary, see, for example, https://www.census.gov/quickfacts/fact/table/US/PST045216. Detailed data on the U.S. age distribution can be found at https://www.census.gov/content/dam/Census/library/publications/2011/dec/c2010br-03.pdf. The internet usage data come from Pew Research Center's 2016 annual survey and are summarized in Anderson and Perrin (2016).

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**Table 2**
Summary statistics by tattoo status.

| Panel A: Socio-demographic characteristics | | | | | | | |
|---|---|---|---|---|---|---|---|
| Variable | No Tattoo | | Hidden | | Visible | | Kruskal–Wallis $\chi^2(2)$, $p$-value |
| | Full | Restricted | Full | Restricted | Full | Restricted | |
| Female | .41 (0.49) | .41 (0.49) | .62 (0.49) | .62 (0.49) | .65 (0.48) | .70 (0.46) | 42.5 $p < .01$ |
| Age (years) | 35.6 (11.2) | 35.6 (11.2) | 33.8 (8.3) | 33.9 (8.3) | 32.5 (8.8) | 33.1 (9.0) | 4.3 $p = .12$ |
| Education | 2.80 (0.64) | 2.79 (0.64) | 2.73 (0.61) | 2.72 (0.61) | 2.60 (0.63) | 2.56 (0.62) | 7.5 $p = .02$ |
| Income | 3.46 (1.51) | 3.44 (1.51) | 3.41 (1.44) | 3.41 (1.43) | 3.16 (1.47) | 3.07 (1.31) | 3.9 $p = .14$ |
| Employed F/T | 63.5% | 63.2% | 61.2% | 61.1% | 57.4% | 57.4% | 2.6 $p = .27$ |
| Employed P/T | 16.3% | 16.3% | 17.3% | 17.1% | 19.1% | 18.0% | |
| Retired | 2.6% | 2.5% | 2.0% | 2.0% | 1.5% | 1.6% | |
| Unemployed | 13.2% | 13.4% | 16.5% | 16.7% | 14.7% | 14.8% | |
| Student | 4.5% | 4.6% | 3.1% | 3.2% | 7.4% | 8.2% | |
| Strength of Religious Beliefs | 3.12 (2.24) | 3.08 (2.23) | 2.87 (2.15) | 2.87 (2.16) | 3.40 (2.21) | 3.21 (2.19) | 3.6 $p = .17$ |
| Church Attendance | 2.10 (1.64) | 2.06 (1.60) | 1.82 (1.38) | 1.81 (1.37) | 2.10 (1.73) | 1.79 (1.38) | 4.7 $p = .09$ |
| Belief in God | 3.69 (2.50) | 3.65 (2.50) | 3.53 (2.39) | 3.54 (2.40) | 4.29 (2.37) | 4.16 (2.42) | 5.1 $p = .08$ |
| Risk-taker | 5.88 (2.61) | 5.87 (2.61) | 6.13 (2.66) | 6.12 (2.66) | 6.66 (2.66) | 6.57 (2.75) | 6.6 $p = .04$ |

| Panel B: time preferences by tattoo status | | | |
|---|---|---|---|
| Choice | No tattoo | Hidden | Visible |
| % Switch (Pairs 1–10) | 83.2% | 82.8% | 72.1% |
| % Never Switch (Pair 11) | 15.0% | 16.1% | 17.7% |
| % Multiple Switches | 1.8% | 1.2% | 10.3% |
| Mean Switching Pair | 6.56 (3.22) | 7.02 (3.06) | 8.38 (2.21) |

*Notes Panel A:* For each tattoo status, the left column reports the mean (s.d.) of the socio-demographic controls for the full sample (n = 1104), while the right column excludes subjects who made multiple switches in the time-preferences experiment (n = 1080). Education, Income, Strength of Religious Beliefs, Church Attendance and Belief in God are categorical variables. Higher values correspond to more of the reported characteristic. The distribution of Employment Status is broken down according to full-time (F/T) employment, part-time (P/T) employment, retired, unemployed and student. The values of the willingness-to-take-risks question range from 0 (not willing) to 10 (very willing). See the Appendix for the questions and response categories. The Kruskal–Wallis test results are based on the full sample.
*Notes Panel B:* Distribution of switching choices (first three rows) and mean switching pair (s.d.) (fourth row).

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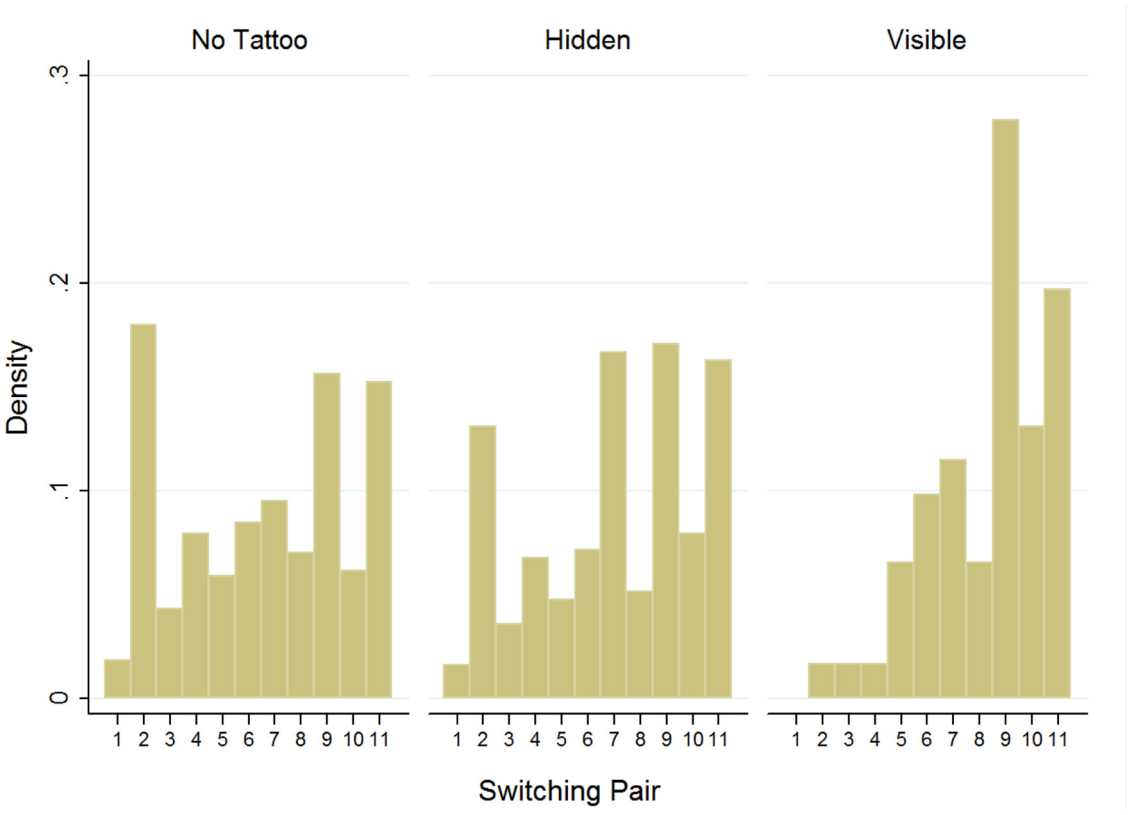


**Fig. 1.** Histograms of switch to option B by tattoo status.
*Notes*: Histograms of the pair at which subjects switch from Option A ($1 payable in 18 h) to Option B (an ever-increasing amount payable in 3 weeks). The choice never to switch to Option B is coded as pair 11.

83%) switch once to Option B, the percentage among the visibles (72%) is noticeably lower. At the same time, only tiny percentages (1.8% and 1.2%, respectively) of the non-tattooed and hiddens switch multiple times compared to a full one in ten (10.3%) of the visibles who do so.[14] The non-parametric, rank-order Kruskal–Wallis test reveals that these distributions by tattoo status differ significantly from one another ($\chi^2(2) = 2.92,\ p = .04$). This initial evidence suggests that the visibles exhibit less rational decision-making on average than the hiddens and non-tattooed.

The regressions on the pair at which a subject switches from Option A to Option B (reported in the next subsection) necessarily drops those subjects who switch multiple times. The right column ("Restricted") under each tattoo status in Table 2, Panel A reports the summary statistics for the socio-demographic variables on the remaining sample. Because fewer than two percent of the non-tattooed and hiddens switch more than once, these values are virtually unchanged from those reported on the full sample, whereas a couple of the values for the visibles change more substantially (e.g., church attendance is lower and percentage female even higher).

The fourth row of Table 2, Panel B reports the mean switching pair by tattoo status among subjects who did not switch multiple times, where those who chose Option A through all 10 pairs are coded as pair 11. The non-tattooed switch at pair 6.56 on average, about half a pair earlier than the hidden tattooed (7.02) and nearly two full pairs before the visibly tattooed (8.38). Interpolating the dollar amounts between pairs, the non-tattooed require about $1.55 on average to switch to Option B, while the visibles demand over $2, about one-third more. Fig. 1 displays the full distributions of switching pairs by tattoo status. Most striking is the 18% of non-tattooed subjects who already switch at Pair 2, compared to 13% of hiddens and a mere 1.6% of visibles. At the other end of the distribution, 61% of the visibles either wait until Pairs 9 or 10 to switch or never switch at all. By contrast, only 37% of the non-tattooed wait so long before switching. Pairwise Wilcoxon rank-sum tests strongly reject the equality of the distributions of switching pairs for the non-tattooed and visibly tattooed samples and for the hidden and visible samples ($p < .01$ in both cases) and weakly rejects their equality for the non-tattooed and hidden samples ($p = .06$).

Fig. 2 displays the robustness of our main finding that tattooed subjects are more short-sighted for different age cohorts. We divide the observations in the 26–40 age cohort into two roughly equally sized groups, ages 26–31 ($N = 330$) and ages

[14] Overall, 24/1104 (2.17%) of our MTurk subjects switched multiple times. In their original experiment, Coller and Williams (1999) report a similar fraction of multiple switchers (4/199 or 2.01%) among university business students.

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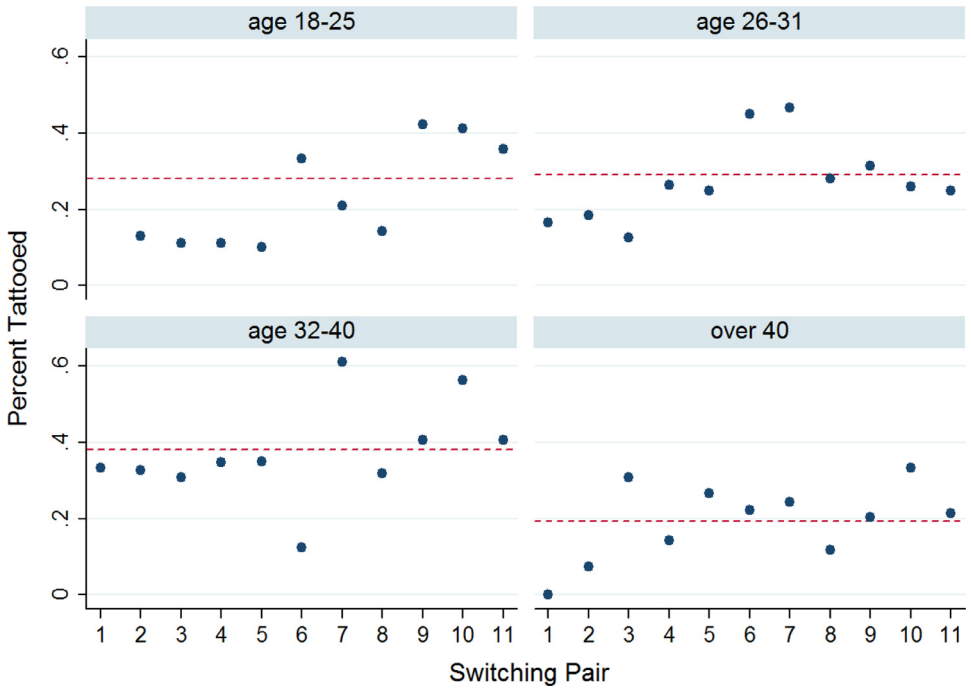


**Fig. 2.** Percentage of tattooed by switching pair and age Cohort.
*Notes:* The dashed line reveals the fraction of tattooed subjects in the given age cohort. For each switching pair, the dot's height shows the fraction of tattooed among the total subjects that switched from Option A to B at this pair.

**Table 3**
Other measures of short-sightedness.

| Domain | Question | No Tattoo | Tattoo – Hidden | Tattoo–Visible |
|---|---|---|---|---|
| Financial | No Retirement Savings | **1.04 (0.73)** | 1.13 (0.70) | 1.22 (0.75) |
| | Late credit card | **1.52 (0.95)** | 1.63 (0.99) | 1.66 (1.09) |
| | Poor Finances | **2.05 (0.82)** | 2.18 (0.75) | 2.10 (0.69) |
| Health | Overeat | 2.20 (1.10) | 2.27 (1.17) | 2.43 (1.29) |
| | No Exercise | 2.46 (1.21) | 2.52 (1.17) | 2.28 (1.22) |
| | Alcohol | **1.96 (1.16)** | 2.26 (1.28) | 2.25 (1.41) |
| | Smoke | **0.72 (1.06)** | **1.20 (1.16)** | **1.50 (1.14)** |
| Social | Personal | **3.36 (2.10)** | **4.11 (2.43)** | **4.34 (2.57)** |
| | Controversial | **4.12 (2.61)** | **4.55 (2.62)** | **5.31 (2.68)** |
| | Good Time | 2.26 (1.55) | 2.33 (1.44) | **2.79 (1.74)** |

*Notes*: Entries are mean responses (standard deviations) to the indicated question. Exact questions appear in the Appendix. Bold entries are significantly different from the others (Wilcoxon–Mann–Whitney rank-sum test).

32–40 ($N = 333$). The remaining age cohorts are ages 18–25 ($N = 171$) and above 40 ($N = 270$). The horizontal dashed lines reveal the fraction of subjects that are tattooed in each age cohort. The highest incidence of tattoos (38.1%) is observed among 32- to 40-year-olds. Above 40, the incidence of tattoos drops 19 percentage points to 19.3%. The height of each observation (dot) shows the fraction of tattooed subjects among the total number of subjects that switched from Option A to Option B at the indicated pair. What stands out in all four age cohorts is the increasing fraction of tattooed subjects as the switching pair increases. In particular, the tattooed tend to be under-represented (relative to their proportion in each age cohort) among those subjects who are more future-oriented and switch early (pairs 1–5). At the same time, the tattooed tend to be over-represented in each age cohort among those who are heavily present-oriented and switch late (pairs 9–11).

Table 3 provides further evidence of the short-sightedness of the tattooed in the financial, health and social domains. The entries indicate the mean response (standard deviation) for each domain-specific question. All of the responses are coded such that larger values correspond to increased short-sightedness. For all behaviors in all domains, both the hidden and visibly tattooed display more short-sightedness than the non-tattooed.[15] The bold entries are significantly different from the others in the same row according to pairwise Wilcoxon rank-sum tests. Thus, for example, the non-tattooed report saving

[15] The single exception is that the visibly tattooed exercise more regularly on average than the non-tattooed; although the difference is not statistically significant ($p = .21$).

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**Table 4**
CRT – Percent correct by tattoo status.

| Question | Topic | No tattoo | | | Hidden tattoo | | | Visible tattoo | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Correct | Intuitive | Wrong | Correct | Intuitive | Wrong | Correct | Intuitive | Wrong |
| CRT 1 | Hamburger & Fries | 47.9% | 49.3% | 2.8% | 35.7% | 62.0% | 2.4% | 22.1% | 66.2% | 11.8% |
| CRT 2 | Spanish moss doubles | 62.9% | 28.2% | 9.0% | 54.9% | 37.7% | 7.5% | 33.8% | 52.9% | 13.2% |
| CRT 3 | 5 printers, 5 minutes | 59.9% | 31.9% | 8.2% | 49.4% | 36.9% | 13.7% | 39.7% | 45.6% | 14.7% |
| CRT 4 | Pass 96th position | 56.5% | 39.1% | 4.5% | 45.5% | 49.4% | 5.1% | 45.6% | 45.6% | 8.8% |
| All Correct | | | 30.2% | | | 21.2% | | | 13.2% | |
| All Incorrect | | | 17.3% | | | 26.7% | | | 38.2% | |

*Notes*: For each of the four CRT questions, the entries indicate the percentages of subjects who answered the question correctly; who gave the intuitive, but incorrect answer; and who gave an unintuitive, incorrect answer, by tattoo status. The percentages of subjects that answered all 4 correctly ("All Correct") and all 4 incorrectly ("All Incorrect") are also given.

more for retirement, make fewer late credit-card payments and better manage their debt and finances than the hiddens and visibles, while these latter two groups are not significantly different from one another along any of these financial measures. The non-tattooed also report drinking and smoking significantly less and are significantly less likely to post personal or controversial statements online than the hiddens and visibles; hiddens also report significantly less smoking and both online behaviors than do the visibles. Finally, the non-tattooed and hidden tattooed report significantly less willingness to sacrifice their future for a good time now than the visibly tattooed.

The percentages of subjects that correctly answered each of the four CRT questions appear in the left-most columns in Table 4 according to tattoo status. The non-tattooed show higher rates of success at all four questions than the hidden tattooed who do better than the visibly tattooed at the first three questions and match their success rate at the fourth question. Quite starkly, the modal number of correctly answered questions is all four for the non-tattooed (30.2% of subjects) versus zero correct answers for the hidden (26.7%) and zero for the visibly tattooed (38.2%).

While incorrect CRT answers are often thought to reflect intuitive or impulsive thinking, it is also possible to give an incorrect, but unintuitive answer. The middle and right-most columns in Table 4 distinguish between subjects who gave the intuitive, incorrect answer ("Intuitive") and those who gave some other unintuitive answer ("Wrong"). For CRT questions 1, 2 and 4, compared to the non-tattooed, the hiddens have a much higher rate of intuitive, incorrect answers along with a similar rate of other unintuitive answers, whereas the visibles have higher percentages of both types of incorrect answers than the non-tattooed for all CRT questions. This suggests that both hiddens and visibles exhibit a tendency to answer impulsively, without sufficient deliberation.

Taken together, we have seen compelling evidence across varying decision types and behavioral domains that those with tattoos, especially visible ones, are more short-sighted and impulsive than the non-tattooed. Next, we conduct robustness tests controlling for a host of other explanatory variables (e.g., motives for getting a tattoo, the time spent contemplating first tattoo, time elapsed since most recent tattoo) to determine whether they attenuate these results.

### 3.2. Tattoos and time preferences

Regression (1) in Table 5 reports the results from a simple OLS regression on the pair at which subject $i$ switched from Option A to Option B (multiple switchers are excluded, those who never switched to Option B are coded as 11).[16] Indicator variables for hidden and visible tattoos and a constant (no tattoo) are the only regressors. Heteroskedasticity-robust standard errors appear in parentheses. Both the estimated coefficients of 0.46 and 1.82 on the "Hidden" and "Visible" indicators, respectively, are significantly different from zero ($p = .04$ and $p < 0.01$), implying the hiddens and visibles switch about half a pair and nearly two pairs later, respectively, than the non-tattooed. The difference between Hidden and Visible of 1.36 pairs is also significant ($p < .01$).

We saw that the visibles have four times as many tattoos on average as the hiddens. Perhaps the Hidden-Visible distinction in (1) serves as a proxy for the number of tattoos. After controlling for subject $i$'s number of tattoos in regression (2), the estimates on Hidden and Visible remain unchanged, while the number of tattoos is not significantly different from zero. Allowing for a non-linear relationship between the number of tattoos and the switching pair by including a squared term for the former measure increases slightly both the Hidden and Visible estimates in (3), while neither the number of tattoos nor the squared term offers any explanatory power.[17]

[16] For the 15.4% of the subjects who never switch to Option B, their decision to switch is censored. Coding this decision as "11" possibly underestimates their reluctance to switch. The significance and non-significance of all our variables of interest remain unchanged if we exclude these subjects from the analysis or replace the OLS regressions with double-sided Tobit regressions with left censoring at 1 and right censoring at 11. Similarly, the results from Poisson regressions are unchanged.

[17] All of the estimates and their (non-)significance in these and all other regressions remain qualitatively the same if we exclude the three subjects in our sample with more than 34 tattoos, which is two standard deviations above the mean number of tattoos among the tattooed.

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**Table 5**
OLS regressions on switching pair.

| Variable | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| Hidden | 0.46** | 0.47** | 0.53** | 0.51** | 0.33 | 0.25 | 0.79** |
| | (0.23) | (0.23) | (0.24) | (0.024) | (0.25) | (0.25) | (0.39) |
| Visible | 1.82*** | 1.87*** | 1.99*** | 1.91*** | 1.72*** | 1.57*** | 2.05*** |
| | (0.30) | (0.32) | (0.38) | (0.38) | (0.40) | (0.41) | (0.51) |
| Tattoos | ___ | −0.004 | −0.029 | −0.027 | −0.024 | −0.026 | −0.017 |
| | | (0.005) | (0.035) | (0.034) | (0.032) | (0.035) | (0.034) |
| Tattoos$^2$ | ___ | ___ | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Take Risks | ___ | ___ | ___ | 0.084** | 0.093** | 0.072* | 0.092** |
| | | | | (0.038) | (0.039) | (0.040) | (0.040) |
| 1 CRT correct | ___ | ___ | ___ | ___ | ___ | −0.66** | ___ |
| | | | | | | (0.32) | |
| 2 CRT correct | ___ | ___ | ___ | ___ | ___ | −0.55* | ___ |
| | | | | | | (0.33) | |
| 3 CRT correct | ___ | ___ | ___ | ___ | ___ | −0.64** | ___ |
| | | | | | | (0.32) | |
| 4 (All) CRT correct | ___ | ___ | ___ | ___ | ___ | −1.34*** | ___ |
| | | | | | | (0.31) | |
| Constant | 6.56 | 6.56 | 6.56 | 6.06 | 8.75 | 9.18 | 9.04 |
| | (0.12) | (0.12) | (0.12) | (0.25) | (1.33) | (1.28) | (1.41) |
| Motives for Tattoo included | No | No | No | No | No | No | Yes |
| Socio-demo controls included | No | No | No | No | Yes | Yes | Yes |
| $R^2$ | .019 | .019 | .020 | .024 | .054 | .073 | .063 |
| N | 1080 | 1080 | 1080 | 1080 | 1047 | 1047 | 1047 |
| Hidden = Visible | $p < .01$ | $p < .01$ | $p < .01$ | $p < .01$ | $p < .01$ | $p < .01$ | $p < .01$ |

*Notes*: Dependent variable: pair at which subject switched from Option A to Option B in incentivized time-preferences experiment. "Hidden" and "Visible" are indicators for whether the subject has tattoos, all of which can be readily hidden with clothing, or at least one visible tattoo, respectively. "Tattoos" and "Tattoos$^2$" are the subject's number of tattoos and number of tattoos squared, respectively (equal to zero if not tattooed). Socio-demographic controls: age, sex, educational attainment, employment status, income, U.S. census region, strength of religious beliefs, church attendance. Regression (7) includes indicator variables for each of the ten motives for getting a tattoo as well as "other" (see the Appendix for the list of motives). Heteroskedasticity-robust standard errors in parentheses. The last row reports the *p*-value from a *t*-test of coefficients that Hidden = Visible.

*** significant at the one-percent level.

** significant at the five-percent level.

* significant at the ten-percent level.

The subject's stated willingness to take risks is added as a regressor to regression (4). An additional increment in his/her preparedness to take risks corresponds to switching to Option B 0.84 pairs later ($p = 0.03$). In words, risk-taking and short-sightedness are positively correlated.[18]

Regression (5) also includes a host of socio-demographic controls: the subject's age, education, sex, income, employment status, census region, frequency of church attendance and strength of religious beliefs. Older and more educated subjects switch to Option B sooner (i.e., are more future-oriented), while stronger religious beliefs predict later switching (i.e., more present-oriented). The coefficient of 1.72 on Visible remains highly significant with the inclusion of these controls, whereas the Hidden estimate falls to 0.33 and is no longer significant ($p = 0.18$).[19]

### 3.3. Tattoos and impulsivity

Is impulsivity the source of tattooed individuals' observed short-sighted preferences in our incentivized experiment? To address this possibility, we include indicator variables for the subject's number of correctly answered CRT questions in regression (6). The narrowly varying estimates from −0.55 to −0.66 (*p*-values from .04 to .09) on one, two and three correctly answered questions imply that subjects who correctly solved one, two or three questions switched to Option B about half a pair earlier than subjects who got all four questions wrong. The absolute magnitude of the coefficient on

[18] This result contrasts with several papers in which more risk aversion is associated with higher rates of discounting the future (e.g., Anderhub et al. 2001, Eckel et al. 2005, Andersen et al. 2008). To reconcile this discrepancy, we note that these papers elicit subjects' risk preferences by having them choose how much of their endowment to invest in a risky financial asset or choose between pairs of risky and relatively safe lotteries. By contrast, our risk measure asks whether the subject is "generally a person who is fully prepared to take risks". Subjects likely have in mind risks that pose a danger to their physical well-being when responding to this question, rather than financial risk.

[19] Further regression analyses in which we include different subsets of the socio-demographic controls lead to the conclusion that no single regressor is responsible for the lack of significance of the Hidden variable. In fact, the three regressors age, education and income are all necessary to render the estimate on Hidden non-significant. Excluding any one of these three variables restores the significance of the Hidden estimate. None of the other variables related to religiosity, region or sex detract from the significance of Hidden.

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**Table 6**
Distribution of reasons for getting a tattoo.

| Motive | Hidden | Visible |
|---|---|---|
| Expression of Individuality | 119 (46.7%) | 30 (44.1%) |
| Like the Way the Tattoo Looks | 119 (46.7%) | 20 (29.4%) |
| Statement of Personal Identity | 90 (35.3%) | 20 (29.4%) |
| Remember Particular Time | 77 (30.2%) | 17 (25.0%) |
| Memorialize Loved One | 51 (20.0%) | 11 (16.2%) |
| Impulsive Decision | 36 (14.1%) | 11 (16.2%) |
| Create Certain Image of Me | 25 (9.8%) | 8 (11.8%) |
| Other | 9 (3.5%) | 7 (10.3%) |
| Most Friends are Tattooed | 9 (3.5%) | 1 (1.5%) |
| Belong to Group who are Tattooed | 2 (0.8%) | 3 (4.4%) |
| Political/Environmental Statement | 2 (0.8%) | 2 (2.9%) |

*Notes:* Number of subjects (percentages) that selected each motive for getting their hidden tattoos and again separately for their visible tattoos. Percentages sum to greater than 100% because they could select more than one motive for each tattoo category.

all four correct answers increases to -1.34 ($p < .01$), indicating that these subjects switched 1.34 pairs before those who answered zero correctly. Moreover, these former subjects switched earlier than those who answered one, two or three correctly ($p \leq .01$ or less for all pairwise t-tests). The inclusion of these CRT dummies reduces only modestly the magnitudes of the Hidden and Visible coefficients. The estimate of 0.25 on Hidden continues to be nonsignificant ($p = .32$), while Visible (1.57) remains significantly different from zero and from the Hidden estimate ($p < .01$ in both cases).[20] Hence, even after accounting for impulsivity, the visibly tattooed are more short-sighted than the hidden tattooed and the non-tattooed.

### 3.4. Motives for getting tattooed

All reasons for getting a tattoo may not be equally short-sighted. Some may be better thought out than others. For example, a tattoo to memorialize a loved one or to remember a certain time period in life may be more meaningful, carefully considered and forward-looking than a tattoo decided upon spontaneously, without reason or because one's friends are tattooed. We asked tattooed subjects to choose as many reasons as applicable for their hidden tattoos and separately for their visible ones. We provided ten reasons and, in case we missed any, added "Other" along with a textbox. Table 6 displays the distributions of reasons for getting a tattoo separately for individuals' hidden and visible tattoos. "Expression of individuality" and "Like the way the tattoo looks" were the most commonly cited reasons for hidden tattoos. For visible tattoos, these two reasons were cited as the most and second-most common motives, respectively, along with "statement of personal identity", which tied for second. Other reasons provided by at least 10% of the tattooed respondents were (in descending order) "to remember a particular time in my life", "to memorialize a loved one", "as a snap or impulsive decision" and "to create a certain image of me".

Regression (7) in Table 5 includes indicators for all 11 reasons to determine whether some might mitigate the hereto observed short-sightedness associated with tattoos. None do. While the signs on these reasons vary from positive to negative, none is significantly different from zero.

Several of the ten reasons share common traits. For example, "expression of individuality", "statement of personal identity", and "to create a certain image of me" are all expressions of one's identity. Also, "to remember a particular time in my life" and "to memorialize a loved one" both invoke tattoos to remember something. Finally, getting a tattoo because "most friends are tattooed" or because one "belong[s] to a group who are tattooed" are both social reasons. In an effort to increase the statistical power of these motives, we combined the first three identity-related reasons into a single motive, and similarly for the two memory-based and the two socially motivated reasons.[21] Still none of these combined motives nor any of the individual motives is a significant predictor of time preference (results not shown, but available upon request).

### 3.5. Tattoos and domain-specific short-sightedness

We already saw evidence in Section 3.1 that the tattooed engage in more short-sighted behaviors in the financial, health and social domains. We will now employ seemingly unrelated regressions (SUR) to determine whether they exhibit more short-sightedness in one domain or another. SUR estimation offers efficiency gains over separate OLS equations by accounting for the cross-equation correlation in the error terms (Zellner, 1962).

[20] We asked subjects at the end of the survey whether they had previously seen the exact or some version of each of the CRT questions. The inclusion of indicator variables for the different responses for each CRT question are mostly non-significant and leave the Hidden and Visible estimates virtually unchanged.

[21] Similarly, Carmen et al. (2012) suggest that the motives for getting a tattoo "tend to fall into three categories: (a) a symbol of an important past event, love or friendship, (b) group membership, and/or (c) a marker of individuality."

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**Table 7**
Seemingly unrelated regressions for different domains of short-sightedness.

| Variable | Financial | Health | Social |
|---|---|---|---|
| Hidden | .126*** (0.049) | .178*** (0.038) | .138*** (0.047) |
| Visible | .121 (0.086) | .323*** (0.067) | .339*** (0.082) |
| Constant | .185 (0.058) | −0.310 (0.046) | −0.508 (0.041) |
| N | 1104 | 1104 | 1104 |
| Hidden = Visible | $p$=.96 | $p$ =.04 | $p$ =.02 |
| Breusch-Pagan test $\chi^2(2) = 78.3$, $p < .01$ | | | |

*Notes*: Seemingly unrelated regressions on subject *i*'s domain-specific standardized mean response for the financial, health and social domains. In addition to indicator variables for hidden and visible tattoos, domain-specific controls are included as regressors, but not reported. The second-to-last last row reports the $p$-value from Wald test of coefficients that Hidden = Visible. The Breusch–Pagan test rejects the independence of the residuals across the three equations.

To begin, we calculate each subject's standardized response to each domain-specific question by subtracting the question mean from the subject's response and dividing by the standard deviation. Next, we compute each subject's average domain-specific standardized response. Then, using SUR, we regress each subject's domain-specific average on indicators for Hidden and Visible, as well as other domain-specific controls. More precisely,

$$\overline{y_i} = \alpha_0 + \alpha_1 \cdot Hidden + \alpha_2 \cdot Visible + \alpha_3 \cdot X_i + \epsilon_i$$

where $\overline{y_i}$ is subject *i*'s domain-specific standardized mean response and $X_i$ is a vector of domain-specific controls, such as income for the financial domain, a dummy for overweight for the health domain, and time spent on social media for the social domain. The random error term is $\epsilon_i$.

Table 7 displays the estimates from the SUR model appear. By rejecting the independence of the cross-equation error terms, the Breusch–Pagan test ($\chi^2(2) = 78.3,\ p < 0.01$) validates the choice of the SUR model. Across all three domains, Hidden is positive and significantly different from zero, implying the hiddens are more short-sighted than the non-tattooed in all three domains. The Visible estimates are also all positive; however, the estimate of .121 in the financial domain is not significant ($p = 0.16$), while the estimates of .323 and .339 in the health and social regressions are highly significant. Not only are the visibles more short-sighted than the non-tattooed in the health and social domains, Wald tests of coefficients reveal that they are also more short-sighted than the hiddens in these domains ($p < 0.05$). These findings serve to validate our time discounting measure and our interpretation of the results from that measure that the visibles are more short-sighted than the hiddens who are more short-sighted than the non-tattooed. What is more, the finding that the visibles are even more short-sighted in the health and social domains than in the financial domain suggests that the results from our incentivized financial measure of short-sightedness may understate the extent to which visibles are more broadly short-sighted.[22]

## 4. Robustness checks

### 4.1. Gender

Next, we explore whether the observed present orientation and impulsiveness of the tattooed, especially the visibly tattooed, holds on different subsamples. To begin, does the relationship apply equally to both sexes? We have already noted that women are about twice as likely as men to have hidden and visible tattoos.[23] Regressions (8) and (9) in Table 8 report estimates from separate regressions on men and women, respectively. Both regressions reveal that visibly tattooed men and women switch to Option B significantly later, 1.92 and 1.43 pairs, respectively, than their non-tattooed, same-sex counterparts ($p < 0.01$ in both cases). Thus, a visible tattoo is unambiguously associated with more myopic time preferences for both sexes.

The findings for the hidden tattooed are not as definitive. Men with only hidden tattoos switch 0.67 pairs later than non-tattooed men ($p = 0.07$), whereas the miniscule estimate of −0.02 ($p = 0.94$) on the Hidden variable for women in (9) implies that there is no difference in the elicited time preferences between women with only hidden tattoos and those without tattoos.

As for impulsivity, Table 9 provides the mean CRT scores by sex and by tattoo status. Among men, the non-tattooed answer more questions correctly on average (2.54) than the hiddens (2.09) ($p < 0.01$ from Wilcoxon nonparametric test) who answer more questions correctly than the visibles (1.50) ($p = 0.07$). Among women, the visibles answer fewer questions

[22] This interpretation is reinforced by the finding that the subject's choice of switching pair in the incentivized experiment is more highly correlated with the subject's standardized mean response from the financial domain than from the health or social domain.

[23] Moreover, relative to the other sex, men tend to prefer tattoos on their biceps and shoulders, whereas women prefer tattoos on their upper and lower back and on their calves, ankles and feet.The full distribution of body parts on which our sample of men and women get tattooed is available upon request.

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**Table 8**
Separate OLS regressions for Men and Women.

| Variable | Men (8) | Women (9) |
|---|---|---|
| Hidden | 0.67* | −0.02 |
| | (0.36) | (0.32) |
| Visible | 1.92*** | 1.43*** |
| | (0.54) | (0.43) |
| Constant | 7.27 | 11.31 |
| | (1.55) | (0.90) |
| Risk, Socio-demo controls | Yes | Yes |
| $R^2$ | .067 | .064 |
| N | 552 | 493 |
| Hidden = Visible | $p$ =.04 | $p$ < .01 |

*Notes:* See Table 5 Notes.

**Table 9**
CRT scores by sex and tattoo status.

| Variable | Men | | | Women | | |
|---|---|---|---|---|---|---|
| | No Tattoo | Hidden | Visible | No Tattoo | Hidden | Visible |
| Out of 4 questions | 2.54 (1.40) | 2.09 (1.44) | 1.50 (1.41) | 1.89 (1.51) | 1.72 (1.51) | 1.36 (1.46) |
| All 4 Correct | 35.1% | 24.7% | 16.7% | 22.9% | 19.1% | 11.4% |
| All 4 Wrong | 12.1% | 18.6% | 29.1% | 24.8% | 31.2% | 43.2% |

*Notes:* Mean number of correctly answered questions (s.d.) (first row). Percentage of subjects that answered all four CRT questions correctly and all four incorrectly (last two rows).

**Table 10**
How long contemplated first tattoo by tattoo status.

| How long? | Hidden | Visible |
|---|---|---|
| Spontaneous | 38 (14.9%) | 12 (17.7%) |
| Day or two | 20 (7.8%) | 8 (11.8%) |
| Several days | 19 (7.5%) | 8 (11.8%) |
| Week or more | 29 (11.4%) | 13 (19.1%) |
| At least a month | 79 (31.0%) | 13 (19.1%) |
| More than year | 70 (27.5%) | 14 (20.6%) |
| Wilcoxon–Mann–Whitney test $z = 2.03$, $p = .04$ | | |

*Notes:* Distributions of lengths of time respondents contemplated their first tattoo before getting it done by tattoo status.

correctly (1.36) than the non-tattooed (1.89) ($p = 0.02$); however, there is no significant difference in performance between the hiddens (1.72) and the non-tattooed ($p = .25$).[24]

Overall, the picture that emerges is that both visibly and hidden tattooed men are more short-sighted and impulsive than their non-tattooed counterparts; yet, while visibly tattooed women are more short-sighted and impulsive than non-tattooed women, women with only hidden tattoos are not significantly different from non-tattooed women along either of these measures.

### 4.2. Tattooed only

In the tattoo portion of the survey, we directed several questions to the tattooed about their decision to get a tattoo. Their responses allow us to explore further the robustness of the observed behavioral differences between the hidden and visibly tattooed. To begin, we asked all tattooed subjects how long they contemplated their first tattoo before getting it done.[25] The distributions of responses for the hiddens and visibles appear in Table 10. What stands out about these distributions is that for the four shortest lengths of contemplation (i.e., “spontaneous”, “a day or two”, “several weeks” and “a week or more”), the percentage of visibles exceeds that of hiddens. By contrast, for the two longest timespans (i.e., “at least a month” and “more than a year”), the ordering reverses with the percentage of hiddens surpassing that of the visibles. The

[24] Elsewhere males have also been observed to perform better than females on the CRT test (see Brañas-Garza et al. 2015 for a recent survey as well as additional evidence on gender differences in CRT performance).

[25] The reason for asking about subjects’ first tattoo ought to be clear. Having gone through the process, subjects with multiple tattoos presumably devote less time to contemplating subsequent tattoos. Since the visibly tattooed have on average more tattoos, asking subjects about, say, their most recent tattoo would bias the results toward the visibles contemplating less their tattoo than the hiddens.

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**Table 11**
Time contemplated first tattoo regression.

| Variable | (10) |
|---|---|
| Visible | 1.47*** (0.35) |
| Contemplate - Day or two | −0.95 (0.70) |
| – Several days | −1.23** (0.62) |
| – Week or more | −1.00 (0.64) |
| – At least a month | −0.64 (0.47) |
| - More than year | −0.47 (0.51) |
| Constant | 12.14 (1.42) |
| Risk, Socio-demo controls | Yes |
| $R^2$ | .169 |
| N | 308 |

*Notes:* Dependent variable: pair at which subject switched from Option A to Option B in incentivized time-preferences experiment. See Table 5 Notes. "Contemplate" refers to how long subjects contemplated their first tattoo before getting it done. Indicator variables for five of the six response categories are included with "spontaneous" being the omitted category.

**Table 12**
Time elapsed since most recent tattoo regressions.

| Variable | (11) | (12) |
|---|---|---|
| Visible | 1.29*** (0.39) | 1.41*** (0.36) |
| Most Recent Tattoo – Between 1–3 years ago | 0.47 (0.63) | ___ |
| – Between 3–10 years ago | −0.17 (0.61) | |
| – Between 10–20 years ago | 0.14 (0.69) | |
| – More than 20 years ago | −0.21 (0.99) | −0.21 (0.78) |
| Constant | 1140 (1.39) | 11.32 (1.34) |
| Risk, Socio-demo controls | Yes | Yes |
| $R^2$ | .162 | .156 |
| N | 308 | 308 |

*Notes:* Dependent variable: pair at which subject switched from Option A to Option B in incentivized time-preferences experiment. See Table 5 Notes. "Most Recent Tattoo" refers to the timeframe in which subjects received their last tattoo. The omitted response category is "within the past year".

clear conclusion is that the visibles spent significantly less time contemplating their first tattoo than the hiddens (Wilcoxon test $z = 2.03,\ p = .04$) – yet further evidence of the impulsivity of the visibly tattooed.

Do subjects who contemplated their first tattoo longer display more future-oriented time preferences in our experiment relative to those whose decision to get a tattoo was spontaneous? The results from regression (10) in Table 11 provide only limited support for this hypothesis. It includes indicator variables for five of the six timespans listed in the question, with "I didn't give it much thought, it was done spontaneously" as the omitted response. While all of the timespan estimates are negative with respect to the omitted spontaneous decision, only the coefficient on "several days" of −1.23 differs significantly from zero. This estimate implies that subjects who contemplated their tattoo several days before following through switch to Option B 1.23 pairs earlier than those whose first tattoo was done spontaneously.

With the inclusion of these timespan indicators, the visibly tattooed remain significantly more present-oriented than the hiddens, switching to Option B about 1.5 pairs later than them.

Another robustness check centers on when the tattooed got their most recent tattoo. There exist two opposing hypotheses. On the one hand, individuals who got tattooed more than 20 years ago may be very short-sighted since they made their choice despite tattoos being heavily stigmatized at the time. On the other hand, the more time that has elapsed since the subject's most recent tattoo, the more time the subject has had to change and perhaps develop more patience.[26]

We asked tattooed subjects when they received their most recent tattoo. Regression (11) in Table 12 includes the timeframe in which subjects received their last tattoo. The response "within the past year" is omitted. The estimated coefficients are small and vary in sign from positive to negative. None is significantly different from zero.[27] Regression (12) combines all of the most-recent-tattoo timeframes of less than 20 years ago into a single category to contrast it with most recent tattoos obtained more than 20 years ago when tattoos were still unconventional. The estimate of −0.21 on this latter variable

[26] Hong et al. (2019) offer a self-signaling explanation that predicts that, among the tattooed, the longer ago they received their most recent tattoo, the less impatient they will be.

[27] Importantly, age is among the socio-demographic controls included in this and all other regressions. Without age, time elapsed since the most recent tattoo and age are confounded. Even without age, none of the estimates on the timeframe indicators differs significantly from zero. In a specification not shown, we also included interaction terms between each of the timeframe indicators and a dichotomous age variable equal to one for subjects older than 40 years of age; none of the timeframe indicators or the interaction terms is significantly different from zero.

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remains nonsignificant ($p = .79$). Highly significant estimates on the Visible indicator of 1.29 in (11) and 1.41 in (12) reveal that the visibles continue to be more short-sighted than the hiddens. In short, even though tattoos have gained mainstream acceptance, we present evidence that the more recently tattooed are every bit as short-sighted as those whose last tattoo was long ago when tattoos were stigmatized.[28]

## 5. Explanations

### 5.1. Causality

Are more short-sighted individuals more likely to get a tattoo, or does getting a tattoo lead to short-sightedness? More explicitly, it seems plausible that being more short-sighted leads one to get a tattoo (especially a visible one). On the other hand, it could be that getting tattooed leads one to become more short-sighted. A possible reasoning goes as follows: after getting tattooed one finds it difficult to obtain one's preferred job – perhaps due to discrimination against (visible) tattoos. As a result, one accepts a lesser paying job. Consequently, one is often engaged in the short-term thinking required to make ends meet with scarce resources to think about the future or saving for retirement.[29] This short-term thinking expresses itself in our time-preferences experiment. It is also possible that both directions of causality are operative. In particular, short-sightedness predisposes individuals to getting a tattoo, then outcomes linked to tattoos perpetuate further short-sightedness.

The reasoning for tattoos leading to short-sightedness is predicated on the tattooed earning less than the non-tattooed, an assumption that finds no support in our data. Table A.1 in the Online Appendix reports OLS regressions on subjects' reported net monthly income. The estimates reveal that the earnings of the hiddens and visibles are not significantly different from the non-tattooed, neither in the absence of any control variables (13) nor in the presence of the entire suite of socio-demographic and risk controls (14).[30] Regression (14) also shows that the pair at which subject $i$ switches to Option B is not a significant predictor of income ($p = .98$).

Even more direct evidence in support of the hypothesis that short-sightedness leads to tattoos rather than the other way around comes from subjects' responses to a question about their intent to get a tattoo within the coming year.

The distinction drawn thus far between the tattooed who chose to get one or more tattoos sometime in the past and the non-tattooed who have chosen not to get a tattoo right up to the present moment compares two sets of temporally incongruent decisions. Some non-tattooed individuals may be seriously contemplating getting tattooed, whereas some tattooed may be very different people today compared to when they got tattooed in the, perhaps distant, past.[31]

To compare the current attitudes toward tattoos of the tattooed and non-tattooed, we asked all subjects how likely they are to get a(nother) tattoo within the next year. Seven possible answers were provided ranging from "no chance whatsoever" and "highly unlikely" to "probably will" and "almost definitely will". Fig. 3 plots the mean switching pair (plus or minus one standard deviation) for each of the seven responses separately for the tattooed and non-tattooed. For both types, but especially the non-tattooed, the switch to Option B occurs later the greater one's intention to get tattooed in the year to come.

Regression (15) in Table 13 interacts the combined response category of "probably will" and "almost definitely will" (henceforth referred to as "highly likely") separately with the non-tattooed and the tattooed. The estimates reveal that the highly likely non-tattooed wait an additional two pairs before switching to Option B than the non-tattooed who are less likely to get tattooed. Put simply, the mere intent to get a tattoo is associated with increased short-sightedness. Meanwhile, the already tattooed individuals who are highly likely to get another tattoo in the next year wait 0.62 pairs more before switching to Option B than the tattooed who are less likely to get another tattoo ($p = .09$). Moreover, the time preferences of the tattooed and non-tattooed who are highly likely to get (another) tattoo within the next year are not significantly different from one another ($p = .20$). In words, regardless of current tattoo status, those intending to get a tattoo within the next year are more short-sighted. Combining this result with the most basic finding from the Results section, we conclude that, whether past or planned, tattoos are associated with more myopic time preferences.

Our finding that the mere intention to get a tattoo predicts short-sightedness and that this holds at least as strongly among the non-tattooed as the tattooed is not consistent with the "tattoos cause short-sightedness" direction of causality. Instead this result agrees with the notion that individuals who possess the trait of short-sightedness are more likely to get tattooed.

[28] We also explored whether the age at which one chose to first get tattooed predicts one's current time preferences. It does not. The analysis is available upon request or in the working paper version of this paper.

[29] Along similar lines, Shah et al. (2012) show that randomly endowing individuals with budgets of varying amounts leads those with limited resources to excessive borrowing.

[30] Consistent with our findings, French et al. (2016) and Dillingh et al. (2018) do not find that the tattooed earn significantly less than the non-tattooed after controlling for educational attainment and other socio-demographic characteristics. Unlike these authors, we do not find that the tattooed (hiddens or visibles) are less likely to be employed full-time nor are they more likely to be unemployed than the non-tattooed.

[31] Tattoo removal could equip us with a more current picture of tattooed individuals' attitudes toward tattoos; however, only seven subjects in our sample have ever had a tattoo removed.

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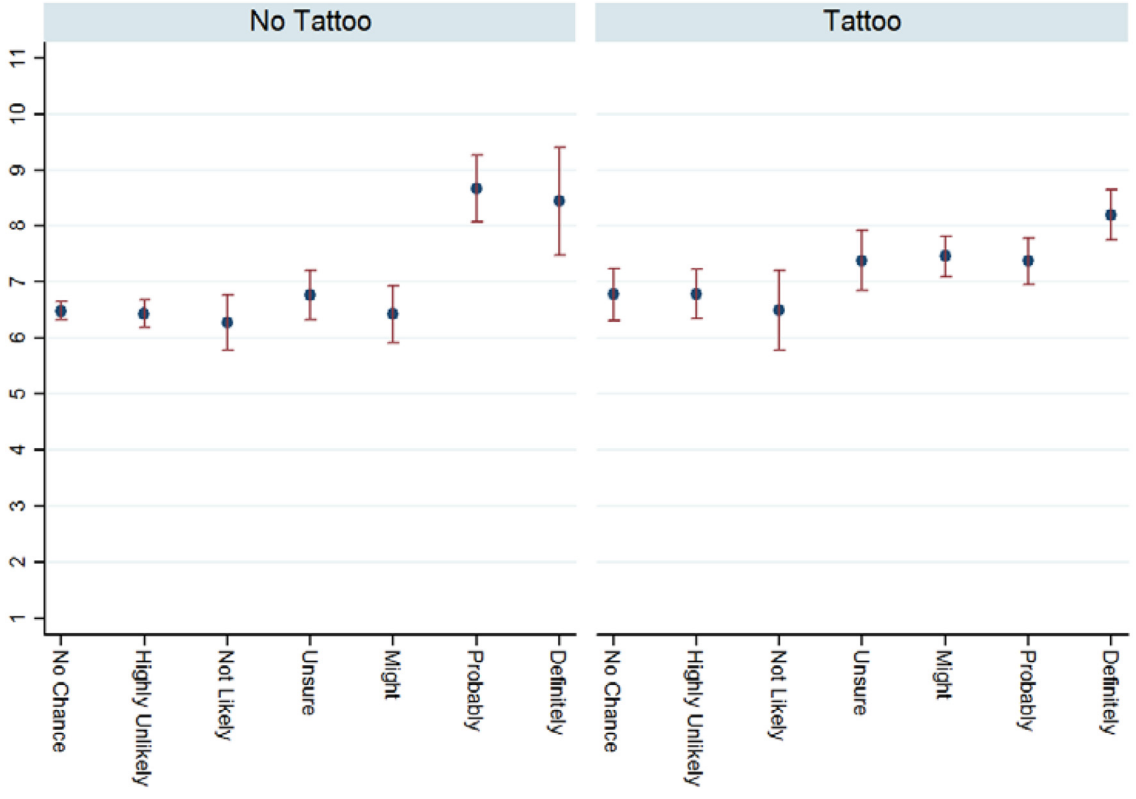


**Fig. 3.** Mean switching pair by likelihood of getting a tattoo within a year by tattoo status.

**Table 13**
Likelihood of getting a tattoo within next year regressions.

| Variable | (15) |
|---|---|
| Tattoo | 0.47** |
| | (0.24) |
| Probably or Definitely Tattoo in next year | ___ |
| Probably or Definitely Tattoo in next year & No Tattoo | 1.86*** |
| | (0.55)) |
| Probably or Definitely Tattoo in next year & Tattoo | 0.62* |
| | (0.36) |
| Constant | 8.42 |
| | (1.31) |
| Risk, Socio-demo controls | Yes |
| $R^2$ | .056 |
| N | 1047 |

*Notes:* See Table 5 Notes. "Tattoo" is an indicator variable for whether the subject has at least one tattoo, hidden or visible. "Probably or Definitely Tattoo in next year" equals one for subjects who responded that they "probably will" or "almost definitely will" get a tattoo within a year, and zero otherwise.

### *5.2. Do they not care or are they unaware?*

Do the tattooed make the decision to get tattooed knowing full well that they may face discrimination in the labor market? Or do they underestimate the extent to which tattoos may be negatively viewed, perhaps because they believe tattoos are more normative in society than is actually the case?

We collected several measures that address these alternative hypotheses. Table 14 reports the mean (standard deviation) for each measure, by tattoo status. First, tattooed individuals who are aware that others may view their tattoos negatively, but nonetheless proceed to get tattooed may be said to place less importance on what others think of them. We asked all participants in our study, "How important is it to you what others think of you?" on a 1–7 scale where 1 corresponds to

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**Table 14**
Summary statistics related to caring, and perceptions of prevalence and adverse consequences of tattoos, by tattoo status and by likelihood of getting a tattoo within next year.

| Variable | No Tattoo | | Hidden | | Visible | | Kruskal–Wallis $\chi^2$, $p$-value |
|---|---|---|---|---|---|---|---|
| | Unlikely | Likely | Unlikely | Likely | Unlikely | Likely | |
| Care what others think | 4.00 (1.60) | | 3.78 (1.65) | | 4.13 (1.61) | | $\chi^2(2)=4.3$ $p=.11$ |
| | 3.99 (1.59) | 4.07 (1.96) | 3.82 (1.64) | 3.65 (1.71) | 4.13 (1.53) | 4.13 (1.79) | $\chi^2(5)=5.0$ $p=.41$ |
| % friends with tattoos | 29.0 (24.9) | | 55.3 (27.6) | | 64.1 (27.1) | | $\chi^2(2)=202.5$ $p<.01$ |
| | 28.1 (24.4) | 52.3 (27.2) | 52.6 (27.2) | 65.3 (27.0) | 61.3 (28.0) | 69.5 (24.9) | $\chi^2(5)=228.8$ $p<.01$ |
| % U.S. pop'n with tattoos | 36.0 (19.1) | | 49.3 (19.9) | | 53.3 (18.1) | | $\chi^2(2)=113.0$ $p<.01$ |
| | 35.4 (18.8) | 52.4 (20.8) | 48.5 (19.8) | 52.5 (20.0) | 52.4 (17.8) | 55.2 (18.8) | $\chi^2(5)=130.7$ $p<.01$ |
| Visible tattoos harmful | 6.74 (1.65) | | 6.24 (1.73) | | 6.16 (1.46) | | $\chi^2(2)=26.8$ $p<.01$ |
| | 6.78 (1.61) | 5.75 (2.49) | 6.23 (1.79) | 6.28 (1.47) | 6.16 (1.49) | 6.17 (1.44) | $\chi^2(5)=31.9$ $p<.01$ |

*Notes*: The first row of each variable indicates the mean (s.d.), by tattoo status, for whether subjects care what others think about them (first row), their percentage of friends with tattoos, their estimates of the percentage of tattooed individuals in U.S. population and whether a visible tattoo is harmful in a hiring scenario. The second row of each variable divides the subjects according to whether they are likely or unlikely to get a(nother) tattoo within the next year. See the Appendix for the precise questions and response categories. The last column reports the Kruskal–Wallis test results.

"not important at all" and 7 equates to "very important." Contrary to the not-caring hypothesis, the visibly tattooed report placing the most importance on what others think of them (mean = 4.13) compared to means of 3.78 for hiddens and 4.00 for non-tattooed.[32]

At the same time, we have several strands of evidence in support of the tattooeds' overestimation of the normativeness of tattoos in society and underestimation of their potential handicap in the workplace. We asked subjects to estimate the percentages of their friends and the American population with one or more tattoos. The visibly tattooed report significantly higher percentages of tattooed friends (64% on average) than the hidden tattooed (55% on average) who report significantly higher percentages of tattooed friends than the non-tattooed (29% on average) ($p < .02$ for all three pairwise Wilcoxon tests).[33]

What is more, the visibles and hiddens estimate that 53% and 49%, respectively, of Americans have at least one tattoo. Both of these estimates substantially exceed the percentage tattooed, even among the age group with the highest tattoo rate. By comparison, the non-tattooeds' average estimate is a more realistic 36%. This evidence indicates that the tattooed, the visibles in particular, have both a circle of friends and a view of American society in which the tattooed are over-represented.

Next, we present evidence that the tattooed underestimate the potentially detrimental effects of a tattoo in the workplace. This evidence comes from a hiring scenario in which all subjects were asked to imagine that an acquaintance is applying for a job as a hotel manager.[34] The job ad states that the qualified job applicant will possess the following qualifications: extensive experience in hotel operations; computer literacy and experience with Windows OS and software; a college/university degree; strong interpersonal skills; be highly responsible and reliable. The subject is asked to evaluate how a shortcoming in each of these five qualifications as well as a number of other factors will help or hinder the subject's acquaintance in getting hired, where 1 is "extremely helpful", 5 equates to "neither helpful nor harmful" and 9 is "extremely harmful." On the one hand, the non-tattooed, hiddens and visibles all recognize that "visible tattoos" are harmful as indicated by their mean ratings significantly greater than 5 ($p < .01$ in one-sided $t$-tests of means). On the other hand, both the hiddens and the visibles rated tattoos as significantly less harmful (mean scores of 6.24 and 6.16, respectively) than did the non-tattooed (mean = 6.74) ($p < .01$ from Kruskal-Wallis test and from both pairwise Wilcoxon tests).[35] This is particularly notable when contrasted with the lack of significant differences in the evaluation distributions by tattoo status for the vast majority of the qualifications and other factors we considered.

[32] The Kruskal-Wallis test cannot quite reject at conventional significance levels that these three sample distributions are drawn from the same population distribution (p = .11).

[33] This is consistent with MacKinnon et al. (2011) who show that people choose to associate more closely with others who share even peripheral physical similarities like wearing glasses and hair color. Tattoos were not considered.

[34] The exact wording of the scenario and response categories appear in the Appendix.

[35] Interestingly, with a mean rating of only 5.75, the non-tattooed who intend to get a tattoo in the coming year regard visible tattoos as the least harmful of any subgroup and only marginally significantly greater than 5 (p = .06).

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**Table 15**
Ordered probits on tattoo status.

| Variable | (16) | (17) |
|---|---|---|
| Switching Pair | 0.03** (0.01) | 0.03** (0.01) |
| 1 CRT correct | −0.19 (0.13) | −0.18 (0.14) |
| 2 CRT correct | −0.12 (0.13) | −0.10 (0.14) |
| 3 CRT correct | −0.36*** (0.13) | −0.36*** (0.14) |
| 4 (All) CRT correct | −0.32*** (0.12) | −0.25* (0.13) |
| Care what others think | −0.02 (0.03) | −0.02 (0.03) |
| % friends with tattoos | 0.02*** (0.00) | 0.02*** (0.00) |
| % U.S. pop'n with tattoos | 0.005** (0.002) | 0.004 (0.003) |
| Visible tattoos harmful | −0.07*** (0.02) | −0.07*** (0.03) |
| Risk, Socio-demo controls | No | Yes |
| Threshold 1 | 0.93 (0.25) | 2.70 (1.00) |
| Threshold 2 | 2.18 (0.26) | 4.01 (1.00) |
| Pseudo $R^2$ | 0.16 | 0.19 |
| N | 1080 | 1047 |

*Notes*: Ordered Probit regressions with tattoo status as the dependent measure, equal to 0 if not tattooed, 1 if hidden tattooed and 2 if visibly tattooed. The regressors include the subject's switching pair, indicators for the subject's number of correctly answered CRT questions, the extent to which the subject cares what others think about them, percentage of friends with tattoos, perception about the percentage of tattooed individuals in U.S. population and the extent to which a visible tattoo is perceived to be harmful in a hiring scenario. See the *Notes* of Table 5 for the risk measure and set of socio-demographic controls. A quadratic for age is also included here to capture the inverted-U relationship between age and the likelihood of having a tattoo.

From our incentivized time-preferences experiment and CRT test, we already know that more short-sighted and more impulsive subjects are more likely to have a tattoo. Does the tattooeds' demonstrated blind spot with respect to the prevalence and acceptance of tattoos provide an independent explanation for the decision to get tattooed?

Table 15 reports the results from ordered probit regressions with the dependent measure, tattoo status, equal to 0 if the subject does not have a tattoo, 1 if s/he has only readily hidden tattoos and 2 if s/he has at least one visible tattoo. Regression (16) confirms that the later the subject switches to Option B in the time-preferences task, the more likely s/he is to have a tattoo and that subjects who answer correctly three or four CRT questions are significantly less likely to have a tattoo than those who got all four questions wrong. The extent to which subjects care about what others think of them is not a significant predictor of tattoo status ($p = .34$), whereas all three of the tattoo prevalence and awareness variables are significantly different from zero in the predicted directions. The less harmful one considers a visible tattoo in the hiring scenario, the more tattooed friends one has and the higher percentage of the U.S. population one believes to be tattooed, the more likely one is to have a tattoo. In fact, increasing a subject's percentage of tattooed friends by 19 percentage points is associated with an upward shift in tattoo status similar in magnitude as going from zero to three or four correctly answered CRT questions.

The signs and (lack of) significance remain largely unchanged when our series of socio-demographic and risk controls are included in regression (19). Only subjects' estimates of the percentage of Americans with a tattoo is no longer significant ($p = .14$).

In summary, the tattooed are not fully aware of the reality of tattoos and it is precisely those individuals least aware that are most likely to get tattooed. These findings are consistent with this paper's theme that the tattooed are short-sighted. They attest to a form of social myopia with regard to tattoos in society at large. The tattooed substantially overestimate their prevalence in the population, and are less concerned about the potentially harmful effects of finding employment. Even if tattoos are normative among friends, far-sighted individuals look beyond their social circle when contemplating a decision with possible career repercussions.

## 6. Conclusions

Experimental and survey research suggests that those with visible tattoos risk facing employer discrimination. This very risk means that choosing a (visible) tattoo may reflect emphasis on immediate desires over consideration of longer-term employment challenges. Our paper reports the first evidence from an incentivized experiment that tattoos can be understood through the lens of intertemporal choice such that the tattooed (especially the visibly tattooed) display more short-sighted time preferences. Additional survey evidence complements past research showing that tattoos are associated with present-oriented preferences and impulsivity. We add nuance to the literature by testing a variety of features of tattoos, finding that only the presence of a tattoo and its visibility predict time preferences; neither the number of tattoos, the motive for getting a tattoo, the time elapsed since one's most recent tattoo nor the age at which one was first tattooed is a significant predictor

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of time preferences.[36] We also contribute novel insight to the literature by demonstrating that temporal short-sightedness predicts future tattoo intentions (in both the currently tattooed and non-tattooed), suggesting that short-sightedness causally precedes the choice to get a tattoo rather than the reverse.

To be clear, we do not condone discrimination on the basis of tattoos. In economic terms, discrimination may be costly to employers who needlessly pass over qualified employees. Moreover, tattoos have come to be so normative among younger Americans that they reveal far less about personality traits than they once did (Swami et al., 2016). Nonetheless, tattooing still seems to reveal two employment-relevant traits – short-sightedness and impulsivity – even while they convey little about other traits about which employers may maintain stereotypes. Some employers may discriminate against the tattooed on the basis of antiquated stereotypes, while others may have intuited the link between tattooing and the failure to consider long-term costs. Could this be a reason for employer discrimination against the tattooed?

If so, we would expect to find high levels of discrimination in occupations in which patience and planning skills are valued and less or possibly no discrimination in occupations in which instinctive, quick decision-making takes precedence. The availability of detailed employment data on a large sample of tattooed and non-tattooed individuals would make this a promising topic for future research. In the meantime, some anecdotal evidence supports this distinction. For instance, internet forums offering advice to avoid or conceal tattoos often focus on more straight-laced, professional fields. Along these lines, Baumann et al. (2016) show that subjects react significantly more negatively to a tattooed doctor than to a tattooed auto mechanic. In contrast, tattoos are highly normative among professional athletes, artists, actors and bartenders.[37] Indeed, tattoos may be an asset in fields where spontaneity, creativity (Resenhoeft et al., 2008) or youthful “edginess” are viewed as desirable traits (Timming, 2017).

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## Supplementary materials

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## References

Akerlof, G.A., Kranton, R.E., 2000. Economics and identity. Q. J. Econ. 115 (3), 715–753.
Anderhub, V., Güth, W., Gneezy, U., Sonsino, D., 2001. On the interaction of risk and time preferences: An experimental study. Germ. Econ. Rev. 2 (3), 239–253.
Andersen, S., Harrison, G.W., Lau, M.I., Rutström, E.E., 2008. Eliciting risk and time preferences. Econometrica 76 (3), 583–618.
Anderson, M., Perrin. A., 2016, September 7. “13% of Americans don't use the internet. Who are they?” retrieved on November 1, 2017 from http://www.pewresearch.org/fact-tank/2016/09/07/some-americans-dont-use-the-internet-who-are-they/.
Andreoni, J., Sprenger, C., 2012. Risk preferences are not time preferences. Am. Econ. Rev. 102 (7), 3357–3376.
Arndt, A.D., Glassman, M.N., 2012. What tattoos tell customers about salespeople: The role of gender norms. Market. Manag. J. 22 (1), 50–65.
Baumann, C., Timming, A.R., Gollan, P.J., 2016. Taboo tattoos? A study of the gendered effects of body art on consumers' attitudes toward visibly tattooed front line staff. J. Retail. Consumer Serv. 29, 31–39.
Brallier, S.A., Maguire, K.A., Smith, D.A., Palm, L.J., 2011. Visible tattoos and employment in the restaurant service industry. Int. J. Bus. Soc. Sci. 2 (6), 72–76.
Brañas-Garza, P., Kujal, P., Lenkei, B., 2015. “Cognitive reflection test: whom, how, when,” unpublished manuscript.
Carmen, R.A., Guitar, A.E., Dillon, H.M., 2012. Ultimate answers to proximate questions: The evolutionary motivations behind tattoos and body piercings in popular culture. Rev. Gen. Psychol. 16 (2), 134–143.
Coller, M., Williams, M.B., 1999. Eliciting individual discount rates. Exp. Econ. 2 (2), 107–127.
Corgnet, B., Espín, A.M., Hernán-González, R., Kujal, P., Rassenti, S., 2016. To trust, or not to trust: cognitive reflection in trust games. J. Behav. Exp. Economics 64, 20–27.
Degelman, D., Price, N.D., 2002. Tattoos and ratings of personal characteristics. Psychol. Rep. 90 (2), 507–514.
Doleac, J.L., Stein, L.C.D., 2013. The visible hand: Race and online market outcomes. Econ. J. 123 (572), F469–F492.
Deschesnes, M., Finès, P., Demers, S., 2006. Are tattooing and body piercing indicators of risk-taking behaviours among high school students? J. Adolesc. 29 (3), 379–393.
Dillingh, R., Kooreman, P., Potters, J., 2018. “Tattoos, life style and the labor market,” unpublished manuscript.
Drimmer, F., 1985. Very Special people: The struggles, loves, and Triumphs of Human Oddities. Bell Publishing Company.
Eckel, C., Johnson, C., Montmarquette, C., 2005. Saving decisions of the working poor: Short-and long-term horizons. In: Field Experiments in Economics. Emerald Group Publishing Limited, pp. 219–260.
Enriquez, J., 2013. Your online life, permanent as a tattoo. TED Conferences.
Frederick, S., 2005. Cognitive reflection and decision making. J. Econ. Perspect. 19 (4), 25–42.
French, M.T., Maclean, J.C., Robins, P.K., Sayed, B., Shiferaw, L., 2016. Tattoos, employment, and labor market earnings: is there a link in the ink? South. Econ. J. 82 (4), 121–1246.

[36] There are other tattoo attributes that we have not considered in this study, for instance, the size or genre of the tattoo. Timming and Perrett (2017) demonstrate a relationship between tattoo genre and perceived trustworthiness.

[37] See https://www.statista.com/statistics/259588/share-of-americans-with-a-tattoo-by-occupation/ for the incidence of tattoos by occupation.

French, M.T., Mortensen, K., Timming, A.R., 2019. Are tattoos associated with employment and wage discrimination? Analyzing the relationships between body art and labor market outcomes. Hum. Relat. 72 (5), 962–987.
Harrison, G.W., Lau, M.I., Williams, M.B., 2002. Estimating individual discount rates in Denmark: a field experiment. Am. Econ. Rev. 92 (5), 1606–1617.
Henle, C.A., Shore, T., Marshall, A. 2018. "Body Art as a Source of Employment Discrimination," unpublished manuscript.
Hong, F., Huang, W., Zhao, X., 2019. Sunk cost as a self-management device. Manag. Sci. 65 (5), 2216–2230.
Hoppe, E.I., Kusterer, D.J., 2011. Behavioral biases and cognitive reflection. Econ. Lett. 110 (2), 97–100.
Horowitz, J.K., 1991. Discounting money payoffs: an experimental analysis. In: Handbook of Behavioral Economics, pp. 309–324.
Jibuti, D., 2018. "Discrimination against workers with visible tattoos: Experimental evidence from Germany," unpublished manuscript.
Kertzman, S., Kagan, A., Vainder, M., Lapidus, R., Weizman, A., 2013. Interactions between risky decisions, impulsiveness and smoking in young tattooed women. BMC psychiatry 13 (1), 278.
Koch, J.R., Roberts, A.E., Armstrong, M.L., Owen, D.C., 2004. Correlations of religious belief and practice with college students' tattoo-related behavior. Psychol. Rep. 94 (2), 425–430.
Kosmin, B.A., Keysar, A., Cragun, R., Navarro-Rivera, J., 2009. "American nones: The profile of the no religion population, a report based on the American religious identification survey 2008."
Laumann, A.E., Derick, A.J., 2006. Tattoos and body piercings in the United States: a national data set. J. Am. Acad. Dermatol. 55 (3), 413–421.
Lynn, C.D., Puckett, T., Guitar, A., Roy, N., 2019. Shirts or Skins?: Tattoos as Costly Honest Signals of Fitness and Affiliation among US Intercollegiate Athletes and Other Undergraduates. Evol. Psychol. Sci. 5 (2), 151–165.
MacKinnon, S.P., Jordan, C.H., Wilson, A.E., 2011. Birds of a feather sit together: physical similarity predicts seating choice. Pers. Soc. Psychol. Bull. 37, 879–892.
Oechssler, J., Roider, A., Schmitz, P.W., 2009. Cognitive abilities and behavioral biases. J. Econ. Behav. Organ. 72 (1), 147–152.
Resenhoeft, A., Villa, J., Wiseman, D., 2008. Tattoos can Harm Perceptions: A Study and Suggestions. J. Am. Coll. Health 56 (5), 593–596.
Ruffle, B.J., Wilson, A.E., 2018. The truth about tattoos. Econ. Lett. 172, 143–147.
Shah, A.K., Mullainathan, S., Shafir, E., 2012. Some consequences of having too little. Science 338 (6107), 682–685.
Sinha-Roy, P., 2012. Tattooed women outnumber men in a new poll. Reuters.
Swami, V., Tran, U.S., Kuhlmann, T., Stieger, S., Gaughan, H., Voracek, M., 2016. More similar than different: Tattooed adults are only slightly more impulsive and willing to take risks than Non-tattooed adults. Person. Individ. Diff. 88, 40–44.
Stagnaro, M.N., Pennycook, G., Rand, D.G., 2018. Performance on the cognitive reflection test is stable across time. Judgm. Deci. Making 13 (3), 260–267.
Thaler, R., 1981. Some empirical evidence on dynamic inconsistency. Econ. Lett. 8 (3), 201–207.
Timming, A.R., 2015. Visible tattoos in the service sector: A new challenge to recruitment and selection. Work. Empl. Soci. 29 (1), 60–78.
Timming, A.R., 2017. Body art as branded labour: At the intersection of employee selection and relationship marketing. Hum. Relat. 70 (9), 1041–1063.
Timming, A.R., Perrett, D.I., 2017. An experimental study of the effects of tattoo genre on perceived trustworthiness: Not all tattoos are created equal. J. Trust Res. 7 (2), 115–128.
Timming, A.R., Nickson, D., Re, D., Perrett, D., 2017. What do you think of my ink? Assessing the effects of body art on employment chances. Hum. Resour. Manage. 56 (1), 133–149.
Thomson, K.S., Oppenheimer, D.M., 2016. Investigating an alternate form of the cognitive reflection test. Judgm. Decis. Making 11 (1), 99–113.
Weber, E.U., Blais, A.-R., Betz, N.E., 2002. A domain-specific risk-attitude scale: Measuring risk perceptions and risk behaviors. J. Behav. Decis. Making 15 (4), 263–290.
York College of Pennsylvania, 2013. National Professionalism Survey – Workplace Report available at https://www.ycp.edu/media/york-website/cpe/York-College-Professionalism-in-the-Workplace-Study-2013.pdf .
Zellner, A., 1962. An efficient method of estimating seemingly unrelated regressions and tests for aggregation bias. J. Am. Statist. Assoc. 57 (298), 348–368.

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