Physical Disorder, Social Capital, and Norm Violation

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January 2012

Abstract

Although controversial from the very beginning, the broken windows theory motivated a zero-tolerance policy in the U.S. and many other countries. Yet, does the prevention of physical disorder on the streets really inhibit crime? In this article we present the results from two field experiments showing that violations of a certain norm foster further violations of the same and different norms. Moreover, we find that disorder effects are significantly stronger in neighborhoods with high social capital and in case of minor norm violations. These findings substantially advance knowledge on the broken windows theory and inform policy makers that a zero-tolerance policy appears to reduce petty, but not necessarily serious crime and might work in "good" but not in "bad" neighborhoods.

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1 Introduction

In 2008 Keizer, Lindenberg, and Steg (KLS in the following) (*1*) revived the discussion on the broken windows theory (*2, 3*) with a highly influential paper in this journal. In a series of field experiments they showed that physical disorder (e.g., litter, graffiti) fosters additional norm violations and, therefore, the spreading of disorder (littering, nonconformity to trespassing, and stealing). Furthermore, disorder effects seem particularly strong if norms of physical order are made apparent by prohibition signs (*4*). Prior empirical findings on the broken windows theory were rather ambiguous (*5–13*) and did not allow decisive conclusions about causality. Hence, it remained unclear whether Kelling's and Wilson's (*2*) initial idea of a cumulative neighborhood decline induced by physical and social disorder holds and whether policing should concentrate on the prevention of minor norm violations. In this paper we add to this discussion in four ways: First, we replicate two of KLS's field experiments on littering and on stealing. Our results are fully in line with their findings. Second, we propose two simple theoretical mechanisms causing these effects: diminishing marginal costs and physical disorder as a signal for low social control. Third, we extend the discussion by local social capital of a neighborhood, which significantly moderates disorder effects. Fourth, we only find disorder effects for minor, but not for severe norm violations.

2 Theoretical Background

To clarify our theoretical argument we distinguish two kinds of norms in the broken windows context: violated and target norm (*14–16*). The violated norm refers to the experimental stimulus, which signals precedent norm violations by others (e.g., littering, spraying graffiti). The target norm, on the other hand, refers to behavioral expectations of subjects participating in the experiment. For example, in one of our experiments, subjects find a lost letter next to a littered mail box. Obviously, in this case 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 want to propose two mechanisms which bring about the effect of physical disorder on additional norm violations. (a) Diminishing marginal costs and (b) physical disorder as a signal for low social control. Mechanism (a) comes into effect if violated and target norm are identical. 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"). In contrast, mechanism (b) is more general since physical disorder signals the strength of norms and their enforce-

ment by the social environment. First, in case of physical disorder people might just imitate littering behavior of others ("if it's okay for everybody else to do it, it's okay for me"). This mechanism only holds if violated and target norm are identical. However, mechanism (b) can also foster violations of non-identical target norms, since it signals a lack of informal social control in a neighborhood. Obviously, nobody prevented norm violations or sanctioned them. Thus, physical disorder is expected to induce further violations of the same norm (*same-norm inhibition effect*) or spillover to a different target norm (*cross-norm inhibition effect*).

Moreover, since informal social control plays a central role for the broken windows thesis, it is straightforward to extend the theoretical framework by local social capital, which proved to be strongly associated with the degree of informal social control and the extent of norm violations in a neighborhood (*17–20*). By local social capital we mean generalized trust and shared norms and values in a neighborhood or community (*16, 21–25*). In our field experiments urban districts and university dormitories function as such geographically defined social spaces. Others (*10, 26–29*) 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 case of norm violations. Besides this general *local social capital effect* on the level of norm violation, we propose that the signaling effect (*30, 31*) of disorder varies with the degree of local social capital. If local social capital is low, people care less about actions of others. In other words, the signal of physical disorder is weaker in low social capital contexts. The signal is not very informative, since it is in line with social capital-based expectations about the behavior of neighbors. 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, physical disorder is also an especially strong signal in high social capital areas since the signal conflicts with expectations derived from local social capital. Thus, we propose an *interaction effect of disorder and social capital*: the effect of physical disorder on norm violations is expected to be stronger in neighborhoods with higher social capital.

3 Experimental Design and Results

In order to test for the four effects we conducted two field experiments. In both experiments we used a disorder treatment to test for an increase in subsequent norm violations. Additionally, we chose locations of experimentation with a varying degree of social capital.

Study 1. The first experiment examines a *same-norm inhibition effect* in the context of littering. It was staged at bicycle parking areas of two university dormitories in Munich

(Germany). Both dormitories are similar in size and location, but significantly differ in local social capital [$t = 5.238; P < 0.000$] (*32*). Following KLS (*1*), we attached a noticeable flyer from a nonexistent car rental firm, reading "We are new in town and wish everybody a wonderful Summer 2010" to the handlebar of each parked bicycle. After the owners picked up their bicycles in the morning we counted how many of these flyers were discarded to the ground (violation of the target norm). In the disorder treatment the otherwise clean parking areas were littered with heavy garbage (Fig. 1A). Our overall result clearly shows a same-norm inhibition effect. The frequency of norm violation is significantly higher when participants are confronted with the same norm already broken [$\chi^2(1, 164) = 6.101, P = 0.014$]. Moreover, the observed overall rates of norm violation (34.7% in the control, 53.9% in the treatment condition) correspond to earlier findings from the Netherlands (*1*).

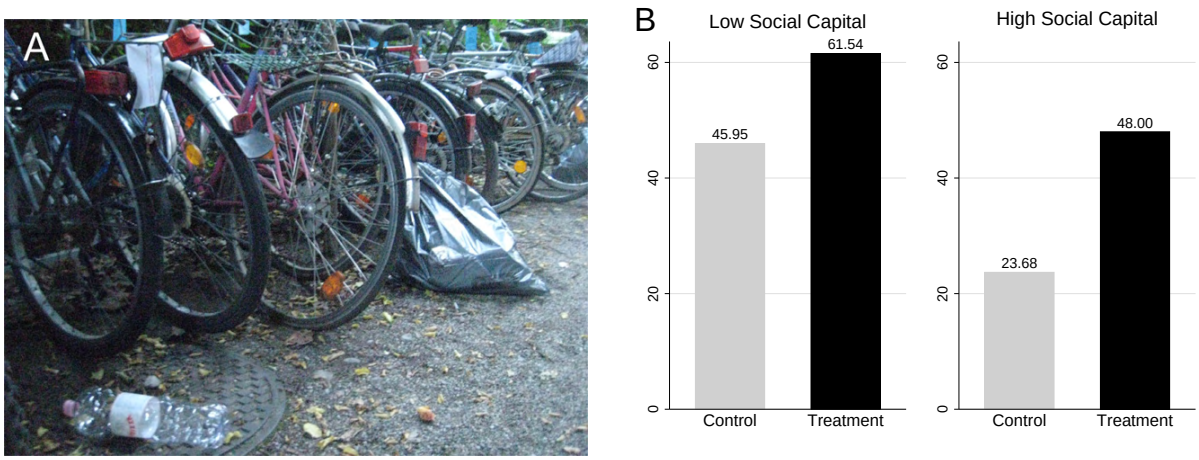

Fig. 1. Study 1: Same-norm inhibition effect. (**A**) Treatment condition in the parking area of a university dormitory. (**B**) Percentage littering at the low and at the high social capital location.

To test for an *interaction of disorder and social capital* we separately repeated the analysis for both dormitories (Fig. 1B). First, we find evidence for the local social capital effect: The basic level 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 disorder effect is 8.8 percentage points larger in the high social capital than in the low social capital scenario. This is in line with the proposed interaction effect of disorder and social capital.

Study 2. In the second field experiment we test for a *cross-norm inhibition effect*. Again following KLS (*1*), we used the lost letter technique (*33–35*) to observe spillovers of norm violations. In order to vary the degree of local social capital, the experiment was conducted at public mail boxes located in two urban districts of Munich. The districts we focus on rank

highest and lowest in local social capital, but are comparable in many other characteristics (*32, 36*). In contrast to KLS (*1*) 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 passerby: no reaction, stealing, or helping (Fig. 2). While the former is a violation of the weak prosocial norm "Put lost letters in the mail box" we interpret the second as a violation of the strong legal norm "Don't steal lost letters". Each letter was prepared with a visible incentive to steal; the displayed amount varied between 5, 10, and 100 Euros.

Fig. 2. Study 2: Treatment condition at a public mail box.

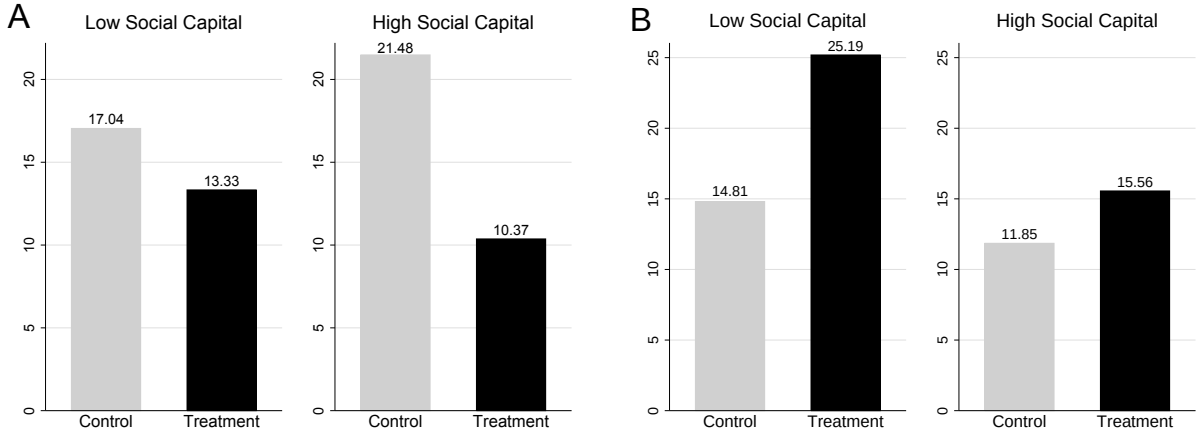

Fig. 3. Study 2: Cross-norm inhibition effect. (**A**) Percentage helping and (**B**) percentage stealing at the low and at the high social capital location.

In both urban districts passerby reactions were observed in a clean as well as a disorder condition. Looking at minor norm violations first (i.e. absence of helping behavior), we find a significant treatment effect in the high social capital scenario [$\chi^2(1, 270) = 6.224, P = 0.013$], with less than half as many helpers in the disorder as in the control condition (Fig. 3A).

However, the rate of norm violation does not significantly change in the low social capital scenario [$\chi^2(1, 270) = 0.719, P = 0.396$]. This makes the spillover effect of norm violation 7.4 percentage points larger in the city district with high local social capital, and, just as in study 1, confirms the interaction effect of disorder and local social capital. This overall result changes in the case of severe norm violations (i.e. stealing behavior; Fig. 3B): Disorder only promotes stealing 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 [$\chi^2(1, 270) = 0.783, P = 0.376$]. Thus, as long as target norms are rigorous, local social capital seems to inhibit disorder effects. Across both locations of experimentation the rates of stealing amount to 13.3% in the control and 20.4% in the treatment condition [$\chi^2(1, 540) = 4.771, P = 0.029$]. Again, this finding closely corresponds to prior results from KLS (*1*). Moreover, regardless of the severity of a target norm the basic level of norm violation in the control condition is qualitatively lower if social capital is high – a finding consistent with the local social capital proposition.

Finally, our variation of incentives to steal offers another crucial extension of KLS's experiments. It shows that envelopes containing a minor amount of money (i.e. 5 or 10 Euro notes) are stolen far more often in the face of disorder (23.3%) than under a clean condition (12.8%) [$\chi^2(1, 360) = 6.778, P = 0.009$], while we find no treatment effect if 100 Euro notes are on display [$\chi^2(1, 360) = 0.000, P = 1.000$]. This holds for both locations of high and low social capital. The finding exemplifies that when exposed to disorder participants perceive minor norm violations as legitimate; however, severe violations such as stealing a high amount of money are less easily triggered by physical disorder. Thus, the "spreading of disorder" seems to be limited to weak forms of norm violation.

4 Conclusions

We were able to replicate two of KLS's (*1*) field experiments with remarkably similar results. Moreover, we proposed two simple mechanisms to explain same- and cross-norm inhibition effects, and extended the broken windows framework by two rather neglected aspects, the influence of local social capital and the severity of norm violations. One conclusion from these findings is that sanctioning and preventing minor norm violations does avert further violations of the same as well as different norms. However, this holds true only for violations of less severe norms. Thus, removing disarray from neighborhoods limits the spread of disorder and might save public budget in the medium and long run, but does not necessarily inhibit more serious crimes. Another conclusion is that the effectiveness of broken windows interventions critically depends on the social context. Unfortunately, early disorder preven-

tions appear to be especially effective in those neighborhoods, in which crime is already less problematic, namely those endowed with high local social capital. In contrast, areas with lower collective efficacy and higher crime rates profit less from reductions of physical disorder. Hence, preventing disorder should not serve as a panacea for reducing crime in "bad" neighborhoods.

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Acknowledgments: We thank the Ludwig-Maximilians University Munich for funding the project. We thank Andreas Bauer, Simon Foresta, Florian Haider, and Martina Kroher for excellent research assistance and Norman Braun, Jose Antonio Hernandez Company, and Patrick Riordan for helpful comments. M.K. and T.W. contributed equally to this work.

Supporting Online Material

Our research is based on two field experiments (conducted in Munich, Germany) and local social capital measurements from survey data (study 1) as well as official census data (study 2). In all experimental conditions, subjects did not know that they were participating in a concealed field experiment. The following material gives detailed information on the measurement of local social capital for the selection of our experimental locations and it provides further aspects of our set-up not covered in the article.

Study 1

The first field experiment was conducted in the Summer of 2010 at two university dormitories with either high or low local social capital.

Measurement of Local Social Capital. We started off assessing the local social capital prevailing in ten major university dormitories in Munich with a three-page paper-and-pencil questionnaire. The questionnaire was distributed to student inhabitants at the main entrance of each dormitory during weekdays between 5 and 8 p.m. 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: respondents' relatedness to the dormitory, frequency and the depth of respondents' contact to other inhabitants, and perceived cohesion (Tab. S1). We first aggregated the answers to four standardized sub-indices (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 ($\alpha = 0.798$) and its values vary considerably across dormitories (Fig. S1). We used this index to distinguish between locations of high or low local social capital.

Dimensions (Items)	Scale	Mean	SD	Subindex consistency (α)
Relatedness to dorm	**ordinal (0-10)**	**5.42**	**2.56**	**0.793**
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.				
Frequency of shared activities	**ordinal (0-10)**	**4.06**	**2.33**	**0.812**
Common cooking				
Common eating				
Common sports				
Common partying				
Common movie lending				
Depth of contact	**metrical**	**5.40**	**5.13**	**0.806**
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?				
Perceived cohesion	**ordinal (0-10)**	**6.38**	**2.15**	**0.753**
Students in the dorm help each other.				
Students know each other well here.				
One can trust students in the dorm.				

Table S1. Measurement of local social capital in university dormitories.

Selection of Experimental Locations. According to our results, there are three types of university dormitories in Munich: Hostels 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 hostels is too high to distinguish them significantly from either the first or the third type of dormitories. The third group consists of two hostels (*Massmann* and *Willy-Graf*) with a high level of local social capital. Both locations significantly differ from the first group of hostels ($P < 0.05$). It is worth mentioning that our findings correspond to the mode of application prevalent at the ten dormitories: While hostels 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 hostel at random, both, *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 to the application scheme as a validation of our local social capital assessment. Thus, we selected *Kaulbach* as the low and *Massmann* as the high social capital location of experimentation. Both dormitories are roughly equal in size (*Kaulbach* has 97 and *Massmann* 125 inhabitants) and are situated within the same

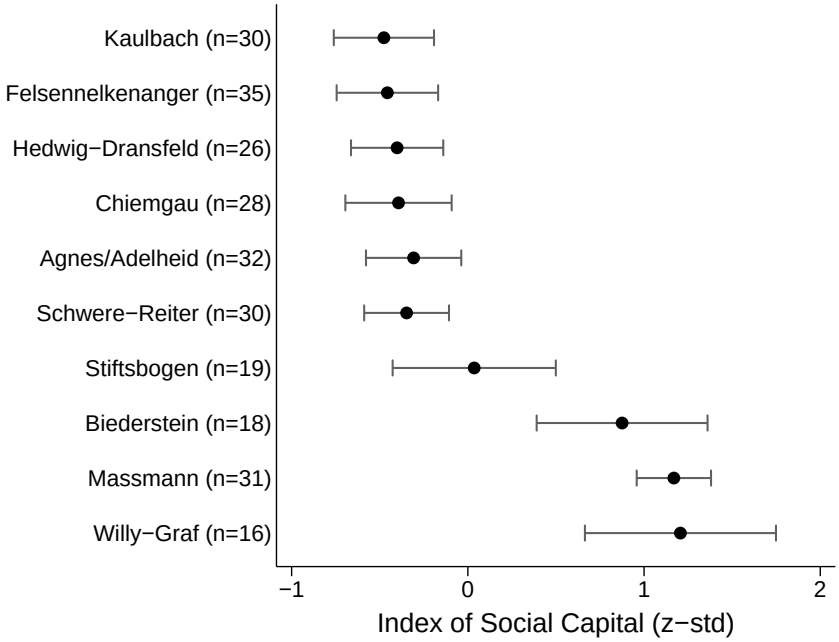

Fig. S1. Local social capital across university dormitories, 95% confidence intervals (number of cases in parentheses).

urban district of Munich. Because of the low number of respondents to our survey (and therefore its unreliable social capital score) *Willy-Graf* hostel was excluded from the experiment.

Detailed Experimental Set-up. To put our participants into a choice situation for or against littering we attached a non-sense flyer to the handlebar of each bicycle in the hostels' parking areas. The flyers were attached with elastic bands in the early morning between 4 to 5 a.m. In order to use their bicycles, the dormitory inhabitants had to remove it from the handlebar of their bicycle (Fig. S2A). All discarded flyers were collected and counted the same day in the afternoon (2 p.m.). Each one of them was interpreted as an incident of littering. Since there were no trashcans in the parking area itself, all missing flyers were interpreted as being orderly disposed (i.e. not littered). Since not all bicycles were used on the days of the experiments, 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 (Tab. S2). Variations of case numbers are due to differences in the number of parked bicycles as well as differences in the daily use of bicycles.

Dormitory	Condition	No. of flyers prepared in the morning	No. of flyers still attached in the afternoon	Effective no. of cases	No. of flyers properly disposed	No. of flyers discarded to the ground
Kaulbach	control	96	59	37	20 (54.05%)	17 (45.95%)
	treatment	110	71	39	15 (38.46%)	24 (61.54%)
Massmann	control	81	43	38	29 (76.32%)	9 (23.68%)
	treatment	99	49	50	26 (52.00%)	24 (48.00%)

Table S2. Number of cases across university dormitories and experimental conditions.

The experiment was first conducted in the natural (i.e. clean) setting of both dormitories' parking areas. These observations serve as the control condition. In a repetition one week later both parking areas were littered with heavy garbage, using 7 rubbish bags, 14 empty bottles, and 4 cardboard boxes at each location. The garbage 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.

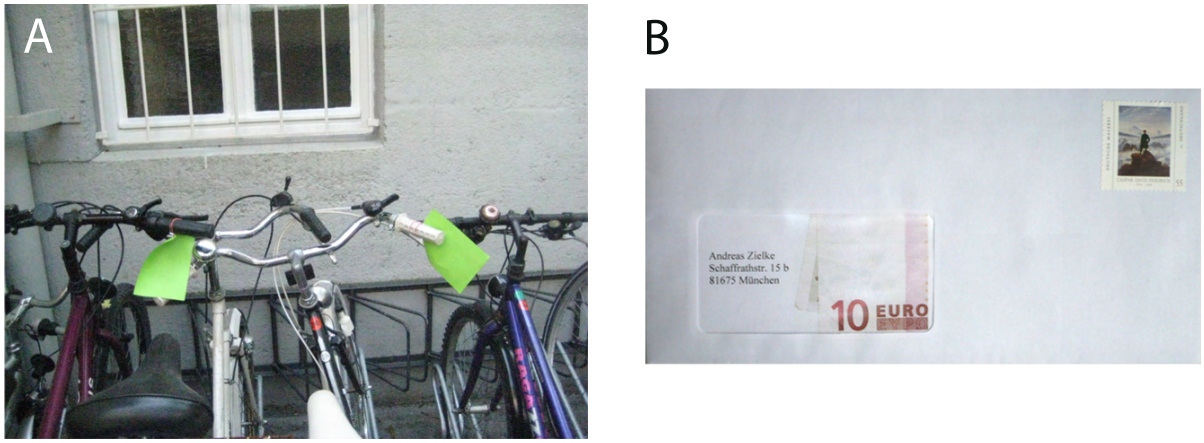

Fig. S2. Experimental set-up. (**A**) Study 1: Flyers attached to bicycle handlebars. (**B**) Study 2: "Lost" letter with a 10 Euro incentive to steal.

Study 2

Our second field experiment was conducted in the Autumn and early Winter of 2011 at public mail boxes in two urban districts with either high or low local social capital.

Measurement of Local Social Capital. In order to identify two urban districts with substantial differences in collective efficacy we constructed an index of local social capital

on the district-level based on official data from the City of Munich (*36*). 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 21 mainly residential districts. Following the literature on local social capital (*23, 25*) the index consists of four district specific variables: the voter turnout in the latest communal election (2008), the share of married inhabitants, the share of households with children, and the inverse of the crime rate (data from 2009). With $\alpha = 0.761$ the index is highly consistent and values vary substantially (Fig. S3).

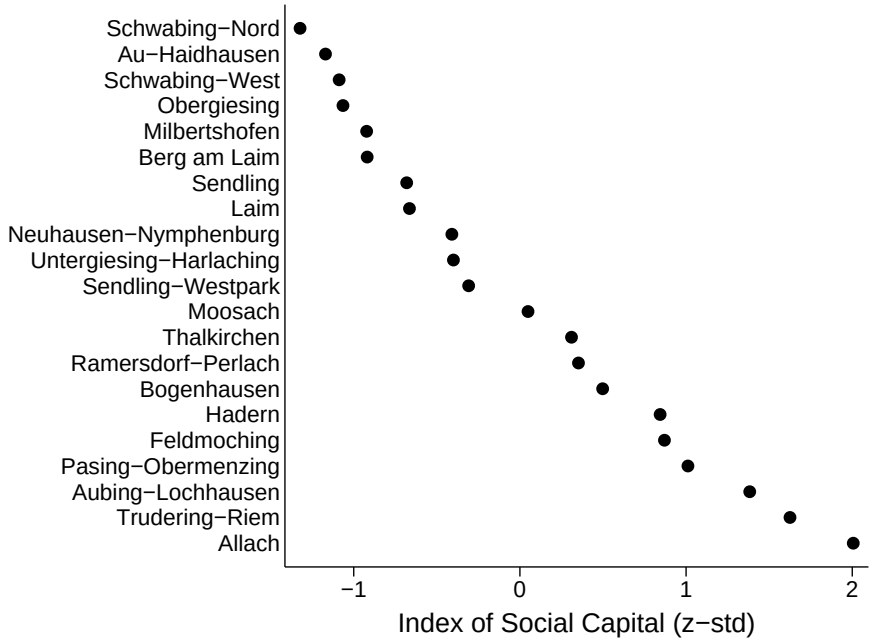

Fig. S3. Local social capital across 21 urban districts in the City of Munich.

Selection of Experimental Locations. We staged the experiment at the two districts which rank highest (*Allach*) and lowest (*Schwabing-Nord*) in local social capital. *Allach* is a rather suburban residential area in North-Western Munich with 29,000 inhabitants. *Schwabing-Nord* is a residential district located in central Munich with 65,000 inhabitants. Apart from social capital both districts are comparable in their sociodemographic composition (e.g., per capita income, age, gender, unemployment and poverty rate). In each district we selected a suitable public mail box for experimentation. Both mail boxes had to be comparable 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

sites. At both locations there were no shops, restaurants, or bars nearby. Moreover, both locations faciliated concealed observation from a parked car.

Detailed 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. Each letter was prepared with a visible incentive to steal (Fig. S2B). The amount displayed through the envelope's address window varied between 5, 10, and 100 Euros. From the parked car each passerby who noticed the highly 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 passerby 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 S3.

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

Table S3. Number of cases per mail box.

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 right next to the mail boxes. This disorder stimulus was clearly visible for each passerby. Data collection took three to four days per location and experimental condition (approximately four hours a day). The whole experiment was conducted at weekdays only, starting from early November to late December 2011. This two-month period allowed for prolonged gaps between days of experimentation. 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 at clear days. Thus, weather conditions did not substantially change throughout the experiment.