Article

Disorder, social capital, and norm violation: Three field experiments on the broken windows thesis

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Abstract
Adding to the debate about the "broken windows" thesis we discuss an explanation of minor norm violation based on the assumption that individuals infer expected sanctioning probabilities from contextual cues. We modify the classical framework of rational crime by signals of disorder, local social control, and their interaction. Testing our implications we present results from three field experiments showing that violations of norms, which prevent physical as well as social disorder, foster further violations of the same and of different norms. Varying the net gains from deviance it shows that disorder effects are limited to low-cost situations. Moreover, we provide suggestive evidence that disorder effects are significantly stronger in neighborhoods with high social capital.

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Introduction

Self-interest is a key driver of human behavior. However, in almost all situations behavior is constrained by social rules (i.e. laws, norms) which define the range of acceptable behavior within society. We argue that the extent to which behavior is governed by such rules depends on the level of social control, i.e. the likelihood and the severity of getting sanctioned (for experimental evidence, see e.g. Franzen and Pointner, 2012). Hence, a rational decision on whether to break rules rests on the probability of sanctions and their severity. Thus, the compliance to social rules should depend on the level of social control exerted in a given situation.

We present an explanation of norm-violating behavior, where the probability and severity of social sanctions is inferred from contextual cues. Unlike Becker's (1968) model of crime our approach particularly applies to situations of minor norm violations. Usually, the cost of getting socially sanctioned is relatively low and, therefore, investing in costly search to gain objective information on rates of detection and punishment is not worthwhile. In situations where punishment is expected to be moderate, e.g. breaking socially as opposed to strongly legally sanctioned rules, easily observable indicators of social control should suffice to infer the costs of deviant behavior.

Our theoretical framework integrates two mechanisms which promote the violation of norms: on the one hand, certain forms of previous norm violations (e.g. littering) trigger the violation of the same norm, since doing likewise adds only marginally to the social cost of non-compliance (*same-norm inhibition effect*). Thus, a growing number of prior norm violations implies a decrease in the expected severity of punishment for individual offenders. On the other hand, observed signs of previous norm violations signal a generally low rate of getting sanctioned and, thus, can spill over to violations of different norms (*cross-norm inhibition effect*).

The notion that the level of social control is inferred from contextual cues relates to the well-known "broken windows" thesis (BWT). Originally proposed by Wilson and Kelling (1982), the BWT states that physical and social disarray fosters additional norm violations and, therefore, the spreading of disorder (Kelling and Coles, 1996; Skogan, 1990). Put into practice, BWT advocates the removal of signs of disorderliness and incivility in order to curb crime. Empirical findings, however, were rather ambiguous (e.g. Corman and Mocan, 2005; Harcourt and Ludwig, 2006; Kelling and Sousa, 2001) and did not allow decisive conclusions about causality. Since most studies are based on observational data, their results have been questioned on methodological grounds (e.g. Braga and Bond, 2008; Levitt, 2004). Although potential confounders are usually statistically controlled for, with observational data it is nearly impossible to rule out the possibility of biased and inconsistent estimates (e.g. Rosenbaum,

2010; Rubin, 2008). From a causal inference perspective one would prefer an experimental design to test for the effects of order maintenance.

Focusing on the consequences of disorder for minor norm violations, Keizer et al. (2008) revived the discussion on the BWT with a highly influential empirical contribution. In a series of field experiments they showed that physical disorder (e.g. litter, graffiti) encourages further norm violations by others (littering, non-conformity to trespassing, and stealing). Furthermore, disorder effects seem particularly strong if norms of physical and social order are made apparent by prohibition signs (Keizer et al., 2011).

This paper adds to the discussion on theoretical and empirical grounds. First, we offer a rational choice explanation for norm violations in the context of environmental cues for the level of social control. Second, using social capital as an indicator of social control we propose hypotheses on the effect of local social capital on the level of norm violations as well as on the interaction between local social capital and the strength of disorder signals. Third, our implementation of three field experiments follows the interventionist approach of Keizer et al. (2008). We replicate two of their field experiments on littering and on stealing yielding surprisingly similar results. Moreover, with an adaptation to jaywalking we provide new evidence for the causal effect of "social disorder". Fourth, varying the costs and benefits of deviance we investigate the scope conditions for disorder effects. Fifth, consistent with our theoretical framework we present suggestive evidence on the consequences of local social capital of a neighborhood, which significantly moderates disorder effects.

Theoretical framework

We develop our theoretical argument in four steps. First, we outline the intuition and scope of a Beckerian rational choice model of norm-violating behavior. Next, framing "broken windows" as signals of low social control we explicate the close relationship between the BWT and theories of rational action, and integrate disorder effects into a framework of deviance in low-cost situations. In a third step, we introduce the concept of social capital and highlight how it fits into the economic approach to human behavior. Finally, we extend the theoretical framework proposing that the strength of disorder effects on further norm violations might vary with the degree of social capital in an area.

Deviance as a rational action

The most influential rational choice approach to deviant behavior is Becker's (1968) model of crime. It is based on the assumption that actors decide on committing a crime on the basis of a calculation of cost and

benefit. A social rule is broken if the expected utility of an offense out-weighs the net benefits of each of the available alternatives. As long as the expected benefit of deviant behavior is dominated by the potential loss of welfare by getting punished, a rational actor would choose to obey a given social rule. According to the model it is rational for individuals to break a rule as long as the chance of punishment is small compared with the potential gains of deviance.

The model has been extended in several ways (e.g. Braun and Gautschi, 2011; Brown and Reynolds, 1973; Heineke, 1975) and is widely accepted within the rational choice community. Although it adds to our under-standing of serious crime, ranging from robbery to tax evasion, we argue that its standard formulation is of limited applicability in the case of minor norm violations. The benefits and costs of littering or jaywalking are so small that they cannot be seriously interpreted as criminal incen-tives or inhibitors.

Instead, in low-cost situations environmental cues signaling social control gain in relevance. Following Kliemt (1986: 333), in low-cost situations "the individual decision maker has no direct interest in the outcome because she or he will hardly be influenced by the outcome". Hence, when individual costs and benefits are low it is rational to shorten the lengthy and cumbersome decision-making process by the use of heuristics. Likewise, Kirchgässner (1992: 305) argues that "[f]or such decisions, soft incentives like those pro-vided by moral rules can have a much stronger impact than (economic) hard incentives". Consequently, we propose a modification of the Beckerian model to account for low-cost situations, where offenders are interested in avoiding social sanctions and thereby rely on environmental cues.

Usually, actors do not know the probability of punishment and have to form subjective expectations on the basis of incomplete information. One source of information could be official statistics about convictions in the past. However, it appears to be unrealistic to assume that actors invest in costly search when breaking minor norms. Rather they are expected to resort to easily observable context-specific cues to estimate detection and sanction rates for specific locations and social contexts. Framed in a rational choice terminology, the subjective belief on the probability of conviction is a function of signals available in the situation at hand.

In contrast, if gains from deviance are high and if punishment is expected to be severe, signs of low social control should affect behavior to a far lesser extent. In such high-cost situations rational beliefs on the costs of deviant behavior are not formed on easily observable cues alone. Instead, as costs and benefits of deviance increase, people ponder the actual net benefits from deviance and contextual cues become less important for individual decision making (*incentivization effect*). In consequence, our modification

of the classical framework applies to violations of moderately sanctioned rules (as opposed to legally sanctioned heavy crime).

Broken windows as signals for social control

To clarify our theoretical argumentation it is necessary to distinguish two kinds of norms: violated norm and target norm. Defining social norms as behavioral expectations in a community of what ought to be done and omitted, which are enforced by positive and negative reinforcement (e.g. Coleman, 1990; Opp, 1983, 2002), the concept of a violated norm refers to social rules broken by others in the past. In many situations contextual cues, such as physical or social disorder, inform about previous norm violations by others. Subjects can infer from behavioral traces what others have done and what appeared morally acceptable or even normal to them. Thus, others' past behavior can have effects on a subject's belief formation and, therefore, her current behavior. Similarly, other authors argue that previous actions affect descriptive norms (e.g. Cialdini, 2007; Cialdini et al., 1990) and empirical expectations about what other people would do in a similar situation (Bicchieri, 2006; Bicchieri and Xiao, 2009).

The target norm, on the other hand, refers to behavioral expectations about what is morally acceptable in a given situation. The concept is closely linked to Cialdini's (2007) injunctive norms and Bicchieri's (2006) normative expectations. Thereby, a target norm not only specifies "what ought to be done", but also entails the "promise of social sanctions" (Cialdini et al., 1990: 1015) if it is broken. The actors of interest in our three studies, which are targeted by such a norm, are the subjects participating in the field experiment. For example, in one of our field experiments subjects find a lost letter containing money next to a littered mail box. Obviously, in this case the trigger is littering, whereas the target norm is "Don't steal lost letters" or even "Put lost letters in the mail box". Thus, violated and target norm can, but need not necessarily, be identical. Having clarified this, we propose two mechanisms which bring about the effect of disorder on additional norm violations.

Mechanism 1 is rather general and applies to both situations of identical and non-identical norms. It rests on the assumption that signs of non-compliance by others signal the likelihood of norm enforcement by the social environment. Contextual cues such as physical or social disorder allow an inference on the level of social control. Obviously, if there is disorder in a given situation or neighborhood, nobody has prevented norm violations or previously sanctioned them. As a consequence, people lower their expectations about the probability of being punished for deviant behavior and generally have less incentive to comply with the rules. Moreover, disorder as a

signal for low social control can promote spillover effects where violations of one norm foster non-compliance to non-identical target norms.

Mechanism 2 only comes into effect if violated norm and target norm are identical. Since fixed costs for mending broken windows are high, certain forms of behavior can lead to diminishing marginal costs for future actions. For example, if a location is already littered with garbage, people might regard the effect of throwing an additional piece of litter on the ground as negligible ("Somebody has to clean up the mess anyway, no matter what I do"). As the perception of the severity of a norm violation is at least partly related to its frequency, one can argue that the number of previous norm violations committed by others negatively influences the perceived costs of sanctions. Individuals might regard it as very improbable to be severely punished for an action many people have done before. In a similar vein, Popitz (1968) argues that lacking knowledge on the extent of norm violations in a population can prevent the spread of norm violations. Recent results by Diekmann et al. (2011) are in line with this consideration: providing experimental subjects with information on the misbehavior of their co-participants significantly increases the individual probability of malpractice. In general, this implies that a growing number of prior norm violations is associated with a decrease in the expected severity of punishment for individual offenders.

As the individual perception of a sanction's gravity decreases, past violations of a norm can encourage similar actions by others. Therefore, the mechanism of diminishing marginal costs gives an additional rationale for cumulative processes of norm violation, such as littering, graffiti, or neighborhood decline. Consequently, signs of deviant behavior by others are expected to induce further violations of the same norm (*same-norm inhibition effect*) or to spill over to a different target norm (*cross-norm inhibition effect*).

Both mechanisms give a theoretical underpinning for the causal effect of physical and social disorder on further norm violations stated by the BWT. Advocates of the BWT advise policy makers to influence the decision environment in order to signal social control and, thereby, to deter criminal acts. Probably the most prominent attempt in this regard has been zero-tolerance policing. As suggested by Wilson and Kelling (1982) (see also Kelling and Coles, 1996) the police should sanction minor violations of the law rather severely and physical disorder should be removed instantly. Since physical or social disorder might signal that no one cares, the main aim of these actions is to raise the expected probability that sanctions will be imposed. Thus, fixing broken windows might influence expectations about the probability of punishment for deviant behavior.

Based on these behavioral assumptions and in order to test the broken windows effect, signals of precedent norm violations by others (e.g. littering,

crossing on a red light) are central stimuli in our experimental design. Looking at the cross-norm inhibition effect appears particularly promising, as it allows us to empirically separate triggers and consequences more clearly. By this and by manipulating the experimental stimulus, one can avoid the basic problem in observational studies that disorder and crime may merely be different dimensions of the same variable (see Sampson and Raudenbush, 1999).

Local social capital and the strength of disorder effects

As beliefs on other people's capacity and willingness to sanction norm violators form the crucial ingredient of our theoretical considerations, we substantiate our argumentation with respect to social capital. Since the concept of social capital is used rather vaguely and inconsistently in the literature, we first outline basic notions of the term and, second, explicate its relationship to the expected level of social control and the enforcement of social norms.

Broadly speaking, there are two traditions in the interpretation of social capital (for reviews see Franzen and Pointner, 2007; van Deth, 2003). While some scholars define social capital as network-based resources (e.g. Bourdieu, 1984; Burt, 1992; Granovetter, 1973), others see the degree of generalized trust as well as shared norms and values on the level of a community or society at the core of this concept (e.g. Fukuyama, 1995; Putnam, 2000). Integrating both perspectives (e.g. Coleman, 1988, 1990), one can argue that frequent interactions within a group of people stimulate norms of reciprocity and foster mechanisms of reputation. Hence, strong integration should motivate individuals to bear costs of sanctioning, both to defend a group's common values as well as to indicate membership to a specific group.

Moreover, social capital allows for a spatial interpretation. The concept of local social capital reflects a neighborhood's capability for informal social control (e.g. Coleman, 1990; Ostrom, 1999; Ostrom and Ahn, 2003). Others (Brown et al., 2004; Sampson and Raudenbush, 1999; Sampson et al., 1997, 2002) speak in a similar meaning of a neighborhood's collective efficacy, if shared expectations for social control exist and there is a perceived willingness of residents to intervene in cases of norm violations. Again, social interactions are the micro-mechanisms fostering or impeding the emergence of generalized trust and shared norms (Coleman, 1990), which proved to be strongly associated with the degree of informal social control and the extent of norm violations in a neighborhood (Coleman, 1988; Markowitz et al., 2001; Silver and Miller, 2004; Steenbeek and Hipp, 2011).

Consequently, a neighborhood highly endowed with social capital should exhibit stronger social control. Therefore, rational actors should take into

account the extent of social capital in a specific area when estimating the probability of sanction and deciding whether to violate a norm or not.

In addition to this generally negative *local social capital effect* on the rate of norm violation, we propose that the signaling effect of disorder varies with the degree of local social capital. If local social capital is low, it is more likely that people feel less attached to their neighborhood, care less about actions of others in the area, or just moved there and do not know anyone. Signals of low social control are not very informative in these areas, since it is common knowledge that crime rates and disorder are usually high in neighborhoods which are low in social capital. The signal is consistent with individuals' expectations about the behavior of neighbors and therefore should not trigger additional norm violations. Hence, the signal of disorder is weaker in low social capital contexts.

In contrast to that, if an area is highly endowed with social capital, people care more about actions of others, and they are more apt to conform to their behavior. Moreover, disorder is an especially strong signal in high social capital areas, because the signal conflicts with expectations derived from local social capital. Thus, we propose an *interaction effect of disorder and social capital*: the effects of physical and social disorder on norm violations are expected to be stronger in neighborhoods with higher social capital. The proposed interaction implies that the consequences of local social capital are partially substituted by the information derived from disorder signals.

Experimental design

In order to test the implications of our framework we conducted three field experiments in Munich, Germany. Each study represents a separate experiment, where subjects, acting in their natural environment, did not know they were taking part in a concealed inquiry. In all field experiments we used a (physical or social) disorder treatment to test for an increase in subjects' norm violations. Studies 1 and 2 investigate the same-norm inhibition effect, while study 3 examines the spillover of norm violations from one rule to another. As the scope of our theoretical approach aims at minor norm violations, our experiments focus on minor offenses, i.e. littering, jaywalking, abstaining from helping. Only in study 3 we introduce higher stakes for deviance, testing the scope of our explanation of norm violation. Extending previous results (Keizer et al., 2008) this stealing experiment provides first evidence on the applicability of the BWT to high-cost situations.[1] Although our field experiments neglect the randomization of participants into specific experimental conditions, the systematic variation of treatments and the non-reactive set-up in a common real-world situation provide for high internal

and external validity. In their basic set-up studies 1 and 3 are replications of field experiments conducted by Keizer et al. (2008) in Groningen, The Netherlands. Study 2 represents a new design to test for the causal effect of social disorder. In addition, to test for an interaction effect between disorder and the expected level of social control, we chose experimental locations with varying degree of local social capital. To identify locations differing in social capital, we analyzed local social capital measurements from survey data (study 1) as well as from official census data (studies 2 and 3).

Study 1: Littering

Background. The first study examines the consequences of physical disorder and tests for a same-norm inhibition effect in the context of littering. The field experiment was staged at bicycle parking areas of two university dormitories in Munich (the selection of dorms is explicated below). We used garbage as our experimental treatment to reflect physical disorder. The outcome variable of interest is the number of incidents of additional littering by our participants. Our explanation of norm violation implies that observing a littered environment (i.e. physical disorder) increases the inclination of subjects to litter too, as the expected probability of getting sanctioned and/or the expected severity of a sanction decreases. As both mechanisms explaining the broken windows effect coincide in situations of diminishing marginal costs (i.e. violated norm and target norm are identical) the experiment does not allow for separating mechanisms 1 and 2.

Experimental set-up. To place our participants at both dormitories into a discrete choice situation for or against littering we followed the procedure proposed by Keizer et al. (2008). In July 2010 we attached a non-sense flyer with a rubber band to the handlebar of each bicycle in the parking areas of the dormitories. The flyer depicted a nonexistent car rental firm and read "We are new in town and wish everybody a wonderful Summer 2010", and thus was not prone to be kept by the participants but offered an instant object of littering. The flyers were attached to the handlebars in the early morning between 04:00 and 05:00. In order to use their bicycles, the dormitory inhabitants had to remove them from the handlebars of their bicycles (Figure 1(a)). Thereby, participants faced an incentive to litter as properly disposing of the flyer is obviously more tedious than just throwing it on the ground.

All discarded flyers were collected and counted on the same day in the afternoon (14:00). As littering represents a violation of the dorms' official rules and generally dorms in Munich are kept surprisingly clean, each discarded flyer can be interpreted as a violation of the target norm. Since there were no trash cans

Figure 1. Flyers attached to bicycles; disorder condition in the parking area.

Table 1. Number of cases across dormitories and experimental conditions.

Social capital	Condition	Number of flyers prepared in the morning	Number of flyers still attached in the afternoon	Effective number of cases	Number of flyers properly disposed of	Number of flyers discarded to the ground
Low	Control	96	59	37	20 (54.05%)	17 (45.95%)
	Treatment	110	71	39	15 (38.46%)	24 (61.54%)
High	Control	81	43	38	29 (76.32%)	9 (23.68%)
	Treatment	99	49	50	26 (52.00%)	24 (48.00%)

in the parking area itself, all missing flyers were interpreted as being orderly disposed of (i.e. not littered). Since not all students used their bicycles on the days of the observation, the effective number of cases per experimental condition is calculated as the difference between the number of flyers attached in the morning and the number of flyers still attached in the afternoon (Table 1). Variations of case numbers are due to differences in the number of parked bicycles as well as differences in the daily use of bicycles.

The field experiment was first conducted in a clean setting of the parking areas of both dormitories. These observations serve as the control condition. In a repetition 1 week later both parking areas were heavily littered with garbage (Figure 1(b)), using 7 rubbish bags, 14 empty bottles, and 4 cardboard boxes for a disorder condition at each location.[2] The disorder treatment was explicitly visible upon entering the parking area and could be seen from every location within the parking area. Weather conditions did not vary across treatments and dormitories.

Measurement of local social capital.   Extending the original design by Keizer et al. (2008) we chose locations with varying levels of social capital. This allows us to test for the proposed negative social capital effect on norm violations as well as the suggested interaction effect between disorder and the level of local social capital. We started off by assessing the local social capital prevailing in 10 major university dormitories in Munich with a 3-page paper-and-pencil questionnaire (the survey was conducted 2 weeks before the first experiment took place). The questionnaire was distributed to student inhabitants at the main entrance of each dormitory during weekdays between 17:00 and 20:00. With a participation rate of roughly 50% the number of returned questionnaires totals 265 ($n \approx 27$ per dormitory). We collected data on four dimensions of perceived local social capital (Table 2): since Kasarda and Janowitz's (1974) influential paper the relatedness of residents to a place has been a commonly used dimension (e.g. Brown et al., 2004). Furthermore, the frequency (e.g. Bellair, 1997; Brown

Table 2. Measurement of local social capital in 10 dormitories.

Dimension (item)	Scale	Mean	SD	Subindex consistency (α)
Relatedness to dorm If I have personal problems, I can consult people in my dorm. I feel related to my dorm. If I move out, I will stay in contact to people from my dorm.	ordinal (0–10)	5.42	2.56	0.793
Frequency of shared activities Common cooking Common eating Common sports Common partying Common movie lending	ordinal (0–10)	4.06	2.33	0.812
Depth of contact How many people in your dorm would you call your friends? With how many people in your dorm will you stay in contact after moving out?	metrical (0–10)	5.40	5.13	0.806
Perceived cohesion Students in the dorm help each other. Students know each other well here. One can trust students in the dorm.	ordinal (0–10)	6.38	2.15	0.753

et al., 2003) and depth of respondents' contact to other inhabitants (e.g. Coleman, 1988, 1990) appears to be an important aspect of community life. Finally, we asked the residents about their perception of the social cohesion in the facilities (e.g. Oberwittler, 2004; Sampson and Raudenbush, 1999). We aggregated the answers to four standardized subindices (each ranging from 0 to 10) and subsequently merged them into a single index of self-reported local social capital (z-standardized with mean = 0 and SD = 1). The resulting index is highly consistent (α = 0.798), and values of local social capital vary considerably across dormitories (Figure 2). We used this index to distinguish between locations with high and low local social capital.
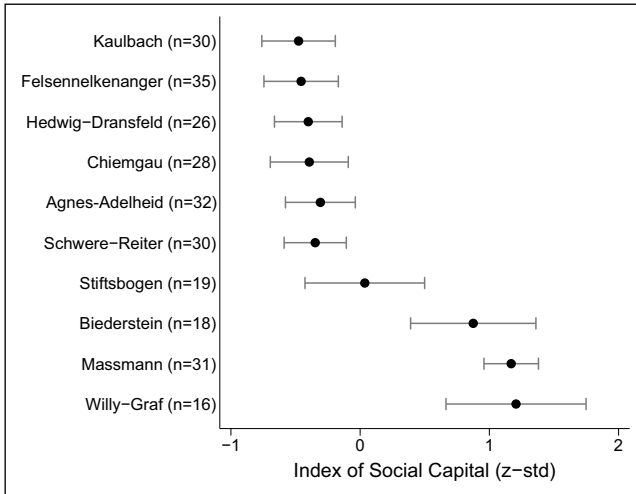
Figure 2. Local social capital across 10 dormitories (95% confidence intervals; number of respondents in parentheses).

Selection of experimental locations. According to our results, there are three types of university dormitories in Munich. Dormitories in the first group (*Kaulbach* to *Schwere-Reiter*) lack local social capital. The *Stiftsbogen* and *Biederstein* dormitories exhibit a higher degree of local social capital; however, variance of individual answers within these dormitories is too high to distinguish them statistically from either the first or the third type of dormitories. The third group consists of two dormitories (*Massmann* and *Willy-Graf*) with a high level of local social capital. Both locations differ significantly from the first group of dormitories ($p < 0.05$). It is worth mentioning that our findings correspond to the application procedure prevalent at the 10 dormitories: while dormitories with low and intermediate levels of local social capital employ a system of centralized application, where the majority of new inhabitants is assigned to a dormitory at random, *Massmann* and *Willy-Graf* use a self-organized "casting scheme", where student applicants are hand-picked by the inhabitants themselves. We interpret this congruence of our measurement with the application scheme as an external validation of our local social capital assessment. Thus, we selected *Kaulbach* as the low and *Massmann* as the high social capital location of experimentation.[3] Both dormitories are roughly equal in size (*Kaulbach* has 97 and *Massmann* 125 inhabitants) and are situated within the same urban district of Munich, but differ significantly in local social capital ($t = 5.238$; $p < 0.001$). Moreover, survey

participants of both dormitories had been living in their residence for 1.8 years on average, suggesting that dormitories are no transitory places, where inhabitants do not care much about preventing disorder or complying to social rules in general.

Study 2: Jaywalking

Background. In the second field experiment we investigate a same-norm inhibition effect of social disorder. As opposed to the case of physical disorder, in situations of social disorder norm violators are directly observable by others. Situations of easily observable social disorder frequently occur, for example, at traffic lights where pedestrians cross on red. This form of social disorder is the experimental stimulus as well as the outcome variable of interest. For offenders there is clearly an incentive to save time. However, in Germany and especially in Munich, crossing on red at pedestrian lights is frequently rebuked by bystanders as well as monetarily sanctioned by police. Thus, it classifies as a minor offense against the law and it is not just "city behavior" as it might be interpreted in the US and many other countries. Again, to test for the proposed interaction effect, we conducted the field experiment at pedestrian lights in four urban districts of Munich which differ in local social capital. Each pedestrian light is situated in proximity to a public transportation stop (approximately 500 meters), providing a frequent observation of passers-by.

Experimental set-up. At each of the four street crossings under consideration we defined the street side closest to the public transportation stop as the experimental location. Every passer-by who came alone and crossed the street at the pedestrian light was counted as a subject. Pedestrians, who simultaneously approached the street light and, clearly visible for the focal participant, violated the norm "Stop at a red light", served as the experimental stimulus. Hence, as in study 1 violated norm and target norm are identical. Observations of passers-by facing no or only law-abiding pedestrians serve as the control. Altogether, pedestrians were only counted as subjects if the signal was red and there was no traffic, i.e. crossing the street was principally possible. Moreover, we introduced a stimulus of physical disorder (one garbage bag, one cardboard box, and one empty bottle) next to the pedestrian light. At each location observations were taken for 2 hours on two weekdays in March 2012. Weather conditions were similar across treatment conditions and locations. To describe our sample the number of observations for both experimental conditions at each location is given in Table 3.

Measurement of local social capital. To identify urban districts with substantial differences in social capital we resort to district-level data from the City

Table 3. Number of cases across city districts and experimental conditions.

Social capital	Condition	Number of cases
Low	Control	129
	Treatment	16
High	Control	29
	Treatment	13

Table 4. Measurement of local social capital in 20 city districts.

Indicator	Description	Mean	SD
Voter turnout	Percentage of district's registered voters taking part in 2008 communal election	48.37	3.95
Share married	Percentage of district's inhabitants being married in 2009	38.53	4.64
Share children	Percentage of district's households with ≥1 child in 2009	18.18	3.77
Crime rate	Number of criminal acts per 100 inhabitants in 2009	5.02	1.42

of Munich (Munich Statistics Agency, 2010). We restrained from measuring social control on the individual level as in study 1, since on the district level the units of social capital formation are considerably larger and poorly confined. As local social capital is not easily observable, we constructed an index from related variables. Albeit these indicators hardly measure local social capital itself, as they are either preconditions or consequences of the concept to be measured, we believe that using corollaries of local social capital captures the concept quite well. Following the literature on local social capital (e.g. van Deth, 2003) the index consists of four district specific variables (see Table 4). First, political participation has been identified as a central corollary of local involvement (e.g. Perkins and Long, 2002; Putnam, 2000). Hence, we use the voter turnout in the latest communal election (2008) as an indicator for the level of neighborhood engagement. Second, the period of residence has been found to affect feelings of commitment and responsibility towards a neighborhood (e.g. Brown et al., 2003; Hipp and Perrin, 2006). We include two indicators which positively correlate with housing duration, i.e. the share of married inhabitants and the share of households with children. Both, being married and raising children are positively linked to increased neighborhood ties (e.g. Franzen and Pointner, 2007) and community participation (e.g. Putnam, 2000). Third, we include
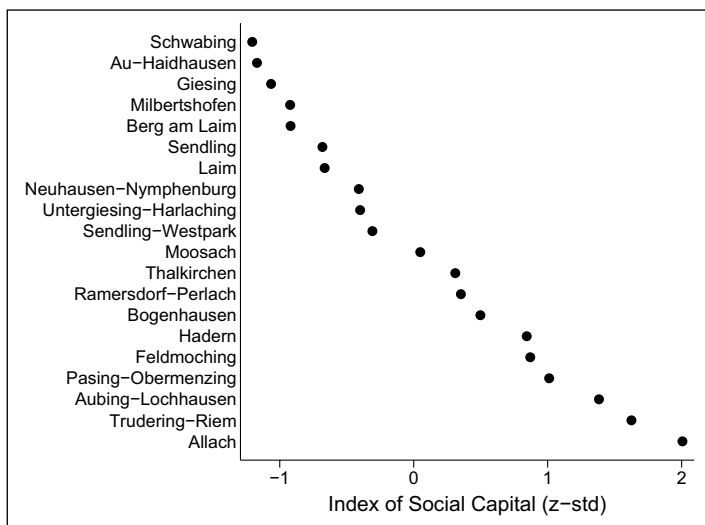
Figure 3. Local social capital across 20 city districts in Munich.

the inverse of the district specific crime rate, as it is a direct consequence of local social control (data from 2009). To ensure that participants in our field experiment live around the area of observation, we excluded all predominantly commercial districts from our analysis, leaving us with 20 mainly residential districts. With $\alpha = 0.761$ the index is highly consistent, and values vary substantially (Figure 3).

Selection of experimental locations. To test our hypotheses with regard to local social capital we selected four neighborhoods which substantially differ in this variable and offer a pedestrian street light which is suitable for our experimental set-up. After a visual examination of appropriate sites in neighborhoods with either high or low local social capital, we chose the districts of *Allach* and *Trudering-Riem* (high social capital) as well as *Schwabing* and *Giesing* (low social capital) for our field experiment. The selected districts strongly differ in local social capital, but are comparable in socioeconomic composition (e.g. age, gender, poverty rate, and unemployment; for data see Munich Statistics Agency, 2010). Being aware of the deficits of our social capital measurement we cross-validated our index with data on "social challenges" in the 20 districts under consideration (see Munich Sozialreferat, 2012). The official indicator consists of district-level variables measuring the number of interventions for child protection, the share of households supported by social workers, receiving

Figure 4. Pedestrian light in the condition of order and physical disorder.

child welfare, or depending on social welfare programs as well as the share of migrant inhabitants. Both measures yield similar results: while *Schwabing* and *Giesing* score high in "social challenges", *Allach* and *Trudering-Riem* feature very low values consistent with our measurement of local social capital.

To limit the influence of unobservables, the pedestrian lights had to provide a comparable situational context. The street lights we chose are particularly set up for pedestrians, each situated on a road of roughly equal size and with minor car traffic. There are no shops, restaurants, or bars near any of the four locations, and buildings or trees helped to conceal the experimenter (see Figure 4 for an example site).

Study 3: Helping and stealing

Background. In the third field experiment we test for cross-norm inhibition effects. Following Keizer et al. (2008), we used the lost letter technique (Merritt and Fowler, 1948; Milgram et al., 1965; Simmons and Zumpf, 1983) as well as a systematic variation of the degree of physical disorder to induce spillovers of norm violations. The outcome variables of interest are helping and stealing behavior. To incentivize norm violations the envelope displayed money (5, 10, or 100 Euros) through the address window. The experiment was conducted at public mail boxes situated in two urban districts of Munich with either high or low local social capital. Again, this variation allows to test for the suggested social capital effects.

Experimental set-up. In order to observe helping or stealing behavior of our participants we placed a "lost" letter in front of the mail box in each district. In contrast to Keizer et al. (2008), our "lost" letter was placed in front of the mail box (not sticking out of it), enabling us to observe three possible reactions by each passer-by: no action, stealing, or helping. While no reaction is
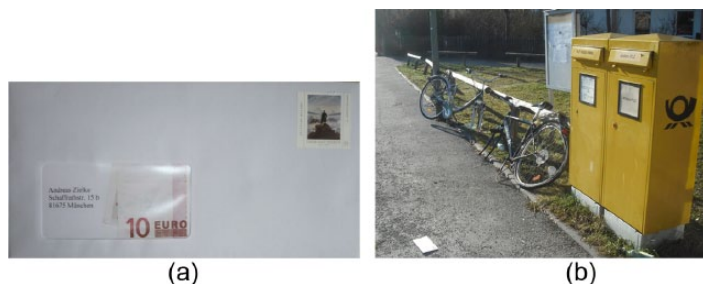
Figure 5. "Lost" letter with incentive to steal; disorder condition at a mail box.

Table 5. Number of cases per mail box and experimental conditions.

Amount displayed	Condition		Total
	Control	Treatment	
5 Euros	45	45	90
10 Euros	45	45	90
100 Euros	45	45	90
Total	135	135	270

a violation of the weak prosocial norm "Put lost letters in the mail box" we interpret stealing as a violation of the strong legal norm "Don't steal lost letters". Each letter was prepared with a visible incentive to steal (Figure 5(a)). In extension to Keizer et al. (2008), the amount displayed through the address window of the envelope varied between 5, 10, and 100 Euros. Taking into account that running off with a 5 or 10 Euro note is (legally as well as socially) less severely punished than stealing 100 Euros, the variation of notes gives some indication whether the explanatory power of the BWT decreases with the strength of norm violations (incentivization effect).

Each passer-by who noticed the clearly visible letter was counted as a subject. If the participant put the envelope in the mail box or stole it, the lost letter was replaced by a new one, once the passer-by had left the location. In both urban districts the procedure was repeated until there were 270 observations completed at each location (135 in the control and 135 in the treatment condition). After 45 observations the amount of money on display was changed. The number of cases per location is given in Table 5.

In the control condition the areas surrounding both mail boxes were kept clean. In the treatment condition we attached two heavily wrecked bicycles to a railing next to the mail boxes (Figure 5(b)). This stimulus of physical disorder was clearly visible for every passer-by. Data collection took 3–4

days per location and experimental condition (approximately 4 hours a day). The whole experiment was conducted on weekdays only, starting from early November to late December 2011. Control and treatment conditions were alternated twice, starting with a clean surrounding at both locations. Since we wanted to avoid the envelopes getting wet, the experiment was only staged on clear days. Thus, weather conditions did not substantially change throughout the experiment.

Selection of experimental locations. Based on the district-level assessment described in study 2 we staged the experiment at the two districts which rank highest (*Allach*) and lowest (*Schwabing*) in local social capital (Figure 3). *Allach* is a suburban residential area on the north-western outskirts of Munich with 29,000 inhabitants. *Schwabing* is a residential district located in central Munich with 128,000 inhabitants. Except for social capital, both districts are comparable in their sociodemographic composition. In each district we selected a suitable public mail box for experimentation. Both mail boxes had to be similar in location, visibility, and frequency of usage. Thus, we selected mail boxes located at broad and regularly frequented streets, both in proximity to public transportation stops (approximately 150 meters). Again, at both locations there were no shops, restaurants, or bars nearby. Both locations facilitated concealed observation from a parked car.

Results

The results section is structured in three parts. First, we present our evidence for the same-norm inhibition effect with respect to physical disorder (i.e. visual cues for previous norm violations; study 1) and social disorder (i.e. directly observed norm violations by others; study 2). Second, we describe our findings concerning the spillover of norm violations (study 3), where we distinguish between socially and legally enforced target norms and vary the incentive for deviance. Third, we summarize suggestive evidence on the effect of local social capital on the rate of norm violations as well as on the varying strength of disorder signals as a function of the degree of local social capital prevailing at the experimental location. To identify statistically significant differences between experimental conditions we report two-sided χ^2 tests.

Same-norm inhibition effect

Study 1: Littering. Results from the littering experiment clearly show a same-norm inhibition effect (Figure 6(a)). The frequency of norm violation is significantly higher when participants are confronted with the same norm
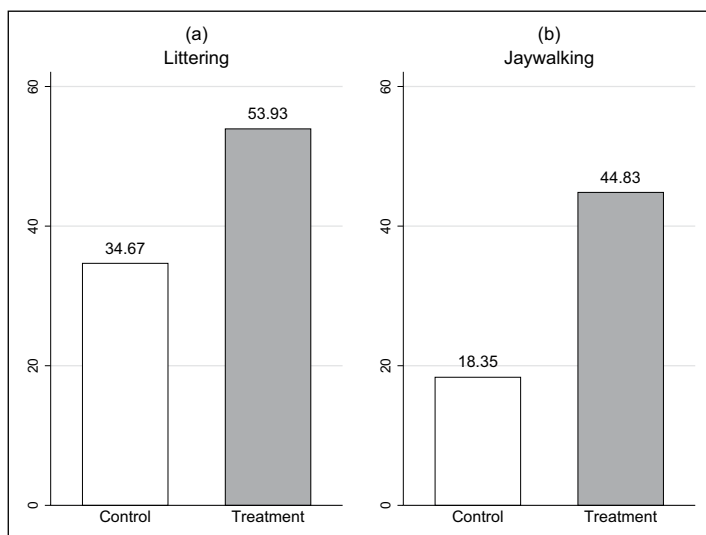
Figure 6. Same-norm inhibition effect.

already broken ($\chi^2(1, 164) = 6.101, p = 0.014$). Moreover, the observed rates of norm violation across both dormitories, 34.7% in the control and 53.9% in the treatment condition, correspond in direction and size to earlier findings from The Netherlands (Keizer et al., 2008).

Study 2: Jaywalking. In addition to this replication of earlier findings our experiment on jaywalking confirms the same-norm inhibition effect with respect to social disorder (Figure 6(b)). Across all four experimental locations participants facing pedestrians crossing against the light show a higher rate of deviance (44.8%) than subjects from the control group (18.4%). The difference in the rate of deviant behavior is highly significant ($\chi^2(1, 187) = 9.860, p = 0.002$). When introducing an additional stimulus of physical disorder we find no significant treatment effect. In a littered environment, however, the effect of social disorder is stronger ($\chi^2(1, 82) = 7.025, p = 0.008$) than in a clean setting ($\chi^2(1, 105) = 3.663, p = 0.056$). Interestingly, physical disorder reinforces the effect of social disorder.

Cross-norm inhibition effect

Study 3: Helping. Looking at the socially sanctioned target norm first, we find less helping behavior in the condition of physical disorder (11.9%) as compared with the control treatment (19.3%; see Figure 7(a)). Across both
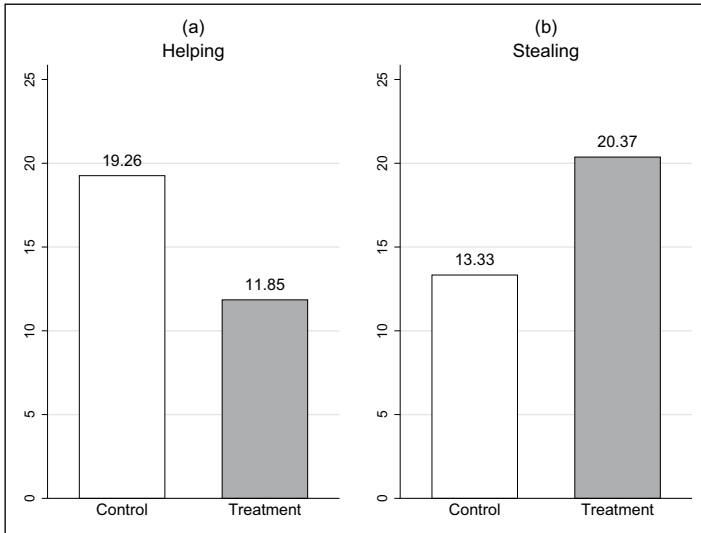
Figure 7. Cross-norm inhibition effect.

experimental locations this difference is significant ($\chi^2(1, 540) = 5.639$, $p = 0.018$). Clearly, this finding is consistent with mechanism 1 which implies a spillover effect of norm violations. Apparently, when exposed to physical disorder participants perceive the violation of minor norms as legitimate.

Study 3: Stealing. Also in the case of a legally sanctioned target norm there is evidence for the cross-norm inhibition effect. While in the clean condition 13.3% of our subjects steal the "lost" letter, the thieving rate increases to 20.4% in the face of physical disorder (Figure 7(b)). Again, the difference is significant ($\chi^2(1, 540) = 4.771$, $p = 0.029$). This finding closely corresponds to prior results from Keizer et al. (2008).

In addition, our variation of incentives to steal offers insights on the applicability of the BWT to situations of more severe sanctions. As mentioned above, we expect individuals to react to contextual cues more strongly in situations where norm violations are only moderately sanctioned. Hence, physical disorder should have a stronger effect on the rate of stealing when there is only a minor amount of money displayed through the address window of the envelope. Our results corroborate this consideration: envelopes containing a 5 Euro note are stolen far more often in the face of disorder (21.1%) than under a clean condition (10.0%) ($\chi^2(1, 180) = 4.229$, $p = 0.040$). If 10 Euro notes are on display, we find a slightly weaker treatment effect ($\chi^2(1, 180) = 2.756$,
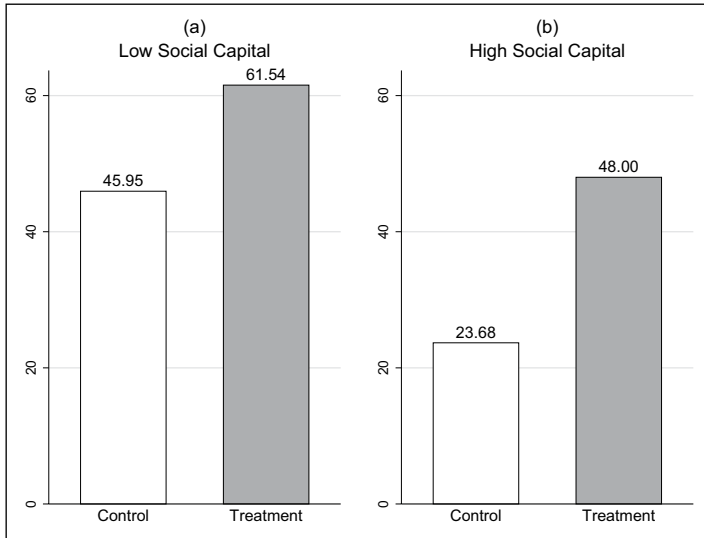
Figure 8. Disorder, social capital, and littering.

$p = 0.097$). In cases of 100 Euro notes, the disorder effect disappears completely ($\chi^2(1, 180) = 0.000$, $p = 1.000$). This finding is well in line with the incentivization hypothesis, according to which the relative importance of environmental cues diminishes with increasing costs and benefits.

Consequences of local social capital

Study 1: Littering. To check for an interaction of physical disorder and social capital we test for a same-norm inhibition effect separately at each dormitory (Figure 8). First, we find evidence for the main effect of local social capital. The basic rate of norm violation is higher if social capital is low ($\chi^2(1, 75) = 4.102$, $p = 0.043$). Second, a large and significant treatment effect occurs only at the high social capital location ($\chi^2(1, 88) = 5.447$, $p = 0.020$), while disorder has no significant effect at the low social capital location ($\chi^2(1, 76) = 1.858$, $p = 0.173$). Altogether, the differences-in-differences estimator shows that the disorder effect is 8.8 percentage points larger in the high social capital than in the low social capital scenario. This finding is in line with the proposed interaction effect of physical disorder and social capital.

Study 2: Jaywalking. A separate analysis for districts with high or low social capital provides no evidence for the main effect of social capital (Figure 9). As in the control condition the baseline rate of compliance is almost equal
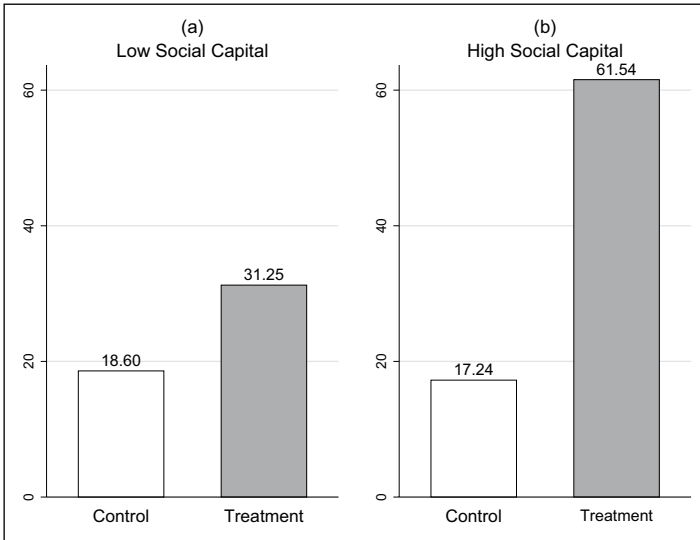
Figure 9. Disorder, social capital, and jaywalking.

across locations with high or low local social capital. However we find the expected interaction effect of social disorder and local social capital. While social disorder shows no significant effect in the low social capital scenario ($\chi^2(1, 145) = 1.423$, $p = 0.223$), there is a strong treatment effect in the districts with high social capital ($\chi^2(1, 42) = 8.241$, $p = 0.004$). As a consequence, the deteriorating effect of social disorder is 31.7 percentage points larger in "good" than in "bad" neighborhoods.

Study 3: Helping. Looking first at minor norm violations (i.e. the absence of helping behavior) our results reveal small but insignificant differences between locations with high (21.5%) and low social capital (17.0%). Nonetheless, we find a significant treatment effect at the high social capital location ($\chi^2(1, 270) = 6.224$, $p = 0.013$), with less than half as many helpers in the disorder as in the control condition (Figure 10). However, the rate of norm violation does not significantly change in the low social capital scenario ($\chi^2(1, 270) = 0.719$, $p = 0.396$). As a result, the spillover effect of norm violation is 7.4 percentage points larger in the city district with high local social capital. Just as in studies 1 and 2, this finding suggests a positive interaction of disorder and local social capital.

Study 3: Stealing. The basic level of stealing in the control condition is slightly lower if social capital is high (11.9% as compared with 14.8% when local
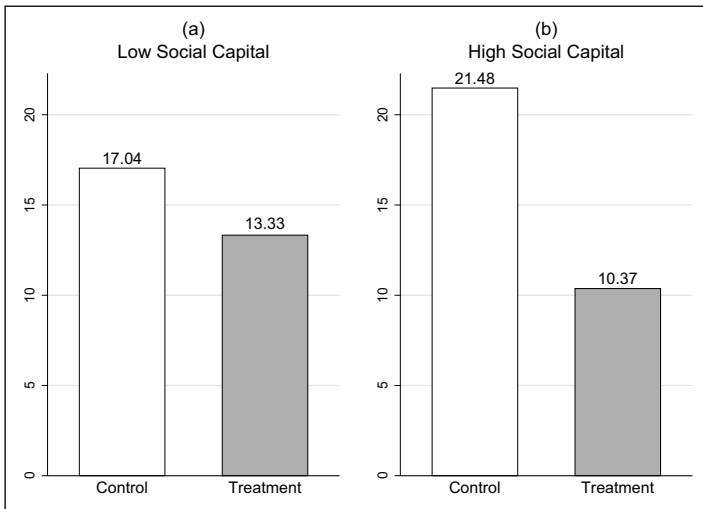
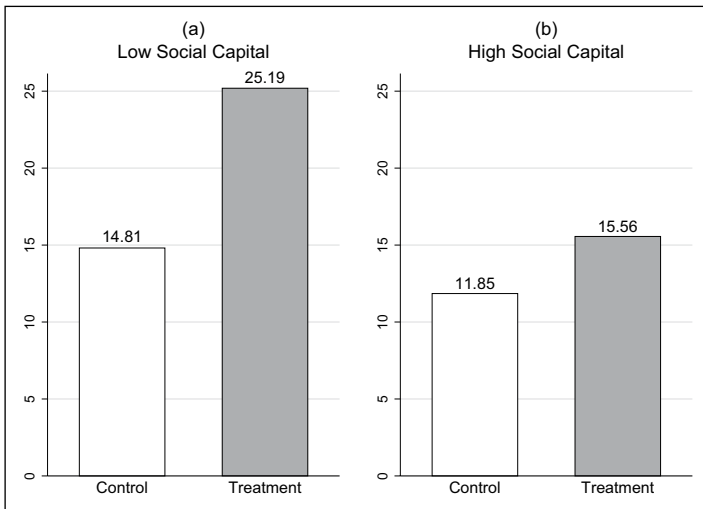**Figure 10.** Disorder, social capital, and helping.

Figure 11. Disorder, social capital, and stealing.

social capital is low; Figure 11). Disorder promotes stealing only at the low social capital location ($\chi^2(1, 270) = 4.537$, $p = 0.033$), whereas we find no significant treatment effect at the high social capital location ($\chi^2(1, 270) =$

0.783, p = 0.376). This finding clearly differs from our previous results on the interaction effect of disorder and social capital in low-cost situations. The seeming contradiction can be resolved by taking into account that costs and benefits are higher in the context of stealing. Once stakes are high, the relevance of environmental cues diminishes. A baseline expectation of sanctioning derived from the knowledge about local social capital dominates signals of disorder. Consequently, in high-cost situations behavior is only affected if both signals of low social control coincide. Unlike in cases of weak norms signals of order-maintenance are no substitute for a neighborhood's social capital in high-cost situations.

Discussion

We add to the debate about the BWT by presenting a rational choice explanation of norm-violating behavior, where the possibility of punishment is inferred from contextual cues in low-cost, but not in high-cost situations. Assuming that disorder signals reactions to previous norm violations we expected individuals to lower their beliefs on the probability and severity of social sanctions in situations with physical or social disorder. Since in high-cost situations it pays to invest in costly search to gain objective information on rates of punishment and to actively ponder the costs and benefits of deviance, our approach particularly applies to situations of minor norm violations. Varying the incentives for deviance we were able to investigate the scope conditions of the BWT. Furthermore, we extended the "broken windows" framework by the rather neglected influence of local social capital and its interaction with disorder. Thereby, the strength of the disorder signal and, thus, the effects of disorder should be stronger in high social capital contexts.

Following the interventionist approach of Keizer et al. (2008) we implemented three field experiments on littering, jaywalking, and helping/ stealing to test our theoretical considerations. Stimuli of physical disorder induced further littering, less helping, and more stealing of lost letters. Moreover, we were able to show a same-norm inhibition effect not only for physical, but also for social disorder. One conclusion from these findings is that early preventions of minor norm violations influence people's beliefs about the probability and severity of social sanctions and will avert further violations of the same norm as well as of different norms of minor severity.

Also consistent with our theoretical framework we found suggestive evidence on the consequences of local social capital of a neighborhood, which significantly moderates disorder effects. As theoretically expected, in the baseline condition of our experiments norm violations occurred less often in areas highly endowed with social capital. Moreover, in low cost situations

the reaction to the disorder treatment was significantly stronger in these districts. As expected, the strength of the signal varied with the social context. Public actions to remove disarray seem to be especially effective in "good" neighborhoods. However, this does not hold true for stealing for which we found a stronger treatment effect in the low social capital area. It appears that when target norms are rigorous, disorder seems to affect behavior only if social control is generally low. Unlike in cases of weak norms, such as anti-littering or helping conventions, order maintenance is no substitute for a neighborhood's collective efficacy.

In line with the incentivization hypothesis we found no disorder effect for stealing 100 Euro notes. This suggests that individuals care less about environmental cues in high-cost situations and, instead, ponder the actual net benefits from deviance. As costs and benefits of deviance increase, contextual cues become less important for individual decision making. Hence, we expect that disorder treatments have even weaker effects on more serious forms of crime than on deviant behavior, such as littering, jaywalking, abstaining from helping, and petty stealing. Consequently, fixing broken windows inhibits minor norm violations but might not avert serious crime: small-scale disorder breeds small-scale norm violation, but not necessarily crime at a high level. Still, since stealing a lost letter was the most severe crime we could induce in the experimental setting, we cannot definitely answer the question whether environmental cues are only relevant in cases of minor norm offenses.

Although our field experiments identify responses to quasi-random stimuli of different norm violations and appear to offer valuable insights on the effects of disorder on social norms, some drawbacks remain. First, the lack of more adequate measures of local social capital inhibited a better test of the extension of the theoretical framework by district-level social capital and its interaction with order maintenance. As suggested by Perkins and Long (2002) and van Deth (2003) we used voter turnout in the latest elections, the proportion of married inhabitants, the proportion of households with children, and the inverse crime rate as indicators for local social capital. These indicators are surely only imperfect measures for the theoretical constructs of interest, but, as our external validations suggest, they offer at least raw approximations.

Second, we could only provide suggestive evidence on the consequences of local social capital, since subjects were not randomly assigned to the different locations. Apart from our experimental conditions it is possible that locations with high or low social capital and the respective subjects of our study systematically differ in variables relevant for the outcome. We have, in fact, tested for local differences with regard to a series of variables which appeared to be important determinants of norm

violation and can rule out this possibility. As well, the fact that we found similar effects in three independent experimental studies at different locations increases our confidence in the validity of these results. However, we cannot finally rule out the possibility that unobservables on the individual and local level bias the estimates of local social capital effects and its interaction with disorder.

Third, questions on the relative importance of disorder signals and local social capital remain open to future research. On the one hand, our results indicate an interaction of both concepts. As a consequence, policies which try to outweigh disorder effects by increasing social capital might not be a panacea. Concerning minor norm violations, an increase in social capital strengthens disorder effects. On the other hand, higher levels of local social capital are associated with lower base rates of deviance. Since both concepts were treated as binary variables in this study, we cannot definitely answer the question how both effects combine. A precondition to determine the exact trade-off between the direct and indirect effect of social capital is to comparably measure both concepts. Such a measure would be a worthwhile contribution, yet, it is beyond the scope of this paper.

Finally, our field experiments do not allow us to study the cumulative spreading of disorder over longer periods of time. Such processes are frequently observed in the context of residential segregation, ethnic conflict and neighborhood decline, and play a crucial part in the theoretical discussion about "broken windows" effects. Thus, although our findings raise doubts about the importance of order-maintenance for the prevention of serious crime, our field experiments should not be understood as a final answer on the validity of the BWT.

Notes

1. Of course it would be interesting to study more serious crime. However, in our field experimental approach it is impossible to test the applicability of the

proposed theoretical mechanisms to severe crime, such as robbery, rape or murder.

2. The non-random ordering of treatment and control conditions opens the possibility that people may be willing to incur the cost of norm compliance once, but not twice. Students may become frustrated by finding the flyer again and simply throw it on the ground. Still, we deliberately chose this design in order to directly replicate the study by Keizer et al. (2008). For future research we recommend a random timing of treatment and control conditions.

3. Owing to the low number of respondents to our survey ($n = 16$) and therefore its unreliable social capital score *Willy-Graf* dormitory was excluded from the field experiment.

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