Integrating theories of law obedience: How utility-theoretic factors, legitimacy, and lack of self-control influence decisions to commit low-level crimes

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Abstract

We conducted two studies using a sample of students (Experiment 1, N=84) and the general public (Experiment 2, N=412) to assess the relative and unique effects of factors suggested by three major theories of law obedience: a utility-theoretic deterrence theory (Becker, 1968), the general theory of crime (Gottfredson & Hirschi, 1990), and the legitimacy model (Tyler, 1990). Six different types of low-level crime were considered. The probability of breaking the law increases with factors predicted by each of these theories, namely detection probability, expected fine, self-control, and legitimacy. All four factors uniquely contribute to predicting law obedience, effects are mainly additive, and no stable interaction effects are observed. The relative influence of the investigated factors varies between types of low-level crimes. This indicates that an integrative theory of why people obey the law needs to consider factors from various theories and allow for the relative influence of factors to differ among crimes. We observe systematic deviations from a basic utility-theoretic approach to law breaking. Individuals' tendency to obey the law is much higher than predicted by an approach taking into account detection probability, expected fines, and benefits only. The robust effects of interindividual differences concerning legitimacy and self-control as well as the finding that the tendency to break the law decreases with increasing benefit of the crime also conflict with a basic utility-theoretic approach to law-obedience.

Keywords: law obedience, deterrence, self-control, legitimacy, decision-making

1 Introduction

Understanding the factors that lead individuals to obey the law or to decide to commit a crime is important for policy-making and society. Accordingly, a large body of empirical research exploring the mechanisms underlying compliance with legal rules has been conducted in different academic areas, including psychology (e.g., Martin & Cohn, 2004; Tyler, 1990), criminology (e.g., Nagin, 1998; Nagin & Paternoster, 1993; Pratt & Cullen, 2000; Pratt, Cullen, Blevins, Daigle & Madensen, 2006), and economics (e.g., Becker, 1968). The classic utility-theoretic approach to crime (Becker, 1968, von Neumann & Morgenstern, 1947), in this context commonly termed *deterrence theory*, assumes that individuals behave rationally and break the law only if it pays to do so according to a comparison of utilities for the different behavioral options. Therefore, the probability of breaking the law should increase with the potential benefit from breaking the law, and it should decrease with increasing detection probability and severity of punishment (i.e., the expected fine or negative utility of incarceration).

The assumption underlying Becker's approach is that crime is not linked to fixed attitudes or personality structures. Instead, people become criminals "because their benefits and costs differ" (Becker, 1968, p. 176). Despite its merits of being a "straightforward explanation of (and solution to) crime" (Pratt et al., 2006, p. 367), there is mounting evidence pointing at limitations of deterrence theory. On the one hand, behavioral decision research has demonstrated systematic biases in judgment and decision-making in general (e.g., Tversky & Kahneman, 1974). On the other hand, a meta-analysis (Pratt et al., 2006) has shown that the effect sizes of detection probability and particularly of severity of sanctions influencing criminal behavior are medium to small and leave a lot of variance in behavior unexplained (details below).

One of the most influential psychological approaches, which we will refer to as the *legitimacy model,* spotlights the link between legitimacy and law obedience (Tyler, 1990). According to Tyler, the perceived legitimacy of legal institutions and authorities (including law-enacting authorities,

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courts, and police) is a crucial predictor of an individual's law obedience. Legitimacy is assumed to produce a feeling of obligation to follow legal authorities (Sunshine & Tyler, 2003a, 2003b; Tyler, 2006), and recent publications emphasize effectiveness, lawfulness, and both distributive as well as procedural justice as core determinants of legitimacy (Tankebe, 2013). Legitimacy is assumed to generate moral grounds on which authorities act (Beetham, 1991; Tankebe, 2013), and thereby becomes a justification for them to hold power (Bottoms & Tankebe, 2012). People comply with legal authorities and thus obey the law "simply because *it is the right thing to do*" (Jackson, Bradford, Hough, Myhill, Quinton & Tyler, 2012, p. 3). This implies that legitimacy goes beyond rewards and punishments that are central to deterrence theory. Tyler (2006) acknowledges that it might be possible to govern based on coercive power; however, he argues that legitimacy facilitates ruling and makes it more (cost-)effective.

A third commonly used approach, developed and popularized mainly in criminology, is the *general theory of crime* (Gottfredson & Hirschi, 1990). The finding that people who engage in criminal activities also tend to exhibit activities that are rewarding in the short term, but signify dangerous in the long term (i.e., smoking, gambling), sparked off the idea that inter-individual differences concerning a lack of self-control could be linked to criminal behavior (Pratt & Cullen, 2000). In a nutshell, the general theory of crime postulates that people with low self-control are more likely to be delinquent when they encounter a criminal opportunity because they are unable to consider the potential long-term effects of their behavior (e.g., fines or imprisonment). According to this theory, most crimes are conducted without planning or preparation. In their original work, Gottfredson and Hirschi (1990) claim that self-control is *the* major (if not only) predictor of delinquency. This strong claim, however, has not been confirmed, and results indicate that "this theory, at best, has identified one mechanism that affects crime" (Grasmick, Tittle, Bursik & Arneklev, 1993, p. 24).

Although all three approaches have received empirical support, only a few studies simultaneously investigated their relative influences, focusing instead on selected bilateral comparisons (for details see below). Knowledge about trilateral dependencies, variation in the relative influence of these factors between types of crimes, as well as dependencies of self-control and legitimacy is largely missing. The current paper addresses this gap in the literature.

2 Previous Findings

2.1 Deterrence Theory

The factors postulated by deterrence theory have been investigated using multiple methodologies, including the recording of responses to virtual scenarios (vignettes), self-reported delinquency, and the analysis of field data. Vignette studies were used particularly often, which will also be the core measurements in the present paper. Individuals report their subjective probability of breaking the law for hypothetical situations, whereby specific factors such as detection probability and/or severity of punishment can be varied between subjects (Nagin & Paternoster, 1993). A meta-analysis (Pratt et al., 2006) summarized more than 200 effect sizes from 40 empirical studies that had investigated the effects of punishment severity and detection probability on the tendency of people to obey the law. The authors identified a medium strength effect of detection probability on law obedience ($r_{weighted}=-0.33$, $p<.01$; $n=107$ data sets). This effect was found to be most predictive for white-collar and for mid-range crime. The effect of punishment severity, in contrast, was almost negligible ($r_{weighted}=-0.027$, $p<.05$; $n=47$ data sets), a finding that is in conflict with a core prediction of deterrence theory.

Furthermore, there is preliminary evidence that the probability of breaking the law increases with the (financial) benefit from crime. Two vignette studies that operationalized benefit in terms of the perceived pleasure from criminal behavior found it to be positively related to the probability of committing a crime (Nagin & Paternoster, 1993; Piquero & Tibbetts, 1996), as predicted by deterrence theory. Overall, deterrence theory and a classic utility-theoretic account seem only partially able to predict individual decisions to break the law.

2.2 Legitimacy Model

Numerous studies have empirically investigated the legitimacy model and established a link between legitimacy and law obedience (or cooperation with legal authorities) in various countries (Bradford, Huq, Jackson & Roberts, 2013; Brubacher, Fondacaro, Brank, Brown & Scott, 2009; Jackson et al., 2012; Huq, Tyler & Schulhofer, 2011; Levi et al., 2009; Nivette & Eisner, 2013; Reisig, Tankebe & Mesko, 2013; Sunshine & Tyler, 2003a, 2003b; Tankebe, 2013; Tyler, 1988, 1990; 2000, 2001, 2003, 2004, 2006; Tyler & Fagan, 2008; Tyler, Schulhofer & Huq, 2010). However, no comprehensive meta-analysis of the effect is available. In his seminal study of 1,575 Chicago residents, Tyler (1990) established that people's general and specific obedience of the law, measured in terms of self-reported delinquency regarding six types of low-level criminal activities, is influenced by legitimacy, measured using a 6-item scale. The zero-order correlation of this measure of legitimacy with overall compliance was $r=0.22$. The effect of legitimacy was found to have a partially independent effect on criminal behavior beyond deterrence factors (i.e., the likelihood to get caught and punished) and further control variables. Yet, the magnitude of the effect of legitimacy on breaking the law was reduced by

70% after controlling for these factors. The analysis did not identify interactions between legitimacy and other factors, and Tyler therefore concluded that the relationship between legitimacy and compliance was at best weakly affected by deterrence and further sociological control factors.

2.3   General Theory of Crime

A large body of research has investigated predictions of the general theory of crime, mostly using self-reported delinquency and attitudinal self-control measures (Pratt & Cullen, 2000). In the majority of these studies, the unidimensional 24-item scale for self-control by Grasmick et al. (1993) was used, which consists of six dependent subscales. The scale is presumably the "most carefully designed and valid measure of self-control" (Pratt & Cullen, 2000, p. 943), although the assumed factor structure was not consistently confirmed (Vazsonyi, Pickering, Junger & Hessing, 2001). Another study found that this scale by Grasmick et al. was a better predictor of delinquency than other measures for self-control (de Vries & van Gelder, 2013). To examine predictions of the theory, a meta-analysis summarized 126 effect sizes estimated from 21 empirical studies that investigated the influence of self-control on people's delinquency (Pratt & Cullen, 2000). The estimated effect of self-control on delinquency was of medium size ($r_{weighted}$=.223, p<.01; n=82 data sets; only studies with attitudinal measures considered). A meta-analysis of 99 additional studies conducted between 2000 and 2010 found even larger effects ($r_{cross-sectional}$=.345 and $r_{longitudinal}$=0.415, Vazsonyi et al., 2017). Hence, the effect of self-control seems to be larger than the effect of punishment severity, but in most cases smaller than the effect of detection probability. The meta-analysis concluded that, even though self-control was a solid and strong predictor of delinquency, the theory clearly did not cover all aspects that drive criminal acts. A further meta-analysis assessed the effect of self-control on delinquency as published in 102 studies summarizing almost 1,000,000 data points (Engel, 2012). Engel concluded that the effect of self-control on delinquency was stable, but small.

Based on a sample of over 8,000 adolescents from four countries (the US, Switzerland, Hungary, the Netherlands), Vazsonyi et al. (2001) showed that the effect of self-control on the tendency to commit criminal acts generalizes over different nations and cultures. The influence of self-control was independent of age and gender in all countries. However, in line with Engel (2012), (lack of) self-control explained a small part of the variance in delinquency. Other empirical studies have confirmed the effect of lacking self-control on social norm violations (Gailliot, Gitter, Baker & Baumeister, 2012) and music piracy (Hinduja, 2012), and provided additional cross-cultural support for the theory (i.e., among South Koreans, Jo & Zhang, 2013; and among Hispanic youth, Vera & Moon, 2013). Furthermore, the interaction effect between

neighborhood characteristics (or, more precisely, their levels of morality) and low self-control in predicting crime, as suggested by the original theory, was investigated and confirmed in a study conducted in Russia and the Ukraine (Zimmerman, Botchkovar, Antonaccio & Hughes, 2012).

2.4   Integrative Investigations and Analysis of Interactions

Similar to the approach by Tyler, described earlier, some studies have jointly investigated two of the three theories under consideration in the current paper. Specifically, there have been attempts to combine deterrence theory with either the legitimacy model (Tyler, 1990; Jackson et al., 2012; Tyran & Feld, 2006), or the general theory of crime (Grasmick et al., 1993; Nagin & Paternoster, 1993; Nagin & Pogarsky, 2001, 2003; Piquero & Tibbetts, 1996; Pogarsky, 2002; Tibbetts & Myers, 1999), but to our knowledge no study has investigated all three approaches simultaneously.

Interactions between self-control and deterrence factors have been occasionally observed in these studies, but results are equivocal. Some studies show that individuals with sufficiently high self-control react more strongly to deterrence factors than people with a lack of self-control (Nagin & Pogarsky, 2001; Piquero & Tibbetts, 1996; Pogarsky, 2002), as suggested by the General Theory of Crime. Other studies, however, found exactly the opposite effect, in that deterrence factors exerted a stronger influence on people who lack self-control (Hirtenlehner, Pauwels & Mesko, 2014; Pogarsky, 2007; Tittle & Botchkovar, 2005; Wright et al. 2004). Differences in the response scale might cause such conflicts (Wagenmakers et al., 2012).

In sum, all three theories have received empirical support, but a simultaneous investigation of multiple factors with the objective of advancing a more comprehensive framework of law obedience is still lacking, even though the importance of linking the existing theories has been highlighted (Pratt et al., 2006). Such an approach seems promising as a starting point to integrate findings from psychology, criminology, and economics into a coherent theory of law-abiding behavior.

3   Hypotheses

We aimed to investigate the impact of factors postulated by deterrence theory, legitimacy, and lack of self-control on the self-reported probability of breaking the law.

Regarding the influence of factors central to these theories, we tested:

H1a$_{DetPr}$: The probability of breaking the law decreases with an increasing probability of detection.

$H1b_{Ben}$: The probability of breaking the law increases with the financial benefit obtainable from delinquent behavior.

$H1c_{PunSev}$: The probability of breaking the law decreases with an increasing severity of the expected punishment in case of detection.

$H2_{Legit}$: The probability of breaking the law decreases with increasing legitimacy.

$H3_{Self-cont}$: The probability of breaking the law increases with lack of self-control.

More importantly, we investigate whether all factors make unique and independent contributions to explaining criminal behavior, as would be expected on theoretical grounds. However, as introduced above, research indicates that the effect of legitimacy is largely reduced in a simultaneous analysis including further controls and self-control has been shown to interact with deterrence factors. Therefore, we test the hypothesis:

$H4_{Indep}$: Legitimacy, self-control, and deterrence factors explain independent variance in the probability of the law being broken. Thus, the partial correlations for legitimacy and lack of self-control, as well as deterrence factors for predicting the probability of the law being broken, are no lower than the univariate correlations.

Furthermore, we tested for the following interaction effects:

$H5a_{IE\,Legit}$: We did not expect two-way interactions between legitimacy, on the one hand, and detection probability and expected fine, on the other hand, in predicting the probability of the law being broken.

$H5b_{IE\_Self\,cont}$: But we did expect two-way interactions between lack of self-control, on the one hand, and detection probability and expected punishment, on the other, in predicting the probability of the law being broken.

Finally, we use an exploratory approach to investigate whether the relative effects of the proposed factors differ between types of crime and also hold when controlling for further previously investigated factors. Specifically, we use as control factors (1) BIG5-personality, (2) subjectively perceived severity of committing the crime, (3) expected severity of committing the crime by others, and (4) attitudes toward the criminal legal system (ATCLS; Martin & Cohn, 2004).

4 Experiments 1 and 2

We conducted two experiments and an additional pilot[1] using vignettes as the dependent measure for criminal behavior

(cf. Nagin & Paternoster, 1993). Experiment 1 involved a student sample and Experiment 2 a larger sample from the general public. The materials and results for both experiments were very similar and therefore only results from an overall analysis will be reported.

Original materials and data of the pilot and the two main studies are also available at https://osf.io/bt9rc. Hypotheses were not pre-registered and power was not estimated, since the studies were conducted in 2011 before we started applying both practices in all our research. A post-hoc sensitivity analysis using G*Power (Faul, Erdfelder, Lang & Buchner, 2007) indicated that we still achieved an excellent power of $1 - \beta = .999$, in the overall analysis for detecting small effects (f^2=.05; α=.05, one sided test, regression with 5 predictors).

4.1 Method

4.1.1 Subjects

For Experiment 1, 84 local residents (mainly students) from Bonn (59.5% female, mean age 24.5 years, $SD = 4.75$) were recruited from the local subject pool using ORSEE (Greiner, 2004). The first part of the study was run online and the second part was run as part of a larger battery that subjects took 60 to 90 min to complete. Individuals were paid on average 18 Euros (approx. USD 25.20) for their participation. For Experiment 2, subjects were recruited via a commercial online panel of individuals from the German general public, and the study took about 20 minutes. The company also took care of payment for the subjects. Participation was steered by fixed quotas, which were set up according to the distribution of gender and age in Germany's population. A total of 412 (50.5% females, mean age = 47.4, SD = 15.54) subjects finished the questionnaire and were included in the analysis.[2] Twenty-four responses (Exp 1: 6, Exp 2: 18) from subjects who expected prison sentences (that were unrealistic for the considered low-level crimes) were excluded from the analysis (including them did not change any of the results).

4.1.2 Design

All subjects worked on six vignettes involving decisions concerning low-level crimes (i.e., free-riding on the train, illegal downloading, speeding, insurance fraud, illegal parking, and littering in a nature reserve). For two of the vignettes (free-riding and insurance fraud) detection probability and financial benefit were independently manipulated between subjects. Hence, we employed a 6 (scenarios for low-level

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[1]The pilot study (*N*=51) showed that sufficiently many subjects considered breaking the law in the six constructed vignettes (from 12% [littering vignette] to 74% [insurance fraud high benefit]). It also provided initial support for the validity of the measures used and the hypotheses. A full report of the results from the pilot study is available at Open Science Framework (OSF): https://osf.io/bt9rc.

[2]An instruction manipulation check (Oppenheimer, Meyvis & Davidenko, 2009) was administered at the beginning of the questionnaire, screening out people who failed to read the instructions properly. Of 975 subjects who saw the first page, 457 (46.87%) successfully passed this instruction check, of whom 412 finished the questionnaire and were included in the analysis.

crimes) x 2 (detection probability: high vs. low) x 2 (financial benefit from breaking the law: high vs. low) non-fully crossed mixed design with detection probability and financial benefit as between-subject factors.

4.1.3 Materials

Subjects indicated their tendency to break the law in all six vignettes. The vignettes were designed to tempt subjects to disobey the law. In the free-riding and the insurance fraud scenarios, financial benefit and detection probability were manipulated. These two vignettes, including the manipulations, read as follows (translated from German; translations of the other four scenarios can be found in Appendix A):

Scenario 1 (Free-riding) "Imagine you are at a train station to board a train. A ticket costs *[LOW FINANCIAL BEN-EFIT: 20€] [HIGH FINANCIAL BENEFIT: 100€].* Suddenly, you realize that you have forgotten your wallet at home. Hence, you do not have any money on you to buy a ticket. As you attempt to return home to pick up the wallet, the arrival of your train is announced. You are already running late and the next train is scheduled for 30 minutes later, so you would certainly be late for an important meeting. Instead of picking up the money, you could also try to free-ride on the train. *[LOW DETECTION PROBABILITY: There is no conductor nearby, and until now you have never had to show your ticket.] [HIGH DETECTION PROBABILITY: When entering the train station, you walked past the conductor.]*"

Scenario 4 (Insurance fraud) "Imagine someone broke into your home and stole your belongings. A few days before the housebreaking, you had broken your fairly new laptop, which was worth about *[LOW FINANCIAL BENEFIT: 750€] [HIGH FINANCIAL BENEFIT: 2,500€].* According to an expert in an electronics retailer, the laptop cannot be fixed. Consequently, the laptop was worthless when it was stolen. However, since your laptop was sitting in its case on your desk, the burglars were unable to see that it was broken and stole it. You are filling in the damage report to your insurance, on which you have to list the stolen goods and their current value. According to your insurance policy, you have to list the actual value of the goods at the time they were stolen. *[LOW DETECTION PROBABILITY: Commonly, with claims of such low value, it is not profitable for the insurance company to check the claims.] [HIGH DETECTION PROBABILITY: Lately, due to more frequent insurance frauds, the insurance company has been conducting many more checks on the claims, even if they are as small as this one.]*"

Subjects' legitimacy was measured using the six-item *legitimacy of the law* scale (Tyler, 1990) (range: 1–4). *Lack of self-control* was measured in terms of a scale introduced

by Grasmick et al. (1993), consisting of 24 items on 6 subscales, which subjects answered on the same 4-point scale as the items on legitimacy. Note that higher values on this scale indicate lower levels of self-control. Appendix B shows both measures.

As exploratory and validation measure, subjects additionally completed a short scale measuring the general personality based on the standard five-factor model Big 5 consisting of 11 items (range: 1–7; Rammstedt & John, 2007) and a scale measuring attitude toward the criminal legal system (ATCLS; Martin & Cohn, 2004; shorted version in Experiment 2) (Appendix C). The studies included some more control measures (e.g., Exp 1: Raudenbush delinquency scale, Raudenbush, Johnson & Sampson [2003], scales measuring the perceived rule of law based on Carothers [1998], a self-reported delinquency scale by Tyler [1990]), which provided no further insights and are therefore not reported here.

4.1.4 Procedure

Subjects were instructed to imagine themselves as being in the situation of the scenarios. For each scenario, subjects indicated their *probability of committing the crime* by answering the neutrally phrased question: *How likely are you to [show the critical behavior; e.g., enter the train without a ticket]?* Answers were given on a scale from 0 (not likely) to 100 (very likely) using a slider, which we transformed into a probability score ranging from 0 to 1 for the analysis. On the next page, subjects indicated a binary decision concerning the critical behavior: *Honestly, are you going to [show the critical behavior; e.g., enter the train without a ticket]?*

Furthermore, subjects indicated their expected detection probabilities and fines for the criminal act. First, subjects were asked: "Please imagine that 1000 individuals in Germany *[show the critical behavior; e.g., enter the train without a ticket].* How many of them get caught?" From the indicated frequency, we calculated the subjective detection probability, which was used in the analyses. Second, we measured the *expected severity of punishment* in case of detection. Subjects indicated whether they expected a prison sentence or a fine (in all cases fines should be expected according to German law). Then, subjects specified the punishment in terms of duration of incarceration (in days) or fine (in Euros, *expected fine*).

In Experiment 1, the experiment was split in two parts. The online part contained all sensitive measures for delinquency and breaking the law (i.e., the vignettes) and was completed prior to the lab part at home. A few days later, subjects were invited to the lab and finished the second part of the study, which contained the non-sensitive measures, such as the legitimacy and the lack of self-control scales. Data from both parts were combined using an anonymous code generated by the subjects to assure confidentiality of data. Completion of the first part was conditional for participation
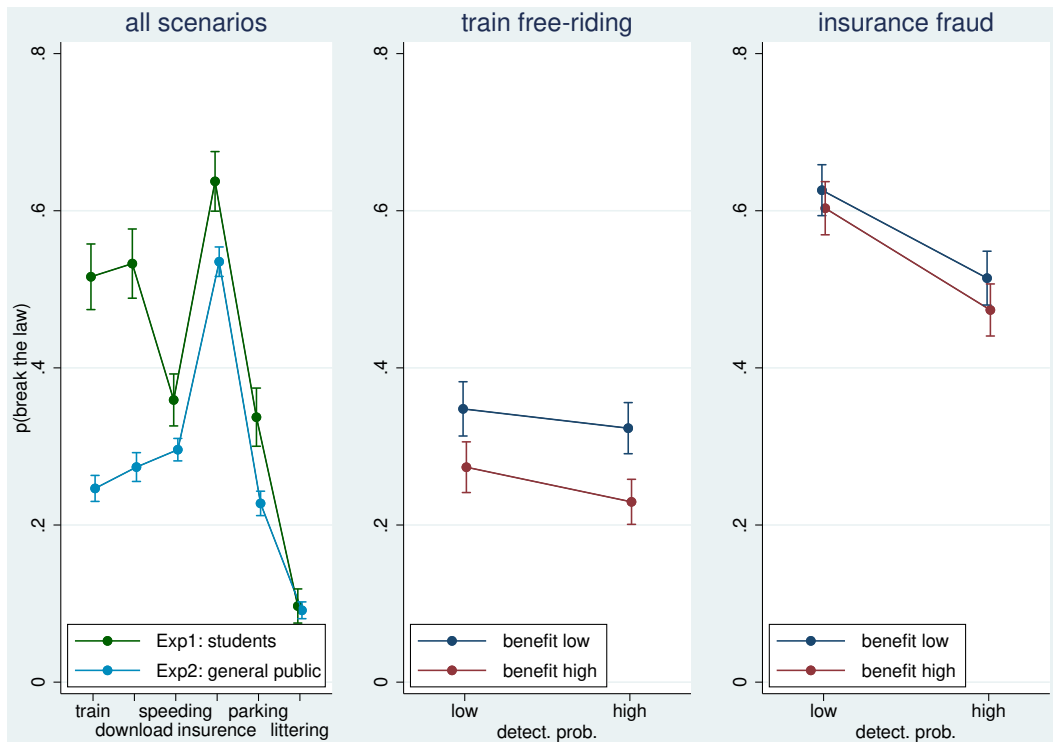
FIGURE 1: The probability of breaking the law by scenarios. Error bars indicate standard errors.

in the second part. In Experiment 2, subjects completed the whole study online at once. To reduce the overall duration for the online study, the number of control measures was reduced and the questionnaire was thereby substantially shortened.

4.2 Results

4.2.1 Descriptive Statistics

The assessed probability of breaking the law correlated highly with the binary decision to break the law ($r = .82$). All subsequent analyses are based on the continuous measure. There was substantial variation in the tendency to break the law among scenarios and subsamples (i.e., students vs. general public), and from our manipulations of benefit and detection probability in two of the scenarios (Figure 1). Insurance fraud was most likely to be committed, whereas littering in a national reserve was least likely. Students showed a substantially higher tendency to break the law in the considered low level crimes than persons from the general public. The manipulation of detection probability descriptively tended to decrease the probability of breaking the law as expected (Figure 1, middle and right panel). Surprisingly, our manipulation to increase the (sure) benefit from crime lead to less law breaking, contrary to a utility theoretic account.

The perceived probabilities of being caught were generally low ($Md \leq 11\%$), except for train free-riding and illegal park-

ing (Appendix D, Table D1, column 2). Expected median fines ranged from 40 € (train free-riding) to 500 € (insurance fraud) (Appendix D, Table D1, column 2). The median expected value of the fines calculated from these values ranged from 0.40 € (littering) to 56 € (high benefit insurance fraud) (Appendix D, Table D1, column 3). Considering these expected values, deterrence theory predicts a crime rate of 94% in the scenarios with sure monetary gains (free-riding: gains of 20€ or 100€; insurance fraud: gains of 750€ or 2500€) but the rate is much lower (Figure 1) indicating effects of further factors.

The own perceived severity of crimes was highest for littering and medium to low for the other scenarios (Appendix D, Table D2, column 1). Severity perceptions were considerably higher in the general public sample as compared to the student sample. The ratings concerning how severe others would perceive committing the crime were lowest for downloading and highest for speeding (Appendix D, Table D2, column 2).

4.2.2 Hypotheses tests

To test our hypotheses we used multivariate random effects tobit regression analyses for the scenarios including manipulations (Table 1, column 1) and over all scenarios (Table 1, column 2) as well as univariate analyses (Table 1, column 3). The deterrence factors *detection probability* (measured and manipulated) and *expected fine* influenced the probability of

TABLE 1: Regression models and univariate coefficients predicting probability to break the law in Experiments 1 and 2.

p(break the law)	(1) train and insurance only		(2) all scenarios		(3) univariate coefficients	
legitimacy	−0.155***	(−4.25)	−0.125***	(−5.14)	−0.153***	(−6.16)
lack of self-control	0.288***	(4.82)	0.241***	(6.01)	0.268***	(6.55)
detection probability high (1=yes, 0=low)	−0.111**	(−3.13)			−0.139***	(−3.87)
benefit high (1=yes, 0=low)	−0.072*	(−2.04)			−0.084*	(−2.32)
det. prob h * ben. h	−0.084	(−1.18)			−0.071	(−0.98)
expected fine (in ln(Euro))	−0.013	(−0.65)	−0.024*	(−2.48)	−0.031**	(−3.16)
detection probability measured			−0.204***	(−3.99)	−0.233***	(−4.50)
student sample (1=yes[Exp1], 0=no[Exp2])	0.243***	(4.90)	0.186***	(5.54)		
var(const[subj])	0.025	(1.73)	0.037***	(6.98)		
controls	scenario dummy		scenario dummies		scenario dummies, student sample	
observations	977		2933			

Note. z statistics in parentheses. Results are from tobit mixed-effect regressions with random effect intercepts for subjects. Scenario dummies in model 2 also include controls for manipulations of scenarios. Constant omitted. Variables "det. prob high" and "benefit high" are centered to avoid correlations with their interaction term. det. prob h = high detection probability; ben, h. = high benefit. * $p < .05$, ** $p < .01$, *** $p < .001$.

breaking the law as predicted by deterrence theory. The tendency to commit a crime decreased with increasing detection probability (H1a$_{DetPr}$) and expected fine (H1c$_{SevPu}$). The effect of benefit ran significantly counter to the prediction of a utility theoretic account in that people's tendency to break the law decreases with increasing sure benefits of the low-level crime, hence H1b$_{Ben}$ had to be rejected. The coefficient is essentially unchanged (from −.08) when simultaneously controlling for potentially higher expected fines and detection probabilities for higher benefits ($b[benefit] = −0.07$, $z = 1.97$, $p = .049$, from Table 1, column 1).

In line with the predictions derived from the legitimacy model and the general theory of crime, legitimacy and lack of self-control predicted the probability to break the law beyond utility theoretic factors. Individuals with higher legitimacy and self-control[3] were less likely to break the law supporting H2$_{Legit}$ and H3$_{Self\_con}$, respectively. The analyses (Table 1, columns 1–3) show that the effects of self-control, legitimacy, detection probability, expected fine and benefit are relatively independent. Effects do not change significantly when comparing coefficients from the univariate and multivariate analyses with all other factors, supporting H4$_{Indep}$ (all Chi^2(1) < 1.3, all $p > .25$), and the effects remain significant.

When adding the interactions of detection probability and

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[3]Note that we use a "lack of self-control" score in the analyses, therefore coefficients have opposite signs.

expected fine with legitimacy or self-control to the regression model (column 2 + two-way interactions), none of the interactions reached conventional significance levels (all $z < 1.70$, all $p > .089$). This is in line with our hypothesis concerning legitimacy H5a$_{IE\_Leg}$, but fails to provide support for the theoretically expected interactions with self-control (H5b$_{IE\_SelfC}$). Hence, a lack of self-control does not lead to a weaker influence of deterrence factors contrary to a central reasoning of the general theory of crime.

4.2.3 Exploratory analyses for testing robustness and differences between crimes

In further exploratory analyses, we investigated whether (a) the effects of the factors influencing law obedience are robust to the inclusion of further control measures and (b) whether effects of the various influence factors are roughly equal for all crimes and therefore independent of contexts.

To test the robustness of our findings, we extended the overall model from Table 1, column 2 by including various control measures. Specifically, we included the personally perceived severity of the offense as well as the assumed severity perceived by others, a score for Attitude Towards the Criminal Legal System (ATCLS score; Martin & Cohn, 2004) and the five general personality factors extraversion, conscientiousness, neuroticism, agreeableness, and openness for experience (measured by the short 11-item scale;

TABLE 2: Univariate correlations and multivariate analyses by crime scenario.

	train	download	speeding	insurance	parking	littering
univariate correlations *r*						
expected fine (in ln(€))	−.084	−.0091	−.01	−.023	−.18***	−.086
detection probability	−.0025	−.12**	.029	−.16***	−.051	−.0061
expected value of fine	−.059	−.084	−.0071	−.056	−.12**	−.024
legitimacy	−.22***	−.31***	−.10*	−.16***	−.14**	−.09*
lack of self-control	.18***	.17***	.15***	.19***	.05	.19***
perceived severity	−.25***	−.42***	−.34***	−.35***	−.31***	−.30***
severity others	−.054	−.14**	−.06	−.11*	−.14**	−.0046
ATCLS	−.075	.0033	−.025	−.15***	−.005	−.04
extraversion	.13**	.01	.059	−.049	.074	.0094
agreeableness	−.076	−.06	−.021	−.16***	−.021	−.097*
conscientiousness	−.084	−.17***	−.10*	−.16***	−.071	−.088
neuroticism	.0044	.000083	.0023	.074	.025	−.021
openness for exper.	−.026	−.096*	−.039	−.077	−.016	−.12*
multivariate coefficients (tobit regression) *b*						
expected fine (in ln(€))	−0.057	−0.0027	0.0093	0.019	−0.065*	−0.0074
detection probability	−0.074	−0.26	0.033	−0.27*	−0.091	−0.12
expected value of fine						
legitimacy	−0.18***	−0.27***	−0.014	−0.041	−0.09*	−0.036
lack of self-control	0.24**	0.25*	0.11*	0.19*	0.055	0.17*
perceived severity	−0.0064***	−0.0091***	−0.005***	−0.0062***	−0.0069***	−0.0052***
severity others	0.0041**	0.0041**	0.0026***	0.0017	0.0029**	0.0034***
ATCLS	0.002	0.058	−0.0053	−0.098*	0.025	−0.031
extraversion	0.061*	0.026	0.018	−0.0088	0.031	0.012
agreeableness	0.018	0.029	0.013	−0.034	0.02	−0.012
conscientiousness	0.013	−0.008	−0.016	−0.022	−0.0063	−0.014
neuroticism	−0.021	−0.045	−0.0013	−0.018	0.0085	−0.0084
openness for exper.	−0.026	−0.038	−0.0013	−0.0057	0.006	−0.027
N	494	474	495	483	496	491

Note. Univariate results are Pearson product-moment correlations, multivariate coefficients are raw coefficients from tobit regressions including all listed factors simultaneously (constant not reported). The predictor 'expected value of fine' is not included in the tobit regression since it is calculated from the already included factors expected fine and detection probability. ATCLS refers to a score from the questionnaire Attitude Towards the Criminal Legal System. * $p < .05$, ** $p < .01$,*** $p < .001$.

Rammstedt & John, 2007). All previously observed effects were little changed and remained significant, except for fine, which remained in the same direction but did not reach significance (analysis not reported). From the additional factors, only severity and severity of others had significant additional effects (details below in the analysis per scenario).

To analyze potential differences between crimes, we calcu-

lated separate univariate correlation and multivariate (tobit) regression analyses for each scenario (Table 2). The results concerning the main variables (expected fine, lack of self-control) were similar in univariate and multivariate analyses (but some differences and reversals concerning the control variables were observed).

Although the direction of the effects remained mainly in the same direction between crime scenarios, we found substantial variation in how strong the various factors influence the probability to break the law. These differences were also confirmed by respective significant interactions in an overall regression (comparing against the grand mean). Detection probability was particularly important for the decision to commit insurance fraud ($p = .030$). The effect of legitimacy was reduced for speeding ($p = .002$) and littering ($p = .008$) but increased for illegal downloading ($p = .04$). Furthermore, in the parking scenario the effect of (lack of) self-control was reduced ($p = .03$).

The observed pattern of variation is plausible and could be explained post-hoc, although these explanations necessarily have to remain speculative since they are based on exploratory analyses. In some cases, breaking the law might not be considered a serious violation of a legal rule (speeding), or legitimacy effects might be overwritten by context specific social norms (e.g., "protect the environment and do not litter"; see Feldman & Harel, 2008), which may be why the effect of legitimacy was reduced for some scenarios. In the insurance case, the subjective feeling of shame and social disapproval in case of detection might have led to a stronger effect of detection probability on criminal decision-making (cf. Feldman, 2009). Illegal downloading seems to be more a matter of principle than deterrence as indicated by the higher effect of legitimacy and perceived severity.

In all scenarios, perceived severity of the offense was the strongest univariate predictor of committing the crime. It is noteworthy, that in a multivariate regression the effect for perceived severity of others reverses. Hence, after controlling for the internalized feeling of wrongness (measured by severity), increased severity perceptions by others even tend to increase crimes. Overall, the results from these exploratory analyses suggest that the influence of deterrence factors, of perceived legitimacy, and of lacking self-control differs between different types of crime.

5 Discussion

Theories from various disciplines aim to explain law obedience and delinquency. Arguably, among the most prominent approaches in economics, psychology, and criminology, respectively, are a utility-theoretic deterrence theory (Becker, 1968), the general theory of crime (Gottfredson & Hirschi, 1990), and the legitimacy model (Tyler, 1990). In two studies employing German samples drawn from a student pool and the general public, we investigated the extent to which the factors postulated by these theories uniquely contribute to explaining law obedience, and whether there are substantial interaction effects. Moreover, we investigated the generalizability of the theories across crime types.

Three main conclusions can be drawn from the studies. First, although we partially confirm predictions of a utility-based deterrence theory, we also find clearly conflicting evidence. Second, the person factors legitimacy and lacking self-control influenced law obedience independent of deterrence factors and from each other. Effects of deterrence factors were not reduced for people with lacking self-control as suggested by the general theory of crime. Third, none of the theories can readily be generalized across types of crimes. Rather, we found that the effects of the factors varied considerably among the scenarios.

According to a utility theoretic deterrence theory, people's decisions to break the law result from a rational comparison of expected costs and benefits. On the most general level, the observed crime rates were much lower than predicted from a utility theoretic account taking into account (monetary) costs and benefits only. Also, no effects of legitimacy and self-control would be expected from a standard utility theoretic perspective, which is clearly contradicted by the data. Still, in line with such an approach and previous findings (see Pratt et al., 2006, for an overview; further see Korobkin & Ulen, 2000; Levitt & Miles, 2006; Marvell & Moody, 1996), detection probability had a significant impact on the probability to break the law. We also found an effect of self-reported expected punishment, although the effect was smaller, which resembled findings in previous empirical studies (Pratt et al., 2006). The effect of financial benefit was even in the opposite direction to the predictions of deterrence theory. Subjects were less inclined to break the law when they could have earned more money from it (controlling for detection probability and expected fine). One potential explanation might be that people are willing to cheat only a little bit and avoid cheating by large amounts to keep up a positive self-view (Mazar, Amir & Ariely, 2008). As a potential limitation to this finding, however, it also seems plausible that the effect of benefits on law obedience might be non-linear (i.e., U-shaped) and that our manipulations might have missed the relevant range that effectively changes behavior (e.g., extremely high benefits that constitute a sufficiently strong immoral offer; Zamir & Medina, 2008).

The differential analyses per scenario showed that the relative importance of the considered influence factors varies with the specific context of the (low-level) crime. In some situations such as in parking offenses the tendency to break the law seems to be a result of weighing costs and benefits. Lack of self-control and legitimacy seem to be less important. In situations such as illegal downloading, obeying the law is driven mainly by legitimacy and hence general principles whether breaking the law is ever acceptable or not. For situations such as littering in a natural reserve lack of self-control and the subjective feeling of severity of doing so seem to be the driving factor and legitimacy and deterrence are less important.

5.1 Limitations

A number of limitations need to be pointed out. First, although we aimed at following a broad and integrative approach, our study clearly cannot be considered fully comprehensive. Other factors have been linked with delinquency as well, though not all of these could be considered here. Among these are the dark-triad personality trait psychopathy (e.g., Asscher et al., 2011; Chabrol et al., 2009), education (Lochner & Moretti, 2004), sensation-seeking (Wilson & Daly, 2006), morality (Stams, Brugman, Dekovic, van Rosmalen, van der Laan & Gibbs, 2006), peer influence and social control (Meldrum, Miller & Flexon, 2013), gender (Moon, McCluskey, McCluskey & Lee, 2012), religiosity (Reisig, Wolfe & Pratt, 2012), belief in a just world, authoritarianism (Cohn & Modecki, 2007), and social identity (Bradford, Hohl, Jackson & MacQueen, 2015). Future research could attempt to test and integrate more of these factors. Also our analysis concerned only low-level crimes and some of these further factors (e.g., psychopathy) might be particularly relevant to predict more severe crimes.

Second, the scenario method, as used in our study, has often been criticized for measuring only intention, but not actual behavior, and a meta-analysis recently found that lack of self-control was more strongly related to imagined than to actual behavior (de Ridder, Lensvelt-Mulders, Finkenauer, Stok & Baumeister, 2012). Although we cannot rule out this objection entirely, we were able to validate our scenario measures using self-reported delinquency scales in the pilot study, indicating that our scenario measures captured the relevant factors at least partially.

Third, although we also employed a sample of the general public to test the robustness of our effects across a wide range of demographic backgrounds, our online survey method restricted subjects to users of the World Wide Web. Furthermore, using the instruction manipulation check, we excluded people who had not properly read the instructions. Both factors might have led to a selection bias in our sample, which might have excluded people who are prone to conduct more severe crimes. Nonetheless, the sample in Experiment 2 was at least representative of the German population according to age and gender. Furthermore, the comparison to the student samples proves the generality of the basic findings reported.

5.2 Summary and Conclusion

Our findings show that a standard utility-theoretic perspective to crime taking into account monetary costs and benefits remains incomplete and cannot fully account for decisions to break the law. The results highlight the additional role of individual differences in explaining delinquency with both legitimacy (Tyler, 1990) and lack of self-control (Gottfredson & Hirschi, 1990). They contribute to predicting the probability of the law being broken. Both factors were equally strong in univariate and multivariate analyses, all indicating small to medium effects. Most importantly, we show that both effects work independently of each other and also independently of utility-theoretic deterrence factors. Hence, a complete model that aims to describe why people obey the law should include factors from all three theories.

The finding that the tendency to commit a crime declines with an increasing sure benefit from the crime, the small effects of expected fines and the observed variation of the relative importance of these factors dependent on the specific crimes, however, indicate that further refinements are necessary to generate a comprehensive theory of crime.

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Appendix A

Scenario 2

Imagine you hear a good song on the radio. When you search for the song online, you find its title and the artists' names, as well as a link to an illegal download. When you check an online store that offers downloads, you find that you can only download the whole album that costs 10.99 euros, which is about ten times as much as a regular single song costs. You still really want the song, though.

Scenario 3

Imagine yourself driving on an empty street through a city because you need to get to a meeting. You are running a bit late. The speed limit is 50 km/h [35 mph].

If you went over the speed limit, at how many km/h over the limit would you consider it a serious infraction of the speeding rule? At _____ km/h over the limit, I would consider it seriously breaking the law and call it "speeding".

Scenario 5

You are in a car on the way to an important business meeting and you are running late. When you get to the desired location you cannot find a designated parking lot. However, along the sidewalk, there is a lot of free space where you could stop your car. This space is a non-parking zone during the time at which you arrive.

Scenario 6

Imagine you are on a hiking tour in a nature preserve. Around lunchtime, you sit down to eat some of the food that you brought along. When you finish your lunch, you realize that you produced some garbage. The wrapping paper of your food is dirty and it would soil your bag if you put it back in there. Furthermore, you expect the garbage to stink due to the heat if you put it back into your backpack. According to your nature preserve map, the next bin is a fair walk away.

Appendix B

Legitimacy Scale (Tyler, 1990)

We would like to measure whether you agree with the following statements or not. There are no correct or wrong answers; we would just like to know your personal assessment.

Scale: 1 = strongly disagree, 2 = disagree somewhat, 3 = agree somewhat, 4 = strongly agree.

People should obey the law even if it goes against what they think is right.

I always try to follow the law even if I think that it is wrong.

Disobeying the law is seldom justified.

It is difficult to break the law and keep one's self-respect.

A person who refuses to obey the law is a menace to society.

Obedience and respect for authority are the most important virtues children should learn.

Lack of Self-Control Scale (Grasmick et al., 1993)

The following 24 statements describe you.

Please indicate your agreement with each statement on a scale ranging from 1 (strongly disagree) to 4 (strongly agree).

1. I often act on the spur of the moment without stopping to think.

2. I don't devote much thought and effort to preparing for the future.

3. I often do whatever brings me pleasure here and now, even at the cost of some distant goal.

4. I'm more concerned with what happens to me in the short run than in the long run.

5. I frequently try to avoid projects that I know will be difficult.

6. When things get complicated, I tend to quit or withdraw.

7. The things in life that are easiest to do bring me the most pleasure.

8. I dislike really hard tasks that stretch my abilities to the limit.

9. I like to test myself every now and then by doing something a little risky.

10. Sometimes I will take a risk just for the fun of it.

11. I sometimes find it exciting to do things for which I might get in trouble.

12. Excitement and adventure are more important to me than security.

13. If I had a choice, I would almost always rather do something physical than something mental.

14. I almost always feel better when I am on the move than when I am sitting and thinking.

15. I like to get out and do things more than I like to read or contemplate ideas.

16. I seem to have more energy and a greater need for activity than most other people my age.

17. I try to look out for myself first, even if it means making things difficult for other people.

18. I'm not very sympathetic to other people when they are having problems.

19. If things I do upset people, it's their problem, not mine.

20. I will try to get the things I want even when I know it's causing problems for other people.

21. I lose my temper pretty easily.

22. Often, when I'm angry at people, I feel more like hurting them than talking to them about why I am angry.

23. When I'm really angry, other people better stay away from me.

24. When I have a serious disagreement with someone, it's usually hard for me to talk calmly about it without getting upset.

Appendix C

Attitude Towards the Criminal Legal System (ATCLS) Scale (adapted from Martin & Cohn, 2004)

Please indicate how much you agree with the following statements. All questions should be answered concerning Germany.

Scale: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree.

1. Punishment in this country is basically ineffective.*

2. Most of our laws are fair and just.*

3. Prosecuting attorneys are dishonest if it means they can win a case.

4. Judges usually make fair decisions.*

5. Police officers unfairly harass certain groups such as minorities and high-school kids.*

6. Most of our laws are effective at protecting people.*

7. Lots of police are corrupt and hypocritical.*

8. Judges are easily bought off by corrupt politicians.*

9. Because police officers are trained so well, there is less crime than there might be.

10. Our current system of punishment is effective at preventing crime.*

11. Defense attorneys care more about their clients than about making money.

12. In general, defense attorneys represent their clients very well.

13. Most prosecuting attorneys are as fair to the victim and defendant as possible.*

14. Police officers treat everyone equally because they are able to ignore prejudice.*

15. There are too many laws that impose on personal freedom.

16. Judges tend to let bias and prejudice affect their decisions.

17. Defense attorneys are dishonest if it means they can win a case.

18. A lot of judges make poor decisions.*

19. Most defense attorneys don't have the time or resources to do their jobs well.

20. Defense attorneys aren't fair to victims because they represent criminals.

21. The punishment given usually fits the crime.*

[three items had to be dropped from the scale due to inconsistency with the German criminal legal system]

* item was included in the short version of the ATCLS scale in Experiment 3

Appendix D

Table D1. Descriptive statistics of probability to break the law, perceived detection probability, expected fine, and expected value of the fine by scenario in Experiments 1 and 2.

scenario	*p*(breakLaw) *M*	*SE*	detection probability *Md*	*M*	*SE*	exp. fine (in Euro) *Md*	*M*	*SE*	expected value of fine *Md*	*M*	*SE*
Experiment 1: student sample											
train_lp_lB	.65	.08	.19	.31	.08	40	39.69	1.85	7.4	11.90	3.05
train_hp_lB	.60	.08	.25	.26	.05	40	44.00	2.65	10.0	13.04	3.30
train_lp_hB	.50	.09	.33	.36	.06	40	70.00	14.46	22.0	25.89	7.24
train_hp_hB	.34	.08	.10	.21	.05	40	56.09	8.50	4.0	16.57	8.13
download	.53	.04	.01	.05	.01	500	840.06	192.68	5.0	40.34	13.73
speeding	.36	.03	.11	.21	.02	70	120.00	15.72	10.0	26.86	6.42
insur_lp_lB	.82	.07	.03	.10	.03	500	665.22	96.54	12.5	81.10	29.95
insur_hp_lB	.59	.07	.10	.16	.03	500	670.45	138.27	50.0	134.93	50.98
insur_lp_hB	.70	.09	.02	.03	.01	275	615.71	210.92	5.5	14.70	6.91
insur_hp_hB	.51	.06	.10	.18	.04	500	1204.04	255.88	56.0	237.52	78.53
parking	.34	.04	.30	.38	.03	50	68.81	7.81	12.0	28.06	4.70
littering	.10	.02	.01	.04	.01	50	114.90	20.44	0.5	8.55	5.38
Experiment 2: general public sample											
train_lp_lB	.30	.04	.10	.16	.02	50	71.02	10.45	3.5	15.41	5.44
train_hp_lB	.26	.03	.10	.17	.02	50	64.82	5.85	4.0	10.65	1.48
train_lp_hB	.22	.03	.05	.20	.03	60	79.28	7.58	3.8	18.29	4.07
train_hp_hB	.21	.03	.10	.23	.02	50	73.78	6.40	6.0	19.31	3.43
download	.27	.02	.01	.08	.01	200	762.95	94.62	2.5	49.16	8.73
speeding	.30	.01	.05	.12	.01	75	107.66	5.01	3.0	12.28	1.10
insur_lp_lB	.59	.04	.02	.12	.02	500	644.63	76.81	12.5	82.32	17.98
insur_hp_lB	.50	.04	.10	.12	.02	500	530.11	68.45	17.4	70.54	19.32
insur_lp_hB	.59	.04	.01	.10	.02	500	889.87	131.39	10.0	68.52	22.44
insur_hp_hB	.47	.04	.05	.12	.02	500	899.95	155.42	11.3	90.90	19.86
parking	.23	.02	.12	.26	.01	40	69.86	4.53	5.0	19.29	2.43
littering	.09	.01	.00	.04	.01	50	159.37	17.97	0.4	16.47	10.76

Note. lp = low detection probability; hp = high detection probability; lB = low benefit; hB = high benefit; insur = insurance fraud.

Table D2. Descriptive statistics for own perceived severity of offense and expected severity perceived by others in Experiments 1 and 2.

scenario	severity			severity others		
	Md	M	SE	Md	M	SE
Experiment 1: student sample						
train_lp_lB	21.0	23.25	4.01	37.5	38.13	5.63
train_hp_lB	5.0	20.24	4.94	20.0	26.28	4.91
train_lp_hB	18.0	25.05	5.02	21.0	24.30	3.77
train_hp_hB	12.0	27.74	6.18	16.0	23.00	4.76
download	14.0	23.37	2.74	15	22.40	2.47
speeding	40.5	43.75	3.34	41.0	40.35	2.77
insur_lp_lB	29.0	32.10	5.06	34.0	38.48	5.86
insur_hp_lB	37.0	38.95	5.75	28.5	32.00	5.15
insur_lp_hB	11.5	28.57	8.33	24.5	29.21	6.80
insur_hp_hB	37.0	41.67	4.69	30.0	35.44	4.14
parking	16.0	25.21	2.84	18.5	25.62	2.53
littering	53.5	54.39	3.81	26.0	32.50	2.79
Experiment 2: general public sample						
train_lp_lB	37.0	40.80	3.05	26.0	31.54	2.44
train_hp_lB	41.0	43.55	3.09	23.0	30.64	2.40
train_lp_hB	50.0	49.16	3.72	34.5	37.09	2.91
train_hp_hB	49.0	48.43	3.04	20.0	27.90	2.25
download	32.0	40.12	1.69	14.0	23.16	1.10
speeding	50.0	51.83	1.54	36.0	39.59	1.29
insur_lp_lB	52.0	55.10	2.97	29.0	33.40	2.60
insur_hp_lB	55.0	52.74	3.34	27.0	33.77	2.95
insur_lp_hB	37.0	42.50	3.08	21.0	27.10	2.22
insur_hp_hB	51.0	51.92	3.12	31.0	35.60	2.65
parking	31.0	39.03	1.52	25.0	30.62	1.24
littering	80.0	67.79	1.65	34.0	37.88	1.37

Note. lp = low detection probability; hp = high detection probability; lB = low benefit; hB = high benefit; insur = insurance fraud.