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Did Strategic Bombing in the Second World War lead to "German Angst": A large-scale empirical test across 89 German cities

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Abstract

A widespread stereotype holds that the Germans are notorious worriers, an idea captured by the term, *German Angst*. An analysis of country-level neurotic personality traits (Trait Anxiety, Trait Depression, and Trait Neuroticism; $N = 7{,}210{,}276$) across 109 countries provided mixed support for this idea; Germany ranked 20th, 31st, and 53rd for Depression, Anxiety, and Neuroticism respectively suggesting, at best, the national stereotype is only partly valid. Theories put forward to explain the stereotypical characterization of Germany focus on the collective traumatic events experienced by Germany during WWII, such as the massive strategic bombing of German cities. We thus examined the link between strategic bombing of 89 German cities and today's regional levels in neurotic traits ($N = 33{,}534$) and related mental health problems. Contrary to the WWII-bombing hypothesis, we found *negative* effects of strategic bombing on regional Trait Depression and mental health problems. This finding was robust when controlling for a host of economic factors and social structure. We also found Resilience X Stressor interactions: Cities with more severe bombings show more resilience today: lower levels of neurotic traits and mental health problems in the face of a current major stressor – economic hardship.

Keywords: German Angst; Neuroticism; Personality; Strategic Bombing; Resilience; Cities; World War II

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Did Strategic Bombing in the Second World War lead to "German Angst": A large-scale empirical test across 89 German cities

"They sowed the wind, and now they are going to reap the whirlwind"
Sir Arthur Harris – Commander of the Royal Air Force Bomber Command
(Originally from the Book of Hosea in the Hebrew Bible, Hosea 8-7)

Germans are often characterized by a suite of rather positive traits, such as industriousness, sense of order, discipline, and punctuality. These positive virtues are widely thought to contribute to the recent economic and social success of German society, even in times of major economic recessions, such as the Great Recession of 2008-2009 (Audretsch & Lehmann, 2016). However, some traits associated with German are less positive. For example, another widely held belief is that Germans are notorious worriers (Fersch, 2012; Frevert & Jensen, 2010). This belief—some call it "The German Disease" (Bode, 2006)—has even made it into the English language in the term, *German Angst*, a phrase that uses the German word Angst, meaning anxiety, worries, or fear (e.g., BBC, 2012; Deutsche Welle, 2016).

From a scientific perspective, *German Angst* can be understood as a national stereotype. The study of national stereotypes has been a topic of research in social and personality psychology for many decades (Madon, 2001; Gilbert, 1951; Terracciano et al., 2005). Research suggests that such stereotypes are widely held but their validity is often suspect (Terracciano et al., 2005). Nevertheless, the scholarly examination of *German Angst* has received surprisingly little attention to date, with virtually no empirical research on *why* Germans might have developed this supposed tendency for worrying. According to the Online Etymology Dictionary the term *German Angst* was introduced in 1849 by George Eliot and was used by Sigmund Freud before WWII. However, usage of this term has grown exponentially since the 1960s. One factor often proposed as the root of modern-day *German Angst* is World War II (WWII; Bode, 2006).

The WWII Hypothesis

Speculation about the possible causes of *German Angst* has been the subject of ongoing debate. Many authors refer to former German Chancellor Helmut Schmidt, widely regarded as one of Germany's leading post-war intellectuals, who in 2011 claimed, "The Germans have a tendency to be afraid. This has been part of their consciousness since the end of the Nazi period and the war". In doing so, he drew attention to the collective residual trauma of WWII that might have left its imprint on the German psyche (Bode, 2006). This broad idea has been echoed by scientists, especially in light of new insights emerging from epigenetic research. For example, when speaking about the scope and origins of *German Angst* in his presidential address to the 62nd Annual Meeting of the Max-Planck-Society (Germany's leading society for basic research), Peter Gruss (2011), himself a renowned expert in developmental biology, indicated that Helmut Schmidt might indeed be right, in view of new research findings; WWII trauma might have left a mark that is still expressed today via epigenetic mechanisms, which have imprinted major traumatic experiences deep within individuals' and generations' biological and psychosocial systems (Feil & Fraga, 2012).

The WWII Hypothesis raises two key questions: First, how would *German Angst* and related chronic worries (e.g., higher collective scores in neurotic personality traits such as Anxiety, Depression, and Neuroticism) have emerged in the first place due to WWII trauma? And second, if *German Angst* was indeed present in the immediate wake of WWII, why would it have persisted over time and generations?

Strategic Bombing as Potential Source of German Angst

WWII (1939 – 1945), widely regarded the biggest military conflict in the history of humankind, brought major anguish and misery to human civilization including the Holocaust with around six million Jews killed by the German Nazi regime, an estimated 21–25 million soldiers killed in battle, and an estimated 50–55 million civilians who lost their lives.

By the end of the war, Germany, and its cities in particular, essentially consisted of a destroyed battlefield. During the 1940 – 1945 period, and particularly over the last 3 years of the war, German cities were bombed heavily by allied forces, mainly by the British Royal Air Force and the United States Army Air Forces. Many cities were largely destroyed, including big cities like Hamburg ("Operation Gomorrah", Thiessen, 2005, which British officials later called "The Hiroshima of Germany" [www.nationalarchives.gov.uk/cabinetpapers/help/glossary-b.htm]), Dresden (Biddle, 2008), and Berlin (Demps, 2012), as well as many smaller cities like Wuppertal or Paderborn (Brakman, Garretsen, & Schramm, 2004). A great number of cities were bombed several times (e.g., Cologne more than 150 times or Berlin more than 300 times) and the bombing often occurred in unpredictable waves with only a short warning for the local populations. In Berlin alone, British bombers dropped over 45 thousand tons of bombs and American bombers dropped a further 23 thousand tons. In Dresden, over the course of three days in February 1945, British and American bombers dropped around four thousand tons of bombs and incendiary devices causing major destruction and firestorms. Reliable data on the total number of fatalities resulting from the strategic bombing of German cities do not exist, but the numbers are likely to be in the hundreds of thousands.

From March 1942, the British enacted a new targeting strategy. Instead of focusing primarily on factories and military targets, the British set out to demoralize the general population (Harris & Cox, 1995; Werrell, 1986). To achieve this goal, the British bombing strategy focused on city centers with the central aim of inflicting damage on the civilian population. The main goal was to break the morale of the German population by delivering massive, unpredictable air strikes that caused major destruction of buildings, high death rates among civilians, and a break-up of infrastructure, resulting in problems such as hunger or lack of medical supplies. In practice, this made every German city a potential target, not just those with industrial or military assets (Harris, 1947). Sir Arthur Harris – the commander of the Royal

Air Force Bomber Command – described this targeting policy thus: "But it must be emphasized… that in no instance, except in Essen, were we aiming specifically at any one factory… the destruction of factories, which was nevertheless on an enormous scale, could be regarded as a bonus. The aiming points were usually right in the center of the town… it was this densely built-up center, which was most susceptible to aerial attack with incendiary bombs." (Harris, 1947, p. 147). The aim of the British was "unambiguously stated [as] the destruction of German cities, the killing of German workers, and the disruption of civilized life throughout Germany" (Garrett, 1993).

In contrast, the American bombing strategy aimed to bomb targets of military and economic importance. However, in practice the accuracy of this so-called "Precision bombing" was limited because the daylight attacks had to be conducted in defensive formations due to enemy fighters. It has been estimated that only 35-40% of the bombs dropped were within one thousand feet of the aiming point (Werrel, 1986) resulting in much collateral damage to civilian areas. Moreover, the Americans also participated in the bombing of city centers such as in Dresden. For a detailed description and discussion of the strategic bombing of Germany between 1940 and 1945 see Friedrich (2008).

The people in these cities were not completely unprotected. During the bombings, the populations of the cities under attack were urged to seek relative safety in bomb-proof basements and air-raid shelters, where they had to wait for many frightening hours or sometimes days, waiting for the noise of the bombs above their heads to end. These shelters saved many lives but the experience of being under attack must have been highly traumatic for the many people subjected to this extreme situation, with its paralyzing loss of control, and the uncertainty about whether oneself and one's family would survive, and whether a future "normal" life would ever be possible again.

Given the devastation leveled against so many German cities and citizens, it seems plausible that the war itself and Germany's subsequent defeat in it might have traumatized the

Germans who survived it. Indeed, the massive strategic bombing of the population's home cities is likely to have been particularly traumatic, resulting in the long-term expression of neurotic personality traits, such as anxiety and depression. The documented effects on the populations of the bombed cities clearly meet the criteria for trauma causes (McCann & Pearlman, 1990). Accordingly, many deem the systematic strategic bombing of German cities, with its specific goal of demoralizing the general German population, to be a key source of *German Angst* (Bode, 2006).

Arguments for the Intergenerational Transmission of German Angst

Why would *German Angst*, which might have originated in the air raid shelters of the bombed cities at the end of WWII, persist until today? Several mechanisms can explain how angst could persist.

First, epigenetic research indicates that major stress and traumas can affect individuals' well-being in an enduring manner across the life-course and even across generations via biological mechanisms. Non-human and human research has shown that traumatic environmental conditions (e.g., major famine or Holocaust exposure) can cause epigenetic changes that persist throughout life (Heijmans et al, 2008; Yehuda, Daskalakis, Bierer, Bader, Klengel, Holsboer, & Binder, 2016). In a review article on research on the intergenerational transmission of stress, Bowers and Yehuda (2016) conclude that little "controversy regarding intergenerational transmission of stress exists today, as transmission has been documented across species, cultures, trauma types, and for a variety of psychiatric disorders." (p. 11). Hence, it is at least possible that traumas resulting from the strategic bombing of Germany might have had epigenetic consequences that affected not only the generations experiencing these air strikes, but also their offspring and subsequent generations (Gottlieb 2003, Gruss, 2011).

Second, *German Angst* might have persisted through informal and formal institutions that shape the local culture (Rentfrow, Gosling, & Potter, 2008). Remnants of the destruction and traumas of WWII bombing are still present in these German cities; for example, memorials

such as the Berliner Gedächtniskriche ("Memorial Church"), which was heavily destroyed in air raids, has been kept in its destroyed condition as a memorial of the war. Many Germans know that the somewhat sober, joyless, and purposive post-war architecture dominating many German cities today was necessitated by the massive destruction of the beautiful old city centers. Dresden was once known as the German Florence and Jewel Box due to its unique baroque and rococo city center, but after the air raids, this cultural heritage was largely destroyed. The ruins of the destroyed Dresden Frauenkirche ("Church of our Lady"), once one of the city's landmarks, were left for 50 years as a memorial to the war in the new city center. The bombings are also subject to major movie productions, such as the 2006 television film, "Dresden" directed by Roland Suso Richter. The national anthem of the socialist East German State (German Democratic Republic), which existed between 1949 – 1990 (German Democratic Republic) was called Auferstanden aus Ruinen ("Risen from Ruins"), a direct reference to the destruction of German cities. Together, the bombings marked major turning points in the histories of the bombed cities, so even today there are daily reminders of this legacy, potentially still exerting an influence on the psyche of the people who live there.

Third, many cities are still *directly* dealing with the effects of the WWII bombings. German cities are "littered" with unexploded bombs lying in the ground. When these unexploded bombs are found (e.g., during construction work), the cities are put under unpredictable, immediate threat because many of the bombs are still dangerous. For example, in December 2016 around 54,000 people had to be evacuated in the city of Augsburg due to a WWII bomb found during constructions. In December 2011, half of the population of Koblenz (about 45,000) was evacuated because bomb-disposal experts had to deactivate two large bombs discovered in the riverbed of the Rhine river during a dry spell. In May 2015, 20,000 Cologne residents were forced to leave their homes because of a bomb found during construction work. In August 2012, experts had to detonate a 250-kilo bomb in the middle of Munich because it could not be deactivated. Experts estimate that many thousands of

unexploded and potentially active bombs are still "sleeping" in the soil of German cities. Hence, the specter of the bombings will remain over German cities for many years to come.

Fourth, the bombing may have resulted in founder effects, as a result of differential migration or survival. For example, the more neurotic residents may have been more alert to the possibilities of bombing raids and the first ones to seek safety when the raids came; such behaviors could result in founder effects such that the degree to which a city was bombed predicted the number of neurotic residents at the end of the war. This effect would be a result of selection (selecting individuals already high on neuroticism) rather than shaping (causing most individuals to become more neurotic). In light of the heritability of personality traits, these founder effects could be retained within a city via simple genetic transmission from one generation to the next.

We should note that our data do not permit us to distinguish between the four mechanisms described above or indeed even if any of them are at play. We present them here merely to argue that there are plausible mechanisms by which the effects of bombing raids carried out over 70 years ago could still be felt today.

The Present Study

Taken together, these arguments suggest that Germany, and by extension, other countries that have undergone major widespread persistent trauma, should be associated with elevated scores on Neuroticism and its associated facets of Anxiety and Depression, compared with countries that have not experienced such traumas.

In our analytic approach we proceeded in the following way. First, using a large cross-cultural personality dataset, we examined Germany's overall ranking on Neuroticism, Anxiety, and Depression, in relation to 108 other countries. This analysis yielded mixed—in some cases puzzling—results, with an overall inconclusive pattern of findings. In trying to understand the results, it became clear that interpretation was hindered by the fact that the countries differed in terms of the time periods of their traumas (e.g., 1940s in Germany vs. 1990s in Bosnia and

Herzegovina), the nature of their traumas (e.g., large-scale aerial bombing/war in Germany vs. civil war in Bosnia and Herzegovina), the likely sampling biases in the Internet-based survey methods (e.g., in Germany where Internet access is widespread vs. Ethiopia where it is not (Pew Research Center, 2016), and potential item and scale characteristics of the translations (Dutch, English, German, Spanish) of the survey instrument.

To address these concerns, but still test the WWII-bombing Hypothesis (that the extent of bombing is associated with subsequent neurotic traits), we decided to undertake an analysis within a single country, Germany. By restricting the analysis to a single country, we are essentially able to control for the period of trauma, the type of trauma, sampling biases, and the language of the survey instrument. In addition, Germany is particularly well suited to such an analysis because the WWII strategic bombing campaigns targeting German cities can be regarded as a quasi-natural experiment (hitting some cities harder than others), and there is no reason to assume that cities were selected as targets as a function of the local neurotic personality make-up (which then might have persisted until today). Moreover, by focusing on Germany we are also able to undertake the analysis within the culture in which the idea of *German Angst* was originally derived.

Specifically, our main analyses examined the intensity of the bombing and its link to neurotic traits (Anxiety, Depression, and Neuroticism) and also to related mental health problems (clinical problems related to depression) across major German cities. The usefulness of focusing on small spatial levels, such as cities, has been established in prior studies examining regional personality differences (e.g., Obschonka et al., 2015; Jokela et al., 2015; Stuetzer et al., 2016). Following the arguments presented above, we expected to find higher German Angst levels in those cities that were more severely bombed and destroyed during WWII. However, it is also possible that the local history of severe bombing and destruction might function as a "hidden vulnerability" in the local populations today. That is, this vulnerability might translate into negative traits and mental health problems only in the

presence of a current major stressor. Such diathesis-stress models of psychological problems and disorders figure prominently in clinical research (Ingram & Luxton, 2005; see also Barlow, Ellard, Sauer-Zavala, Bullis, & Carl, 2014), including research on long-term and intergenerational effects of severe trauma (Baider, Peretz, Hadani, Perry, Avramov, & De Nour, 2000; Solomon, Kotler, & Mikulincer, 1988). One of the most potent stressors for a population is economic hardship (Conger et al., 1992; Elder, 1974/1999); for example, high unemployment negatively affects mental health (Paul & Moser, 2009). We thus considered recent regional economic hardship as a potential stressor that could increase local levels of German Angst, particularly when a stronger vulnerability (due to severe bombing) is given. In other words, we tested interaction effects, expecting to find higher regional German Angst levels in areas subjected to higher levels of strategic bombing during WWII, but particularly when experiencing economic hardship as a current major stressor in the region. Our proxies for economic hardship were a lower local Gross Domestic Product (GDP), a higher local unemployment rate, and a higher local population loss due to massive outmigration, which together signal major problems in these regions.

Taken together, our two Hypotheses to be tested in our main analysis are:

H1: Cities with more severe bombing in WWII have higher scores in neurotic traits and mental health problems.

H2: The relationship between more severe WWII bombing and higher levels in neurotic traits / mental health problems is stronger in cities with higher levels in current economic hardship.

To test the robustness of the findings, we also undertook a series of follow-up analyses (e.g., with weighted personality traits). To examine whether findings could be subject to an ecological fallacy, in which relationships at the regional level do not match the underlying relationships at the individual level, we repeated our analysis at the individual level, correlating the individual personality scores with individual controls and regional bombing data.

Method

Variables

Strategic Bombing

Data on the strategic bombing of German cities during WWII are taken from Brakman, Garretsen, and Schramm (2004), who analyzed the long-term effects of strategic bombing during WWII on the economic development of major German cities. The two main variables used in this study are *rubble* in m^3 per capita and the *loss of housing stock* between between 1939 and 1945 in %. Brakman et al., meticulously collected these data from several sources such as statistical yearbooks and special reports documenting the war destruction for 103 German cities in present-day Germany. Their sample includes all major cities, defined as having a population of at least 50,000 people in 1939 or more than 100,000 inhabitants at any point after that. We excluded three cities, which had missing data on the loss of housing stock (Heidelberg, Wolfsburg, and Weimar) and another 11 cities for which we had less than 100 respondents in our personality dataset.

As noted above, the allied bombing left major structural damage to many cities. Some cities lost more than half of their housing stock (e.g., 51% in Gelsenkirchen, 53.5% in Hamburg, 60% in Dresden, 70% in Cologne, and 95.6% in Paderborn), whereas other cities were less severely destroyed (e.g., 3.1% in Goettingen, 5% in Erfurt, 11% in Leverkusen, and 25% in Leipzig). On average, the cities in our sample lost 37.5% of their housing stock from 1939 to 1945 (SD = 20.7). The rubble in m^3 per capita was on average 11.9 (SD = 8.3). Data on rubble are available only for West German cities, probably as result of the differing strategies for collecting and reporting war-related data in the East German cities during the cold war after 1949. Thus, as indicators of strategic bombing during WWII, our final sample has data on *loss of housing stock* for 89 cities and on *rubble* for 69 cities.

It is important to stress again that the bombing attacks, particularly the British bombing attacks beginning from March 1942, were not primarily focused on factories and military targets but were designed to inflict damage to the civilian population by focusing on city centers. Thus,

the bombing attacks on German cities that produced most of the rubble and the loss of housing stock in cities can be regarded as a quasi-natural experiment, hitting some cities harder than others. If there were any pre-war regional differences in neurotic traits and mental health, it is unlikely that the bombing attacks were related to these pre-war differences.

Regional Personality

We utilized personality collected within the ongoing, global Gosling-Potter Internet project (Gosling, Vazire, Srivastava, & John, 2004; see also Gebauer et al., 2015; Rentfrow et al., 2013, 2015). The project has been collecting personality data via a noncommercial Internet website, which can be reached via several channels (e.g., search engines, unsolicited links on other webpages). People can voluntarily participate in this study by completing a questionnaire on socio-demographic variables, personality traits, and state of residence. As an incentive, participants received a personality evaluation based on their responses. In this study we utilize two versions of the dataset. First, to analyze cross-country differences in neurotic traits, we use the complete global data set covering all countries. For this analysis we use data from all respondents who completed the questionnaire from the start of the project in December 1998 until 2015. To ensure we had reliable estimates of personality at the country level, we excluded countries with fewer than 1,000 participants, resulting in 109 countries (N = 7,210,276). Second, to uncover regional differences across German cities, we use a subset of the data that met our inclusion criteria (see below) collected from respondents from Germany between 2003 (the first time respondents were asked to provide their postal code) and 2015 (N = 33,534).

The personality data were collected via the well-established Big Five Inventory (BFI; John & Srivastava, 1999), which consists of 44 items (5-point Likert scale, 1 = *disagree strongly*, 5 = *agree strongly*) (see also Rentfrow et al., 2008, 2013). Here we focus on neurotic traits, namely Neuroticism as a broad Big Five trait, and Anxiety and Depression as established sub-facets of Neuroticism. According to Soto and John (2009), Neuroticism was measured with eight items [“is depressed, blue“, “can be moody“, „is relaxed, handles stress well“ (reversed),

"worries a lot", "remains calm in tense situations" (reversed), „gets nervous easily", „can be tense", „is emotionally stable, not easily upset" (reversed)]; Anxiety with four items ["is relaxed, handles stress well" (reversed), "worries a lot", "remains calm in tense situations" (reversed), „gets nervous easily"]; and Depression with two items ("is depressed, blue", "can be moody"). These scales for Neuroticism, and the sub-facets Anxiety and Depression, yielded acceptable levels of internal consistency (αs = .87, .77, .67, respectively). We aggregated the individual-level observations based on the city in which the participants spent most time in their youth. Anxiety had a mean of 3.00 (*SD* = 0.07), Depression had a mean of 3.15 (*SD* = 0.08), and Neuroticism had a mean of 3.04 (*SD* = 0.06).

Our main analyses focus on the regional personality traits of cities. So we used data only from those participants: 1) who had reported a valid postal code for the place where they spent most time in their youth (explained below), 2) whose postal code could be allocated to the 89 cities included here, and 3) who had completed the questionnaire section on the Big Five traits. These selection criteria resulted in a sample of 33,534 respondents (*M* = 377 respondents per city, *SD* = 354, *Min* = 109, *Max* = 1,934). Of those who indicated, 58.7% of the respondents were female. The respondents' mean age was 30 years (*SD* = 11 years). Regarding ethnicity, of those who indicated, 2% were Asian, 1% were Black, 96% where White/Caucasian and 1% had a different ethnicity. 30% of the respondents had a bachelor's degree or higher.

Next, we evaluated the representativeness of the Personality sample by comparing the demographic characteristics of the Personality sample with data from the German 2011 census and related sources. In most cases, we correlated the percentage of respondents in each demographic group from the Personality sample with the percentage of the population from that group within each city. The correlation between the number of respondents per city in our sample and the population of the city was 0.90. The correlation between the share of female respondents and female population share at the city level is 0.05. With regard to age, the correlations of the population share in specific age groups at the regional level are 0.18 (under

18 years), 0.22 (18-24 years), 0.01 (25-44 years), 0.11 (45-64 years) and -0.14 (over 65 years). The correlation between the respondent share with a bachelor degree or higher and the respective population share in the city is 0.38. A comparison regarding ethnicity could not be made because data on ethnicity of the general population is not provided by the German Statistical Office.

Overall, these results suggest that the Personality sample is fairly representative of the local population regarding the size of the population and education. However, the deviation of our sample from that of the census in some age brackets and the gender imbalance might be a concern. We address this concern in with a robustness check where we weight the individual respondents in the personality data set – which are used for the computation of the regional personality traits – by age and gender. The results of this robustness check did not differ from those of our main regressions.

Mental Health

One of the greatest threats to mental health is depression. Depression is defined by the WHO as a common mental disorder, associated with depressed mood, loss of interest or pleasure, decreased energy, feelings of guilt or low self-worth, disturbed sleep or appetite, and poor concentration (WHO, 2012). It is estimated that major depressive disorder is among the leading causes of disability adjusted life years and suicides, particularly in developed countries (Murray et al., 2012).

We use data from the Techniker Krankenkasse (TKK), which is one of the leading suppliers of health insurance in Germany. The raw data used for this analysis cover all members of the TKK from 2000 to 2013. Note that, with a few exceptions, the complete German labor force (employed and unemployed) is statutory insured. Thus, this dataset covers a large part of the German population and does not suffer from any kind of response bias or sampling bias. To the best of our knowledge, we are the first to use these data for regional level analysis.

From the raw data, the TKK computed the number of working days missed due to depression disorder per 100 insurance years for each region (henceforth: *missing working days*, $M = 108.27$, $SD = 24.28$). The average of 108.27 missing working days per 100 insurance years means that, on average, a regular member of the TKK missed 1.0895 working days in one year due to depression. The second indicator provided by the TKK is the share of persons with prescriptions of *antidepressant drugs* ($M = 6.27$, $SD = 0.86$) as treatment for depression. These data were made available to us by the TKK; details can be found in an online report (TKK, 2015).

Economic Hardship

We consider three indicators of economic hardship, which were all taken from the German Statistical Office. First, we use *GDP per capita* in Euro (average of the years 1996-2012, $M = 33{,}448$, $SD = 12{,}354$). Low *GDP per capita* is an indicator of economic hardship. A low GDP per capita can signal economically distressed regions that might be related to personality traits and mental health. As a second indicator for regional economic hardship. we use the *unemployment rate* in % (average of the years 1996-2012, $M = 8.98$, $SD = 3.39$). Unemployment is a strong predictor of mental health (Paul & Moser, 2009). The third indicator for regional economic prosperity is the regional *population loss* from 1996 to 2012 in % ($M = 1.30$, $SD = 8.44$). Outmigration is a common response to poor economic conditions, such as the well-known East-to-West migration pattern following the reunification of Germany (Beck, 2004).

Control Variables

Regional level. We control for several regional variables that might be related to Neuroticism and its sub-facets and to the two indicators of mental health. We stress that for the vast majority of variables the causal direction between Neuroticism and the variables are unclear at the regional level. However, any relationships identified between bombing and traits or between bombing and mental health could be driven by some "third variables". Thus, we

aim to include a wide variety of control variables to account for this potential co-variance. Obviously, the reported correlations between the control variables, traits, and bombing do not offer any evidence regarding their causal connections. Our approach is to err on the side of caution, rather than suffer from omitted variable bias. A similar reasoning and strategy was used in the regional research by Rentfrow et al. (2008). Note also that due to administrational reforms some of the 89 original cities have merged in the last decades. These mergers result in us having the same vector of control variables for the cities Wattenscheid and Bochum and for West Berlin and East Berlin.

First, 50 years of communism and the subsequent re-unification process may have left an imprint on current-day traits. Thus, we include a dummy variable to indicate whether the city was located in the former East or West Germany (Dummy variable *East*, $M = 0.19$, $SD = 0.40$).

A second group of indicators captures the social structure of the region. Prior studies have found a positive relationship between Neuroticism and crime (e.g., Ozer & Benet-Martinez, 2006), which has also been confirmed at the regional level (Jokela et al., 2015; Rentfrow et al., 2008). We, thus, consider the regional *crime rate* per 100,000 capita. These data are taken from the police crime statistics. We focus on four major offenses: murder, assault, theft, and burglary. Note that many crimes are not reported to the police. Thus, we follow the procedure described in Bug, Kroh, and Meier (2015) to adjust for the dark-field of non-reported offenses. Additionally, some crimes are perceived as more threatening than others (e.g., murder is viewed as more threatening than burglary) so the different offenses are weighted by seriousness. The weights are taken come from Bug et al., and are based on an online survey of the general population. As suggested by Bug et al., the crime rate was standardized to a unit interval for the regression. The final variable has a mean of 0.56 ($SD = 0.20$).

Previous research has shown that the regional prevalence of some occupations/industries is related to regional personality structure. For example, Rentfrow,

Gosling, & Potter (2008) showed that the share of the working population in arts and entertainment is strongly related to Neuroticism in U.S. states. To account for this potential effect, we consider the employment share in *creative class* occupations (Florida, 2002). The creative class captures employees who are working in creative and innovative occupations. According to theorizing in economic geography, the creative class is a social class that is open to ideas and different lifestyles (Florida, 2002). Thus, the regional prevalence of the creative class might be related to mental health and regional personality structure. The data on creative class are for the year 2009 and come from the Social Insurance Statistics (see Spengler, 2008, for details), which covers all employees subject to statutory social insurance. On average 6.54% belong to the creative class (SD = 2.36).

Prior research points to the existence of regional differences in intergroup anxiety among the local population in Germany (Stephan & Stephan, 1985; Wagner et al., 2003), which could be related to Neuroticism. This intergroup anxiety has become particularly visible as the recent wave of refugees has spurred xenophobic reactions in Germany (ARD, 2016). To account for this potential relationship, we control for the share of *foreigners* living in German cities (M = 9.84, SD = 5.00). Data on the share of foreigners come from the 2011 Census.

Religion also seems to be related to Neuroticism (Jokela et al., 2015). Therefore, we include the population share of religious people as a control variable (*regional religiosity*, M = 53.26, SD = 19.64). A religious person is defined as a person who is a member of the Roman-Catholic church or the Evangelical-Refomred Church. These data also coe from the 2011 Census. Unfortunately, the Centsus does not provide information on the population share in other religious communities.

To consider additional indicators of the regional culture (Florida, 2002), we also use the regional population share belonging to the *LBGT* community (homosexual, bisexual and transsexual) (M = 8.05, SD = 2.18). These data come from the Gosling-Potter Internet project.

The next group of control variables considers environmental characteristics of the cities. In particular, atmospheric pollutants are related to higher mortality rates and hospital admissions (Brunekreef & Holgate, 2002), so they might also be related to Neuroticism. We thus consider data of thee atmospheric pollutants, which are taken from the Federal Environment Office: 1) *Atmospheric particulate matter* (PM10, regional average between 2010 and 2014 in $\mu g/m^3$, $M = 19.17$, $SD = 2.19$), 2) *nitrogen dioxide* (NO_2, regional average between 2010 and 2014 in $\mu g/m^3$, $M = 18.41$, $SD = 4.96$) and 3) ground-level *ozone* (annual number of days with ground-level ozone of at least 120 $\mu g/m^3$, regional average between 2010 and 2014, $M = 16.23$, $SD = 4.91$).

Prior research at the national level found that more demanding climatic conditions are negatively related to subjective well-being (Fischer & van de Vliert, 2011) and thus probably to neurotic traits and mental health. Accordingly, we use data from the German Meterologial Service on three climate indicators: 1) mean *July temperature* in degrees Celsius (reference period 1960-1990, $M = 17.61$, $SD = 0.80$), 2) mean *July sunshine* in hours (reference period 1960-1990, $M = 204.14$, $SD = 18.71$), and 3) Mean *July precipitation* in litres per m^2 (reference period 1960-1990, $M = 74.40$, $SD = 14.77$).

Beyond pollution and climate, the structure of a city might also influence well-being. More *recreational area* allows for more recreation activities, which can foster well-being in general (Diener, 2000) and thus might correlate with mental health. Therefore, we considered the share of a city's area that is available for recreation ($M = 5.50$, $SD = 3.17$). The respective landuse data stem from the Federal Institut for Reseach on Building, Urban Affairs and Spatial Development.

The regional distribution of Neuroticism across U.S. states in Rentfrow et al., (2008) suggests that more popoulated states have higher levels of Neuroticism (though the causality and mechanisms remain unclear). Thus, we use the *population size* of the city as a control variable. Another reason for including this variable in the regression is that there is a small

positive correlation between population size and our two main independent variables (with rubble 1945: r = .18, and with loss housing stock 1939-1945: r = .13), suggesting that larger cities might have been bombed a little bit more heavily.

Individual level. For the additional robustness checks at the individual level, we include some individual-level controls (from the Gosling-Potter Internet project dataset). Note, that the dataset is rather sparse in this regard so that we do not have relevant data on relationships, own children, or unemployment. Other variables such as social class have much missing data, substantially reducing the number of available observations. However, we are using the individual-level analyses as robustness checks, designed to rule out the ecological fallacy. Thus, it is not necessary to have an all-encompassing list of individual-level control variables. As a result of missing data in the variables used, the sample size for the regressions using loss of housing stock is reduced to 20,811 and for the regressions with rubble the sample size is reduced to 16,062.

We consider *age* of the respondent as an individual level control variable given that earlier research found regional-level age to be related to Neuroticism (Jokela et al., 2015). Additionally, we include *gender* as a control variable (1=male, 0=female, $M = 0.43$, $SD = 0.50$) due to observed gender differences in neurotic traits (Costa, Terraciano, & McRae, 2001; Lynn & Martin, 1997). We also deemed it important to consider education. We capture educational attainment with two dummy variables—whether the respondent had a *bachelors degree or higher* ($M = 0.35$, $SD = 0.48$) and whether the respondent had *no high-school degree* ($M = 0.34$, $SD = 0.47$). As expected, given the structure of the German educational system, the share of respondents without a high-school degree was quite high. The reason for this is that Germany's educational system awards some degrees after 8 and 10 years of schooling, which is often coupled with a subsequent 3-year educational training. Pupils choosing this combination technically do not have a high-school degree. Cross-country studies of personality have consistently found differences in personality traits across countries and cultures (e.g., Schmitt

et al., 2007), so we included a dummy variable on ethnicity indicating whether or not the respondent was of Caucasian ethnicity (*non-caucasian ethnicity*, $M = 0.03$, $SD = 0.16$).

At the regional level, we included an indicator for religiosity from the Census data. At the individual level we can include a more direct control because respondents were asked to self-assess their *individual religiosity* (1=not very religious, 5 = very religious, $M = 1.92$, $SD = 1.21$). At the individual level, we are also able to include the individual-level version of the above described control variable for *LBGT* (dummy variable: 1=homosexual, bisexual and transsexual, 0=heterosexual, $M = 0.08$, $SD = 0.27$).

Results

Preliminary Analysis: Cross-Country Comparison

The WWII-bombing hypothesis suggests that Germany, and by extension, other countries that have undergone major widespread persistent trauma, should be associated with elevated scores on Neuroticism and its associated facets of Anxiety and Depression, compared with countries that have not experienced such traumas. To test this idea, we examined Germany's overall ranking on Neuroticism, plus the Anxiety and Depression sub-facets, in relation to 108 other countries.

The rankings, shown in Table 1, show mixed support for the *German Angst* stereotype. Specifically, the Germans in this global sample were ranked 31st (out of 109 countries) on the Anxiety subfacet, 20th on the Depression subfacet, and 53rd on the broader Neuroticism trait. Even in comparison to the other 35 OECD countries, which share more of the socio-economic characteristics than the other countries do, the results do not yield strong support for the existence of *German Angst*; Germans rank 8th (out of 35 countries) on Anxiety, 5th on Depression, and 10th on Neuroticism.

Based on the argument that persistent widespread trauma leads to Neuroticism, other countries with a history of major persistent conflict should also yield high scores on these dimensions. However, they do not. With respect to Neuroticism, Afghanistan ranks 98th of 109

countries, and Bosnia and Herzegovina ranks 43rd. Japan, which like Germany was subjected to massive bombing campaigns in WWII ranks 83rd and Vietnam, which endured wars in the 1950s and 1970s ranks 95th.

Should these findings be taken to indicate that major regional trauma is unrelated to Neuroticism and related traits? Perhaps they should. However, with the benefit of hindsight, there are a number of reasons to suggest that these cross-country analyses may not be fair tests of the WWII-bombing hypothesis. First, the periods during which the various countries' traumas took place vary dramatically; for example, Germany experienced war and defeat in the 1910s and 1940s, Ethiopia experienced civil war for many years in the 1970s and 1980s, and Bosnia experienced the civil war with Serbia in the 1990s. Second, the kinds of traumas experienced by the different countries varied considerably; for example, Germany experienced aerial bombing and ground warfare whereas other countries experienced civil war and other atrocities. Third, the data were collected via an online questionnaire, raising the possibility that sampling biases differed across the countries as a result of cross-country differences in the degree of Internet penetration and other social factors; for example, in 2015 the 85% of adults in Germany used the Internet, whereas in Ethiopia, the number was just 8% (Pew, 2016). Fourth, the Internet-based survey was administered in four different languages (Dutch, English, German, Spanish) raising the possibility of cross-language differences in items or scale functioning.

As a result of these differences the cross-country rankings must be considered inconclusive. However, the differences highlighted by this analysis do suggest a path for testing the WWII-bombing hypothesis. Specifically, if the period of trauma, the type of trauma, level of Internet penetration (and other social factors), and language can be kept constant, then the subsequent comparison should be more informative. All these conditions can be met by undertaking an analysis within a single country. Germany is a particularly good candidate for such a within-country analysis because, as noted above, the strategic bombing was essentially

random, meaning there are unlikely to be pre-existing differences between the cities that were subject to heavy vs. light bombing. Moreover, focusing on Germany allows us to undertake the analysis within the culture in which the idea of *German Angst* was originally derived. The remainder of the paper focuses on such an analysis.

Main Analysis

Bivariate relationships at the regional level

Figures A1-A7 map the regional distribution of the main variables for the cities. In Table 2 we present the correlations among the variables at the regional level, computed across German cities. We use the 10% level as cut-off point regarding statistical significance because of the low number of observations (89 cities). Rubble is negatively correlated with Anxiety (r = -.22, p < .05), Depression (r = -.44, p < .05), and Neuroticism (r = -.30, p < .05), but not significantly correlated with missing working days (r =.04, p > .05) and antidepressant drugs (r =.03, p > .05). The loss of housing stock is negatively correlated with Depression (r = -.25, p < .05) and positively correlated with antidepressant drugs (r = .22, p < .05), but not significantly correlated with Anxiety (r = -.08, p > .05), Neuroticism (r = -.18, p > .05), and missing working days (r = .02, p > .05).

From individual-level research we know that neurotic personality traits such as Neuroticism are associated with mental health disorders, such as anxiety and depression (Kotov, Gamez, Schmidt, & Watson, 2010). When analyzed at the regional level, we found that Neuroticism is positively correlated with missing working days (r =.24, p < .05) and the prescription of antidepressant drugs (r =.22, p < .05). There are even stronger correlations for the sub-facet depression with missing working days (r =.30, p < .05) and antidepressant drugs (r =.32, p < .05). However, Anxiety was not significantly related to the two indicators of mental health, perhaps because the mental health indicators looked only at depression disorders, not anxiety disorders. Taken together, there is considerable overlap between the established individual-level research on personality and mental health on the one hand, and the region-level

data in our analysis on the other. These observed region-level correlations support the validity of the regional data we analyze (e.g., the regional neurotic traits indeed manifest themselves in corresponding regional patterns of mental-health problems).

Main effect of strategic bombing at the regional level (Hypothesis 1)

In this section we test whether cities with more severe bombing in WWII have higher scores in neurotic traits and related mental health problems. We present the regression results regarding the trait variables and the two mental-health indicators in detail in Tables A2-A11 in the appendix. In Model 1 of each of these tables, we include only our strategic bombing indicators into the regression. Model 2 presents results with the full set of economic hardship variables and control variables. The intention of this procedure is to check whether the significance of the strategic bombing indicators depends on the inclusion of arbitrary control variables. We find this not to be the case. Only in one out of 10 cases (Table A5, testing missing work days) the strategic bombing indicator turns from significant to non-significant when including the control variables.

For the sake of brevity, we describe the results only for two dependent variables: Depression and missing work days. Depression (Table A3) is quite representative of the results regarding the other trait variables and the results regarding missing working days (Table A5) are similar to the other mental-health DVs. Depression (Table A3, Model 2) is positively related to creative class (β = .18, *SE* = .19, $p < .1$), and the presence of atmospheric particulate matter (β = .47, *SE* = 0.18, $p < .05$). Depression is negatively related to the presence of a larger LBGT community (β = -.22, *SE* = 0.11, $p < .05$), and nitrogen dioxide (β = -.40, *SE* = .21, $p < .1$). Missing working days (Table A5, Model 1) is positively related to atmospheric particulate matter (β = .48, *SE* =.14, $p < .001$) and July sunshine (β = .22, *SE* =.12, $p < .10$).

The effects of strategic bombing are given in Model 2 in Tables A2-A11. Table 3 summarizes the results of these 10 regression tables. The loss of housing stock 1939-1945 negatively predicts Depression (β = -.30, *SE* = .11, $p < .05$) and there was a negative, small

relationship with missing working days (β = -.14, SE = 0.08, p < .1). There was no effect of loss of housing stock on Anxiety, Neuroticism, nor anti-depressant drugs. Our alternative indicator for strategic bombing, rubble in 1945, also predicts Depression (β = -.38, SE = .12, p < .01) but is not significantly related to the other dependent variables. Including the loss of housing stock or rubble in the regressions, where they show up significant, leads to an increase in explained variance of .010 to .105.

Taken together, these results give no indication that strategic bombing is *positively* related to current *German Angst* levels. Hence, Hypothesis 1 received no support. In fact, we found some evidence for the very opposite effect—a *negative* link (with respect to Trait Depression and mental health problems), even when controlling for an array of regional control variables. So it this mirroring some kind of resilience in more severely bombed cities compared to other cities?

Interaction effects at the regional level (Hypothesis 2)

We then tested Hypothesis 2 which stated that the (assumed) positive relationship between bombing intensity and neurotic traits/mental health problems would be stronger if there is a major stressor, current economic hardship (GDP per capita, unemployment rate, and population loss). We tested 30 possible interactions between the two strategic bombing indicators and the three economic prosperity variables on all five dependent variables (30 possible interactions = 2 strategic bombing indicators * 3 economic prosperity indicators * 5 DVs). Note that the strategic bombing variables on the one side and the economic hardship variables on the other did not correlate with each other (Table 1), indicating that the interacting variables are independent of each other.

The results of these interaction effects are depicted in Models 3-5 in Tables A2 and A11 and are summarized in Table 4. We discuss just one of these interaction effects in more detail because they are all similar in character. The interaction between the loss of housing stock 1939-1945 and the unemployment rate is significant in the regression on Anxiety (Model 4,

Table A2, β = -.27, *SE* = .12, $p < .05$). The respective plot of the interaction effect in Figure A8 reveals that in cities that lost more housing stock, a rising unemployment rate had a weaker association with Anxiety, compared to cities that lost less housing stock. Regarding Anxiety, there are additional significant interactions between the loss of housing stock 1939-1945 and population loss (Table A2, Model 5, β = -.20, *SE* = .10, $p < .10$, plotted in Figure A9), between rubble in 1945 and unemployment rate (Table A7, Model 4, β = -.24, *SE* = .13, $p < .10$, plotted in Figure A10), and between rubble in 1945 and population loss (Table A7, Model 5, β = -.44, *SE* = .14, $p < .01$, plotted in Figure A11).

With regard to Depression, we find significant interactions between the loss of housing stock 1939-1945 and unemployment rate (Table A3, Model 4, β = -.21, *SE* = .11, $p < .1$, plotted in Figure A12), and between rubble in 1945 and population loss (Table A8, Model 5, β = -.20, *SE* = .11, $p < .10$, plotted in Figure A13).

Using Neuroticism as the DV, we find significant interactions between the loss of housing stock and unemployment rate (Table A4, Model 4, β = -.29, *SE* = .12, $p < .05$, plotted in Figure A14), between the loss of housing stock 1939-1945 and population loss (Table A4, Model 5, β = -.21, *SE* = .11, $p < .10$, plotted in Figure A15), between rubble in 1945 and GDP per capita (Table A9, Model 3, β = .19, *SE* = .11, $p < .10$, plotted in Figure A16), between rubble in 1945 and unemployment rate (Table A9, Model 4, β = -.25, *SE* = .12, $p < .05$, plotted in Figure A17), and between rubble in 1945 and population loss (Table A9, Model 5, β = -.38, *SE* = .12, $p < .01$, plotted in Figure A18).

When looking at the prescription rates of anti-depressant drugs, we find significant interactions between the loss of housing stock 1939-1945 and GDP per capita (Table A6, Model 3, β = .15, *SE* = .09, $p < .10$, plotted in Figure A19), and between the loss of housing stock 1939-1945 and unemployment rate (Table A6, Model 4, β = -.16, *SE* = .08, $p < .05$, plotted in Figure A20). There are no significant interactions regarding the missing working days DV.

Summing up, we find significant interaction effects in 13 of the 30 regressions; we summarize the results of all interaction effects in Table 4. The significant interaction effects additionally explain, on average, 4%-points of the variance of the DVs. In all of those 13 cases we find that in cities that were bombed more severely, more economic hardship has a weaker or non-existent effect on the neurotic traits and the mental health indicators. In contrast, in cities that were bombed less severely, more economic hardship has a stronger effect on the personality traits and mental health. This repeated pattern is visualized in Figure 1. Note that this figure is not the result of an actual regression but depicts the prototypical significant interaction effects discussed above.

The majority of the significant interaction effects are with the population-loss variable. Unemployment rate also delivers some significant interactions, and GDP per capita has the fewest significant interactions. The latter result fits nicely with results from well-being research in economics, in which unemployment presents a major threat to well-being (Di Tella et al., 2001). In contrast, research in economics suggests GDP is not important for well-being, a result known as the Easterlin Paradox in cross-country analysis (Easterlin, 2016).

Taken together, we see a remarkably consistent interaction pattern, in which more severe strategic bombing buffers the positive effect of economic hardship on neurotic traits and mental health problems. This again points towards a resilience rather than a vulnerability phenomenon with respect to potential long-term effects of massive bombing.

Robustness Checks

Weighted Personality Traits

As discussed in the variables section, the regional personality data set is less representative for age and gender. To address this potential bias we computed the regional measures for Trait Anxiety, Trait Depression, and Trait Neuroticism again but this time we weighted the individual observations in the personality data set to match the age x gender distribution of the respective city. We, then, used these weighted trait measures as DVs and

reran the regressions. The results are depicted in Tables A12-A17. In general, we find similar results to those using the unweighted traits. Thus, we simply mention here the changes to the original results. Regarding main effects, the effect of rubble on depression is no longer significant (Table A16, Model 2, β = -.19, *SE* = .12, ns.). The effect of loss of housing stock on depression remains significant but with a somewhat reduced effect size and level of significance (Table A13, Model 2, β = -.20, *SE* = .12, $p < .10$).

Robustness checks regarding the remaining two DVs, missing working days and anti-depressant drugs, could not be performed because these data were available only at the regional level, not the individual level. Thus, we cannot weight the individual level observations. However, the German health-insurance system prohibits health insurance providers, such as the TKK, from altering their pool of insured regarding specific gender or age groups or any other socio-economic category. So these data can be regarded as quite representative.

Of the 11 significant interaction effects between strategic bombing and economic hardship on the regional traits, 5 are no longer significant when using the weighted traits (Table A12, Model 4; Table A17, Model; Table A16, Model 5; Table A17, Model 3; Table A17, Model 4). Six interactions remain significant and there is now one additional significant interaction effect, which was not significant in the original regressions (Table A13, Model 5, β = -.19, *SE* = .11, $p < .10$). The plots of the significant interactions in this robustness check look very similar to those in the original regressions and therefore we refrain from including them into the Appendix.

Individual-Level Analyses

Until now we have looked exclusively on the regional level. We next ask whether the results hold at the individual. That is, do individuals living in cities that were bombed more or less severely differ in their individual levels of Trait Anxiety, Trait Depression, and Trait Neuroticism? This is an important robustness check for two reasons. First, it allows us to

directly control for age and gender, which partly mitigates the problem of the gender and age imbalance of the Gosling-Potter personality sample.

Second, it allows us to test whether the relationships computed at the regional level match the relationships computed at the individual level; if the two levels of analysis match, this parallel result is consistent with the idea that the regional-level relationships are being driven by the aggregation of individual-level relationships, thereby reducing (but not ruling out) the risk of committing the ecological fallacy. We conducted multi-level random intercepts models because of the nested structure of our data (different people in different cities). We have no individual-level data on mental health so the analyses are restricted to the personality trait DVs and are presented in Tables A18-A23.

At the individual level, we are able to include some additional individual control variables, such as age, gender, ethnicity, and educational attainment. These individual controls turn out to be important predictors for the traits. The pattern of the results are similar across traits so we discuss here solely the results regarding anxiety (Table A18, Model 2). Significant predictors of Anxiety at the individual level are age (β = -.09, *SE* = .01, $p < .001$), gender (male = 1, female = 0, β = -.23, *SE* = .01, $p < .001$), belonging to LBGT (β = .06, *SE* = .01, $p < .001$) and individual religiosity (β = .01, *SE* = .01, $p < .10$). Additionally, having no high school degree is positively related to Anxiety (β = .06, *SE* = .01, $p < .001$) while having a bachelor degree or higher is negatively related to Anxiety (β = -.04, *SE* = .01, $p < .001$), with having a high-school degree being the reference category.

Regarding the first research question on potential main effects of strategic bombing on Anxiety, Depression, and Neuroticism, we find the original results confirmed. In particular, Anxiety was predicted by loss of housing stock 1939-1945 (Table A18, Model 2, β = -.01, *SE* = .01, $p < .10$) but not by rubble (Table A21, Model 2). Depression was predicted by loss of housing stock 1939-1945 (Table A19, Model 2, β = -.02, *SE* = .01, $p < .01$) and rubble 1945 (Table A22, Model 2, β = -.02, , *SE* = .01, $p < .01$). Neuroticism was predicted by loss of housing

stock (Table A20, Model 2, β = -.02, *SE* = .01, $p < .05$) but not by rubble 1945 (Table A22, Model 2). In sum, 4 out of 6 main effects (2 strategic bombing variables x 3 trait DVs) were significant at the individual level. At the regional level, only 2 out of 6 main effects were significant. However, the increase in number in significant main effects is arguably due to a larger N. As in many other studies, the effect sizes and the share of explained variance in individual-level regressions in this study are smaller than in regressions at the regional level, even when using the same variables (e.g., Obschonka et al., 2015).

We also tested for interaction effects between the strategic bombing indicators and economic prosperity on the personality variables at the individual level. The results of these interaction effects are depicted in Model 3-5 in Tables A18-A23. Of the 11 significant interaction effects at the regional level, only two remain significant at the individual level while the remaining 9 become non-significant. Regarding anxiety, the interaction between loss of housing stock 1939-1945 and population loss remains significant (Table A18, Model 5, β = -.02, *SE* = .01, $p < .05$). Also the interaction between loss of housing stock 1939-1945 and population loss regarding Neuroticism remains significant (Table A20, Model 5, β = -.02, *SE* = .01, $p < .05$). These interaction effects are similar to those at the regional level, so we do not provide their plots in the appendix. All interactions involving rubble on the one side, and GDP per capita or unemployment rate as moderators on the other, are non-significant at the individual level.

Discussion

Our analyses focused on two simple questions: First, does the *German Angst* stereotype have a kernel of truth to it. And second, are regional differences in *German Angst* related to the differential strategic bombing of German cities during WWII, particularly if the region is experiencing a major stressor today that might expose the latent WWII wounds in the collective mindsets of local populations? Both questions are based on the assumption that major historical shocks might have the potential to shape regional personality in enduring ways (e.g., through

epigenetic effects and intergenerational transmission, selection effects, and a persisting local culture originally shaped by the shocks). Our assumption concentrated on a potential *negative* long-term effect of massive bombing.

Our cross-country comparison did not provide compelling evidence for the *German Angst* stereotype; relative to 108 other countries, Germany placed 20th, 31st, and 53rd for Depression, Anxiety, and Neuroticism respectively. Moreover, if bombing and other sustained widespread traumas are supposedly the cause of *German Angst*, then other countries that have seen significant sustained trauma over the past century (e.g., Afghanistan, Belgium, Bosnia and Herzegovina, Ethiopia, Japan, Lebanon, Nicaragua, Uganda, Vietnam), might also be expected to rank highly on these traits. But that was not consistently the case.

In trying to make sense of these results, it became clear that these cross-country analyses were hindered by differences in the amount of time elapsed since the traumas, differences in the nature of the traumas, differences in likely sampling biases, and potential differences in item and scale characteristics of the various translations of the survey instrument. This analysis generated the design of the focal study, namely overcoming all the difficulties raised by the cross-country analyses by undertaking equivalent analyses all within the same country, Germany.

Specifically, we examined regional differences in *German Angst* and to the WWII traumas associated with the strategic bombing of German cities. We had expected that cities with a more severe bombing history to show higher *German Angst* levels today than shown by other cities (Hypothesis 1), particularly if they are facing a current major stressor (economic hardship) (Hypothesis 2). However, contrary to our expectations, our results indicate that those cities with more severe bombings show comparatively less, not more, *German Angst*, at least with regard to Trait Depression and related mental health. Consistent with this finding, we found interaction effects between strategic bombing and current economic hardship according

to which the positive effect of economic hardship on neurotic traits and mental health problems appears to be buffered if the city had experienced major bombing and destruction in WWII.

How should we interpret these surprising results, which seem to indicate that German cities that suffered more severe bombing show more resilience than other cities do? In the following pages we offer some speculation about potential mechanisms that could be behind the effects we uncovered. Naturally, given the findings were exactly opposite to the ones we predicted, the mechanisms we offer are necessarily *ad hoc*; nonetheless, we hope that they might serve as a starting point for future research on this topic.

One possibility is that the major destruction of cities could have made the local population "tougher," serving as an impetus for the remaining residents to pull together. The reconstruction of the destroyed houses and infrastructure of the bombed German cities in the years following the war was a remarkably effort. Germany literally rose from the ruins ("Auferstanden aus Ruinen"), as recounted in the national anthem of the German Democratic Republic.

Individual-level research on the development of resilience (e.g., human adaptation and major shocks) shows that individuals can become remarkably resilient in response to severe conditions, as observed, for example, in Glen Elder's (1974/1999) famous study of the children of the Great Depression or in research on Holocaust survivors (Barel, Van IJzendoorn, Sagi-Schwartz, & Bakermans-Kranenburg, 2010; see also Masten, 2001). An additional example relates to the 9/11 attacks on New York City in 2001. Some experts had initially expected the attacks to leave a lasting negative imprint on the local culture, but in reality the New Yorkers showed remarkable resilience (Bonanno, Galea, Bucciarelli, & Vlahov, 2006; Glaeser & Shapiro, 2002). These examples are consistent with Dienstbier's (1989) theory of the development of physiological toughness, which draws on a broad array of human and animal studies and points to the role of stressful events in producing resilient individuals. Another explanation for this effect could be that peoples' collective responses to major traumas like 9/11

encourage social cohesion (Cohn, Mehl, & Pennebaker, 2004). Research indicates, for example, that external threats strengthen social support within threatened groups, thereby boosting their psychological adjustment (Bond, Lun, & Li, 2012).

Moreover, advances in research on the neurobiology of resilience, a literature that we did not take into consideration when planning this study and developing our expectations, suggests that "resilience in both children and adults is a common outcome following adversity" (Russo, Murrough, Han, Charney, & Nestler, 2012, p. 1478). Such adversity could include traumatic bombing experiences, which would also explain, for example, findings of *positive* posttraumatic growth after the 9/11 terrorist attacks in the US (Milam, Ritt-Olson, Tan, Unger, & Nezami, 2005).

One often-cited example of becoming tougher and resilient in the wake of the strategic bombing of German cities is the case of the so-called Trümmerfrauen (rubble women), who played a major role in clearing and reconstructing the destroyed cities, given that so many men died on the battlefields (Akbulut-Yuksel, Khamis, & Yuksel, 2011). In fact, the image of the heroic rubble women among the endless ruins became a symbol of the resilience and sense of optimism of the German people, despite the loss of the war, the decimated cities, and the millions of dead soldiers and civilians. One could speculate that these resilient rubble women might have generated a local culture of resilience, in the form of proactive coping with the negative situation. These rubble women, in turn, became the mothers and grandmothers of the subsequent generations, potentially passing on their resilience to subsequent generations. So perhaps the apparent current resilience of the formerly heavily bombed cities, as revealed by our analyses, is an historical imprint of the resilient and proactive women that were key to reconstructing the Germany in the wake of WWII.

Our results are also in line with research concerned with the effects of major shocks on the *economic* success of cities. Economic research often reveals, at best, short-run negative effects of major bombing destruction with few or negligible long-term effects on the economic

trajectories of bombed cities and regions in Germany (Brakman, Garretsen, & Schramm, 2004), Japan (Davis & Weinstein, 2002), and Vietnam (Miguel, & Roland, 2011). The reason for this non-effect is not quite clear because these studies rarely investigate the underlying mechanisms. However, the absence of a bombing effect is consistent with one prominent theory on city growth, which argues that the economic success of cities is based on city fundamentals such as locational features (e.g., access to rivers or the sea) and the productivity of the workforce (e.g., knowledge encoded in patents; Davis & Weinstein, 2002). As long as these fundamentals are not affected, even heavily bombed regions recover in short periods of time because the physical infrastructure can be repaired or replaced rather quickly.

The documented long-run continuous economic development of heavily bombed regions would be less likely if the strategic bombing had raised long-term local levels of neurotic traits and reduced mental health. Neuroticism is negatively related to entrepreneurship (e.g., Obschonka et al., 2013, in press), which in turn is a major predictor of long-term economic growth (e.g., Glaeser, Kerr & Kerr, 2015; Stuetzer et al., 2017). If the population of the heavily bombed cities became highly neurotic, the cities would have been less able to return to a growth path via entrepreneurship.

To examine this possible connection between bombing, neuroticism, and entrepreneurship, we tested whether bombing in WWII had any lasting effects on entrepreneurship in German cities. As indicators of entrepreneurship we used the self-employment rates from 1950, 1961 and 1970 as well as a more recent start-up rate (1996-2008) which is defined as the number of newly started firms per 1,000 employees (e.g., Stuetzer et al, 2016). Self-employment data were taken from Sensch (2004) and originally come from the population census. Data on start-ups were taken from the German Social Insurance statistics, which keeps records of all firms with at least one employee obliged to social insurance. The average start-up rate between 1996 and 2008 was used as dependent variable (data from 2009 onwards were not available to us). We regressed these entrepreneurship indicators on a small

set of independent variables which were available to us and are routinely employed in research on regional differences in entrepreneurship (e.g., Obschonka et al., 2015). The results of this regression are presented in Table 5. Neither the loss of housing stock 1939-1945 nor rubble in 1945 predicted regional differences in self-employment rates and start-up rates, which again runs counter to the WWII Hypothesis.

So far we argued that our results could be explained by a resilience effect, in which the WWII destruction made people tougher. Another possible explanation for our findings centers on the effects of the swift economic recovery of Germany after WWII (Abelshauser, 1987; 2011). This explanation is based on the idea that the repair or replacement of war related devastations might have led to short-term accelerated economic growth in heavily bombed cities during the reconstruction period. If economic success leads to a reduction in neurotic traits and an improvement in mental health, our finding of a negative relationship between bombing and neurotic traits might reflect the success of the reconstruction period. In other words, this explanation suggests that the key causal factor of present-day low Neuroticism in some cities was not the devastation wreaked by the bombing but the local economic success that followed in the wake of the devastation.

We tested the hypothesis that accelerated city growth mediated the relationship between strategic bombing and subsequent city-level Neuroticism and mental health. Data on city growth are taken from Brakman, Garretsen, and Schramm (2004), who compiled city-level Census data for various years. For our purpose we compute the average annual population growth rate between 1946 and 1970 for West German cities (M = 1.019, SD = 0.009, Min = 0.996, Max = 1.046). We do not use the growth of East German cities because their growth pattern was heavily influenced by the planned economy approach (Brakman et al., 2004). The results of the respective regressions are shown in Table 6. Model 1 reveals that the mediating variable, average annual population growth rate 1946-1970, is indeed significantly higher in the more severely bombed cities ($\beta = 0.38$, $p < .05$). However, Models 3, 5, 7 and 11 show that

this mediating variable does not predict the neurotic traits and mental health, thereby ruling out any mediated effects. The one exception in Model 9 is missing working days, which is predicted by the average annual population growth rate (β = -0.51, $p < .001$). As noted earlier, the loss of housing stock 1939-1945 does not predict missing working days, so there is no effect to be mediated. When using rubble in 1945 as an alternative indicator, the results remain unchanged and are thus not reported here. Taken together, we find no support for the idea that accelerated growth in the severely bombed cities explains their lower scores on neurotic traits and higher mental health.

Yet another possible explanation for the lower scores in neurotic traits and higher mental health in the more severely bombed cities could lie in historic or recent migration patterns. After WWII, more than 10 million people from the Eastern parts of Germany (hereafter referred to as expellees), which are now parts of Poland and the Czech Republic, fled or were expelled from their original cities and villages and had to settle within the new borders of Germany. The flight itself might be a traumatic experience. Moreover, Beutel, Deckel, and Brähler (2007) report that, compared with expellees were more likely to have no father during childhood and adolescence and were more likely to have lost their houses due to bombing in their original cities and villages compared to war survivors who did not face expulsion. Beutel et al., also report that expellees suffered from greater health concerns and had lower well-being scores compared to non-refugees, even 50 years after their original migration.

Additionally, more than 3 million people migrated from the Soviet Occupation Zone (which became the German Democratic Republic after 1949) to West Germany until the inner German border was upgraded to the point of impenetrability. Political oppression and poor economic conditions were the main drivers of this migration wave, which might be reflected in higher scores in neurotic traits. The economic success of West Germany was the trigger of another major wave of migration, mainly from southern European countries. More than 2 million people (so called “Gastarbeiter” = guest workers) from these countries migrated to

Germany from 1955 until 1973, when the relevant work-migration programs were stopped by the government (Oltmer, 2016). Many of these foreigners filled physically demanding jobs and their living conditions were worse compared to those of most German citizens, which might be reflected in the foreigners having higher scores in neurotic traits.

It is possible that these migration patterns explain the city-level variation in neurotic traits and mental well-being. In particular, the expellees were housed more often in cities that were hit less hard by the war (Brakman et al., 2004) because there was more housing stock left in these cities. Thus, it is possible that severely bombed cities have lower scores in neurotic traits and higher scores in mental health because they did not incorporate large numbers of traumatized expellees. Arguments can be made for why the East German refugees and foreigners (mainly guest workers) would gravitate to both the more heavily bombed and the less heavily bombed cities. On the one hand, one main reason for migrating was to find employment, suggesting that the population shares might be higher in cities that were growing faster, which as we noted above, were the most destroyed cities. On the other hand, East German refugees and foreigners also needed housing and thus migrated to less severely destroyed cities. We nevertheless test the hypotheses that these migration patterns mediate the relationship between strategic bombing in WWII and lower scores in neurotic traits and high scores mental health.

Data on the three groups of migrants (expellees, East Germans, and foreign guest workers) come from the 1961 population census. The average population share of expellees in West German cities in 1961 was 15% (SD = 4.8, Min = 5.6, Max = 31.2), the average of share of East Germans was 6% (SD = 1.5, Min = 2.9, Max = 9.7) and the average share of foreigners was 1.4% (SD = 0.7, Min = 0.4, Max = 4.1). Note that these data are not available for East German cities, West Berlin, and Bremerhaven. We also lack data on several other post-WWII migration patterns, most notably of more than 5 million returning prisoners of war.

The regressions testing these mediation models are shown in Table 7. Model 2 and 3 in Table 7 show that there is no significant relationship between the East German population share as well as the foreigner population share with bombing, ruling out any mediating effects of these variables. Model 1 shows that the mediating variable expellee population share 1961 is significantly higher in less severely bombed cities measured by the loss of housing stock 1939-1945 (β = -0.24, $p < .05$). However, Models 5, 7, 9, and 11 show that this mediating variable does not predict present-day neurotic traits and mental health, thereby ruling out any mediated effects. Only in Model 13 does the expellees population share predict the use of anti-depressant drugs (β = -0.24, $p < .05$) but the indirect effect was not significantly different from zero (β = 0.05, 95% confidence interval = -0.003 and 0.143 after 2,000 replications). Taken together, we must reject the hypothesis that the differential inflow of refugees to the more severely bombed or least severely cities can explain the lower scores of neurotic traits and higher mental health in the severely bombed cities. Although there is no mediating effect of these three migration flows between strategic bombing and *German Angst* indicators, there are direct effects of these migration flows. Model 5, 7, 9, 11, and 13 show that the share of foreigners negatively affects our *German Angst* indicators, Anxiety (β = -0.24, $p < .05$), Neuroticism (β = -0.25, $p < .1$) and mental health indicators, missing working days (β = -0.29, $p < .05$) and anti-depressant drugs (β = -0.24, $p < .1$). However, even when controlling for migration flows, the loss of housing stock 1939-1945 still negatively predicts trait Depression (Models 7) as it did in the original regression setting (Table 3).

Beyond historic migration patterns, more recent migration flows could also potentially explain the variation in *German Angst* indicators across cities. To account for such patterns, we reran the original city-level regressions but with additional controls for recent migration patterns. More precisely, we tested whether our findings linking WWII bombing intensity to low levels of *German Angst* indicators, and the buffering effect of bombing on the relationship between economic hardship and Angst indicators remains when controlling for the inflow of

foreigners, East or West Germans after reunification. Data on migration flows are for the year 2012 and come from the German statistical office (county-to-county migration flows). The respective results are summarized in Table 8. Regarding the main effects of strategic bombing on *German Angst* indicators, we find all three previous significant effects (presented in Table 3) to be stable after including recent migration flows (first row in Table 8). Regarding the 13 significant interaction effects between strategic bombing and economic hardship (Table 4), we find that 9 are still significant after including recent migration flows (rows 2-4 in Table 8). Taken together, these additional analyses suggest that historic post-war and recent migrations are not valid alternative explanations of our finding that cities which were bombed more heavily show more resilience in terms of lower scores in neurotic traits and higher scores in mental health.

Another form of migration possibly explaining the current findings—and one we cannot test here—is based on the idea that the bombing itself may have precipitated differential migration patterns. Specifically, it is possible that the bombing of cities inflicted a particularly heavy psychological toll on the residents higher on neuroticism, who are by their nature more susceptible to stress than less neurotic individuals. If so, these residents would have been the ones particularly likely to move away from the heavily bombed cities leaving behind a population with fewer neurotic people in it and diminishing the city's average level of neuroticism. These lower levels of neuroticism could be passed on to succeeding generations via simple genetic inheritance.

Even if the neurotic residents remained in a heavily bombed city it is possible that the higher levels of stress they experienced, relative to their less neurotic counterparts, would inflict a higher physiological burden reducing their levels of fertility; in light of the heritability of personality traits, the result would be a smaller proportion of neurotic people in the next generation of that city's residents. These two mechanisms—differential migration and differential fertility—could result in the same pattern of findings as the mechanism by which

the trauma of bombing causes the residents to generally become more resilient, but the mechanisms are quite different.

The potential explanations above fall, to varying degrees, into the broad categories of plasticity, dispersal, and selection, that are well known in the Behavioral Ecology literature. Plasticity refers to the fact that individuals may change their levels of Neuroticism in response to life events (e.g., toughening up in response to trauma, building resilience as a result of social support), establishing new cultural norms that may get handed down to subsequent populations. Dispersal refers to the fact that individuals of different levels of Neuroticism might select themselves in or out of certain contexts, as might be the case if only the city residents low on Neuroticism remained in a city experiencing the trauma of bombing and its aftermath. Selection refers to the fact that individuals of different levels of Neuroticism may differentially pass on their genes to subsequent generations, as might be the case if Neuroticism was associated with differential fertility in times of stress (e.g., if calmer people are more likely to conceive or choose to start a family than neurotic people). These parallels between the mechanisms potentially driving such phenotype-environment correlations in the human and non-human animal literatures hint at the promise of drawing on the models, theories, and methods of behavioral ecology.

Limitations

Our study has several limitations. First, our data do not permit us to model and test causal mechanisms, such as epigenetic effects and intergenerational transmission of these effects (Bowers & Yehuda, 2016), the complete selective migration patterns over centuries (Jokela, 2009), or the actual effects of formal and informal institutions and their respective historical development (Greif, 2006). To shed further light on the long-term effects of major collective traumas, such as major bombings, and the potential mechanisms underlying these effects, a broad array of research is needed, most likely drawing on natural experiments, cross-cultural research, and perhaps even comparative studies of similar phenomena in non-human

animal populations. Second, we solely focused on regional mental health related to depression because other data were not available to us. Future research could consider a wider spectrum of neurotic disorders and symptoms to capture additional objective manifestations of *German Angst* levels. Third, our regional personality data was not representative of the general population. Nonetheless, we still found meaningful region-level correlations with our objective mental-health outcomes (Table 2). Furthermore, we attempted to address this representativeness issue by weighting these regional-level data and conducting individual-level analyses as part of our robustness checks. Related to the issue of representativeness, our regional personality sample consists mostly of people born after the WWII and there is no way determining in which cities the respondents' parents lived during WWII. We partially circumvented the problem by computing the regional trait measures on the basis of the respondents' youth residence but, of course, this step does not solve the issue completely. Nonetheless, our main results survived several robustness checks based on historical and recent migration patterns. Fourth, our analyses were limited in terms of the specific kind of trauma they included and in the specific context of that trauma. For example, we did not include many of the other traumatic experiences associated with the war, such as the mourning of millions of fallen German soldiers by their widows and children nor the hundreds of thousands of war-disabled (Bode, 2006). Fifth, with regard to understanding *German Angst*, we did not examine the effects of splitting Germany into a socialist East German state and a capitalist West German state; this schism placed Germany at the center of decades' worth of cold-war posturing and could also have contributed to *German Angst*.

Conclusion

To conclude, our study contributes to the public and scholarly debate on the link between major regional shocks (e.g., war, disasters, etc.) and their collective psychological and societal consequences (Cutter et al., 2015). It also contributes to the wider field of socioecological psychology (Oishi, 2014), with its subfield of geographical psychology

(Rentfrow, 2014; Rentfrow, Gosling, & Potter, 2008) and potential historical sources of regional psychological differences (Stuetzer et al., 2016; Plaut, Markus, Treadway, & Fu, 2012; Talhelm, Zhang, Oishi, Shimin, Duan, Lan, & Kitayama, 2014).

Contrary to expectations, our study found no indications that the severe bombing of German cities during WWII might have led to higher regional levels of *German Angst* in these cities today. In fact, we found the opposite pattern, with more present-day resilience in the cities that were heavily bombed in WWII. Moreover, the positive effect of economic hardship on *German Angst* levels was weaker in cities that were bombed more heavily. Hence, the WWII Hypothesis appears to have underestimated the effects of adversity in promoting resilience. Future research should focus on replicating these findings in other contexts and, if supported elsewhere, identifying the mechanisms linking adversity to resilience.

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Table 1: Trait Anxiety, Trait Depression, and Trait Neuroticism for each of the 109 countries (Total N = 7,210,276)

Country	N	Trait Anxiety		Trait Depression		Trait Neuroticism	
		Index	Rank	Index	Rank	Index	Rank
Afghanistan	1172	2.77	101	2.91	82	2.86	98
Albania	2288	2.93	66	2.82	98	2.93	85
Algeria	1074	2.95	55	3.12	27	3.04	45
Argentina	88211	3.27	1	3.33	2	3.32	1
Armenia	1084	3.17	5	3.20	9	3.21	5
Aruba	1014	2.98	35	3.02	59	3.03	52
Australia	195857	2.93	65 (16)	2.92	80 (22)	2.97	74 (20)
Austria	27143	2.92	72 (18)	3.05	45 (10)	2.95	80 (22)
Bahamas	1655	2.89	82	2.84	94	2.91	91
Bahrain	1554	3.01	27	3.12	26	3.09	18
Bangladesh	3482	2.94	57	3.14	16	3.07	30
Barbados	1274	2.93	69	2.95	75	2.97	73
Belgium	43692	2.98	36 (9)	2.85	93 (29)	3.00	63 (16)
Belize	1025	2.91	78	2.94	78	2.96	77
Bolivia	6115	3.13	7	3.35	1	3.20	6
Bosnia and	1371	2.94	59	3.09	34	3.04	43
Brazil	26538	3.17	3	3.06	43	3.18	9
Brunei Darussalam	1211	3.18	2	3.22	7	3.22	2
Bulgaria	3610	2.98	38	3.05	48	3.05	38
Canada	371882	2.92	71 (17)	2.90	85 (24)	2.95	79 (21)
Chile	44552	3.02	23 (7)	3.07	39 (9)	3.05	36 (9)
China	20069	2.87	90	2.79	100	2.91	90
Colombia	34905	3.01	28	3.07	37	3.04	47
Costa Rica	6712	2.97	47	3.03	57	3.02	57
Croatia	6920	2.90	80	2.99	70	2.99	70
Cuba	1037	3.05	17	2.99	69	3.08	26
Cyprus	2307	2.95	53	2.99	71	3.02	56
Czech Republic	3566	2.94	61 (15)	3.01	61 (16)	3.01	61 (14)
Denmark	19074	2.73	104 (34)	2.77	103 (33)	2.78	104 (33)
Dominican Republic	6222	3.03	20	3.03	55	3.03	49
Ecuador	9065	2.95	54	3.06	42	2.99	69
Egypt	9075	3.11	9	3.27	3	3.21	4
El Salvador	3682	3.01	26	3.11	29	3.06	34
Estonia	2459	2.96	50 (13)	3.19	10 (2)	3.08	22 (6)
Ethiopia	1008	2.87	91	2.94	77	2.91	89
Finland	23526	2.92	73 (19)	3.04	52 (13)	3.00	67 (19)
France	18502	2.88	85 (25)	2.83	96 (31)	2.93	84 (25)
Germany	**186848**	**3.00**	**31 (8)**	**3.13**	**20 (5)**	**3.03**	**53 (10)**
Ghana	1949	2.65	108	2.75	106	2.74	107
Greece	10982	3.11	10 (2)	3.23	6 (1)	3.19	7 (1)
Guatemala	5635	3.05	18	3.12	28	3.09	19
Honduras	3336	3.00	32	3.05	46	3.04	48
Hong Kong	12626	3.01	29	3.04	50	3.07	27
Hungary	3746	2.94	60 (14)	2.98	72 (18)	3.01	59 (13)
Iceland	2520	2.79	99 (30)	2.97	73 (19)	2.90	96 (30)
India	114500	2.93	70	3.13	19	3.04	42
Indonesia	15199	2.94	58	3.17	12	3.06	33
Iran	4438	3.02	22	2.99	68	3.07	28
Ireland	41257	2.97	44 (11)	2.93	79 (21)	3.00	65 (17)
Israel	7426	2.85	94 (29)	2.95	74 (20)	2.95	81 (23)
Italy	13831	2.87	92 (28)	2.86	91 (28)	2.92	87 (26)
Jamaica	4199	2.85	93	3.00	67	2.92	86
Japan	10232	2.88	84 (24)	2.92	81 (23)	2.94	83 (24)
Jordan	2431	3.06	15	3.13	22	3.13	12
Kenya	6985	2.73	105	2.78	102	2.81	102
Kuwait	2504	2.97	45	3.08	36	3.06	32
Latvia	1440	2.97	48 (12)	3.07	38 (8)	3.06	35 (8)

Table 1 (continued)

Country	N	Trait Anxiety		Trait Depression		Trait Neuroticism	
		Index	Rank	Index	Rank	Index	Rank
Lebanon	5518	3.09	12	3.13	21	3.16	10
Lithuania	2277	3.02	24	3.12	23	3.10	17
Luxembourg	1116	3.06	16 (5)	3.09	33 (7)	3.08	25 (7)
Macedonia	1121	2.93	62	3.06	44	3.01	60
Malaysia	39606	3.02	21	3.11	30	3.08	21
Malta	1590	3.09	11	3.00	62	3.12	15
Mauritius	1706	2.97	46	3.12	25	3.08	24
Mexico	136305	3.04	19 (6)	3.15	14 (3)	3.09	20 (5)
Morocco	1346	2.99	34	3.16	13	3.08	23
Nepal	2142	2.98	40	3.06	41	3.05	37
Netherlands	163472	2.76	103 (33)	2.67	109 (35)	2.79	103 (32)
Netherlands Antilles	2470	2.82	96	2.80	99	2.86	99
New Zealand	43167	2.89	81 (23)	2.86	90 (27)	2.92	88 (27)
Nicaragua	2316	2.98	37	3.10	32	3.04	44
Nigeria	7033	2.62	109	2.72	107	2.71	109
Norway	42859	2.67	106 (35)	2.76	105 (34)	2.74	106 (35)
Oman	1068	2.87	89	3.00	63	2.96	76
Pakistan	27498	3.00	30	3.24	4	3.13	13
Panama	2938	2.93	64	3.02	60	2.96	75
Paraguay	3517	3.15	6	3.21	8	3.19	8
Peru	23056	2.98	39	3.14	17	3.03	50
Philippines	91638	2.96	52	3.18	11	3.04	41
Poland	7951	3.07	14 (4)	3.14	18 (4)	3.14	11 (2)
Portugal	8334	3.08	13 (3)	3.12	24 (6)	3.13	14 (3)
Puerto Rico	7244	2.92	74	2.82	97	2.91	92
Qatar	2064	2.93	67	3.04	49	3.01	58
Romania	13055	2.93	63	3.10	31	3.03	51
Russia	3624	2.97	49	3.00	66	3.05	39
Saudi Arabia	5887	2.98	43	3.06	40	3.05	40
Serbia	5665	2.98	42	3.09	35	3.06	31
Singapore	59119	2.99	33	3.03	56	3.04	46
Slovakia	1691	2.92	75 (20)	3.05	47 (11)	3.00	62 (15)
Slovenia	3095	2.92	76 (21)	3.04	51 (12)	3.00	66 (18)
South Africa	26039	2.88	86	2.91	84	2.94	82
South Korea	9960	2.88	87 (26)	2.86	89 (26)	2.90	94 (29)
Spain	135048	3.13	8 (1)	3.03	53 (14)	3.10	16 (4)
Sri Lanka	3958	2.89	83	2.91	83	2.96	78
Sweden	46828	2.76	102 (32)	2.87	88 (25)	2.82	101 (31)
Switzerland	36741	2.77	100 (31)	2.79	101 (32)	2.77	105 (34)
Taiwan	3873	2.96	51	2.88	87	2.98	72
Thailand	8501	2.81	98	2.86	92	2.88	97
Trinidad and Tobago	4183	2.93	68	3.03	54	2.99	68
Turkey	5298	2.91	77 (22)	3.02	58 (15)	3.02	55 (12)
Uganda	1377	2.66	107	2.70	108	2.73	108
Ukraine	1081	2.94	56	2.95	76	3.00	64
United Arab Emirates	14907	2.91	79	3.00	64	2.98	71
United Kingdom	438854	2.98	41 (10)	3.00	65 (17)	3.02	54 (11)
United States	4275860	2.87	88 (27)	2.84	95 (30)	2.90	93 (28)
Uruguay	6351	3.17	4	3.23	5	3.22	3
Venezuela	19318	3.02	25	3.15	15	3.07	29
Vietnam	3480	2.82	95	2.88	86	2.90	95
Zimbabwe	1114	2.81	97	2.77	104	2.85	100

Notes: The rank in the rank column gives the rank among all 109 countries. The rank in brackets gives the rank among the 35 OECD countries.

Table 2: Zero-order correlations between the variables at the regional level

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Strategic bombing																								
1	Loss of housing stock 1939-1945	–																						
2	Rubble 1945	.68	–																					
Neurotic traits and mental health																								
3	Trait Anxiety	-.08	-.22	–																				
4	Trait Depression	-.25	-.44	.69	–																			
5	Trait Neuroticism	-.18	-.30	.94	.87	–																		
6	Missing working days	.02	.04	.15	.30	.24	–																	
7	Antidepressant drugs	.22	.03	.17	.32	.22	.43	–																
Economic hardship																								
8	GDP per capita	.07	.15	-.20	-.22	-.24	-.26	.15	–															
9	Unemployment rate	-.13	-.06	.15	.13	.19	.37	-.30	-.79	–														
10	Population loss	-.08	-.05	.18	.14	.20	.20	-.15	-.59	.74	–													
Control variables																								
11	East Germany	-.31	–	-.01	-.16	-.04	-.28	-.71	-.36	.51	.43	–												
12	Crime rate	.08	.26	-.04	-.04	-.06	.22	.07	.29	.03	-.05	-.08	–											
13	Creative class	-.16	-.02	-.01	-.12	-.05	-.41	-.29	.43	-.38	-.41	.18	.02	–										
14	Foreigners	.25	.28	-.15	-.14	-.17	.13	.40	.65	-.52	-.48	-.61	.22	.12	–									
15	Regional religiosity	.26	-.27	.10	.23	.11	.21	.76	.22	-.49	-.40	-.91	-.10	-.22	.41	–								
16	Non-heterosexual orientation	.13	.13	-.09	-.17	-.17	.17	-.15	-.07	.23	-.00	.10	.35	-.07	-.12	-.12	–							
17	Atmospheric particulate matter	.05	.05	.22	.14	.22	.42	-.02	-.20	.45	.29	.14	.11	-.15	.05	-.17	.21	–						
18	Nitrogen dioxide	.20	.09	.03	-.00	.02	.31	.26	.21	-.07	-.13	-.39	.11	-.03	.60	.29	.01	.65	–					
19	Ozone	-.00	-.02	-.03	-.21	-.10	-.32	.06	.43	-.43	-.29	-.08	-.08	.37	.52	.07	-.14	.02	.32	–				
20	July temperature	.05	.05	.09	-.11	.02	-.08	-.04	.32	-.10	-.16	.06	.24	.25	.39	-.10	.14	.45	.52	.63	–			
21	July sunshine	-.18	-.02	-.15	-.21	-.18	-.32	-.22	.45	-.37	-.29	.22	.08	.46	.27	-.29	-.06	-.27	-.20	.52	.33	–		
22	July precipitation	.17	-.11	.04	.14	.08	.24	.49	-.01	-.21	-.11	-.55	-.22	-.22	.32	.53	-.16	-.13	.22	-.07	-.40	-.33	–	
23	Recreation area	.01	.18	.12	-.04	.08	.23	-.18	.05	.28	.14	.14	.50	.04	.16	-.30	.33	.52	.37	.02	.34	-.05	-.15	–
24	Population size	.13	.18	-.07	-.13	-.09	.14	-.16	.03	.15	-.18	.02	.35	.05	.20	-.17	.30	.23	.11	.01	.14	.09	-.09	.37

Note.

Correlations above |.17| are significant at the 10% level, above |.21| are significant at the 5% level, above |.29| are significant at the 1% level, and above |.34| are significant at the 0.1% level.

Table 3: Overview of regional level regression results

Variables	DV: Trait Anxiety		DV: Trait Depression		DV: Trait Neuroticism		DV: Missing working days		DV: Anti-depressant drugs	
	IV: Loss of housing stock 1939-1945 (Table A2)	IV: Rubble 1945 (Table A7)	IV: Loss of housing stock 1939-1945 (Table A3)	IV: Rubble 1945 (Table A8)	IV: Loss of housing stock 1939-1945 (Table A4)	IV: Rubble 1945 (Table A9)	IV: Loss of housing stock 1939-1945 (Table A5)	IV: Rubble 1945 (Table A10)	IV: Loss of housing stock 1939-1945 (Table A6)	IV: Rubble 1945 (Table A11)
Strategic bombing	-0.06	-0.01	-0.30**	-0.38**	-0.16	-0.11	-0.14^{+}	0.01	-0.01	0.15
Economic hardship variables + Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	89	69	89	69	89	69	89	69	89	69
R^2 (adjusted)	0.123	0.084	0.231	0.252	0.186	0.162	0.515	0.534	0.639	0.320
ΔR^2 (adjusted)	-0.009	-0.018	0.073	0.105	0.011	-0.005	0.010	-0.009	-0.005	0.005

Note.

Standardized coefficients are given. The full models including the standard errors are shown in the Appendix (Tables A2-A11, Model 2). The ΔR^2 were computed by comparing Model 2 in Tables A2-A11 to a model without the neurotic traits and mental health indicators. The original OLS regressions include the economic hardship variables and the regional controls as covariates. All variables were z-standardized.

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

Table 4: Overview of interaction effects at the regional level

		DV: Trait Anxiety		DV: Trait Depression		DV: Trait Neuroticism		DV: Missing working days		DV: Anti-depressant drugs	
		Loss of housing stock 1939-1945 (Table A2)	Rubble 1945 (Table A7)	Loss of housing stock 1939-1945 (Table A3)	Rubble 1945 (Table A8)	Loss of housing stock 1939-1945 (Table A4)	Rubble 1945 (Table A9)	Loss of housing stock 1939-1945 (Table A5)	Rubble 1945 (Table A10)	Loss of housing stock 1939-1945 (Table A6)	Rubble 1945 (Table A11)
Interaction strategic bombing X GDP per capita (Model 3)	β	0.11	0.19	0.01	0.12	0.10	0.19^{+}	0.02	-0.02	0.15^{+}	-0.09
	R^2 (adjusted)	0.119	0.099	0.220	0.250	0.182	0.178	0.508	0.525	0.649	0.314
	ΔR^2 (adjusted)	-0.004	0.015	-0.011	-0.002	-0.004	0.016	-0.007	-0.009	0.010	-0.006
Interaction strategic bombing X unemployment rate (Model 4)	B	-0.27*	-0.24^{+}	-0.21^{+}	-0.18	-0.29*	-0.25*	-0.02	-0.08	-0.16*	-0.17
	R^2 (adjusted)	0.167	0.120	0.254	0.265	0.238	0.201	0.509	0.531	0.654	0.332
	ΔR^2 (adjusted)	0.044	0.036	0.023	0.013	0.052	0.039	-0.006	-0.003	0.015	0.012
Interaction strategic bombing X population loss (Model 5)	β	-0.20^{+}	-0.44**	-0.11	-0.20^{+}	-0.21^{+}	-0.38**	0.03	-0.14	0.05	-0.12
	R^2 (adjusted)	0.147	0.210	0.232	0.267	0.214	0.253	0.509	0.540	0.636	0.317
	ΔR^2 (adjusted)	0.024	0.126	0.001	0.015	0.028	0.091	-0.006	0.006	-0.003	-0.003
Strategic bombing + economic hardship + control variables		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N		89	69	89	69	89	69	89	69	89	69

Note.

Standardized coefficients are given. The full models including the standard errors are shown in the Appendix (Tables A2-A11, Model 3-5). The original OLS regressions include the strategic bombing variables, the economic hardship variables and the regional controls as covariates. All variables were z-standardized.

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

Table 5: Regional level regressions with entrepreneurship rates as DV

Variable	Model 1 DV: Self-employment rate 1950	Model 2 DV: Self-employment rate 1950	Model 3 DV: Self-employment rate 1961	Model 4 DV: Self-employment rate 1961	Model 5 DV: Self-employment rate 1970	Model 6 DV: Self-employment rate 1970	Model 7 DV: Start-up rate 2008-2012	Model 8 DV: Start-up rate 2008-2012
Strategic bombing								
Loss of housing stock 1939-1945	0.07		0.02		0.13		-0.02	
Rubble 1945		0.18		-0.03		0.08		-0.05
Economic controls								
Population size 1950	-0.07	-0.12						
Population size 1961			0.10	0.11				
Population size 1970					-0.04	-0.05		
Population size 2008							0.44***	0.48***
GDP per capita 2008-2012							-0.60***	-0.58***
Unemployment rate 2008-2012							0.10	0.10
Constant	-0.01	0.02	-0.04	-0.04	-0.02	0.01	0.00	-0.02
N	72	69	72	69	72	69	89	69
R^2 (adjusted)	-0.020	0.006	-0.015	-0.016	-0.013	-0.024	0.638	0.590

Note.

OLS regressions. Standardized coefficients are given. Standard errors suppressed due to brevity. All variables were z-standardized.

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

Table 6: Overview of regression results regarding city growth as mediator

Variables	Model 1 DV: Average annual population growth rate 1946-1970	Model 2 DV: Trait Anxiety	Model 3 DV: Trait Anxiety	Model 4 DV: Trait Depression	Model 5 DV: Trait Depression	Model 6 DV: Trait Neuroticism	Model 7 DV: Trait Neuroticism	Model 8 DV: Missing working days	Model 9 DV: Missing working days	Model 10 DV: Anti-depressant drugs	Model 11 DV: Anti-depressant drugs
Loss of housing stock 1939-1945	0.38*	-0.09	-0.11	-0.32*	-0.31*	-0.21^{+}	-0.22^{+}	-0.07	0.12	0.01	0.02
Average annual population growth rate 1946-1970			0.05		-0.02		0.03		-0.51***		-0.03
N	72	72	72	72	72	72	72	72	72	72	72
R^2 (adjusted)	0.129	-0.001	-0.018	0.088	0.075	0.030	0.017	-0.009	0.208	-0.014	-0.028

Note.

Standardized coefficients are given. The standard errors are suppressed due to brevity. OLS regressions. All variables were z-standardized.

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

Table 7: Overview of regression results regarding refugees as mediator

Variables	Model 1 DV: Expellees 1961	Model 2 DV: East Germans 1961	Model 3 DV: Foreigners 1961	Model 4 DV: Trait Anxiety	Model 5 DV: Trait Anxiety	Model 6 DV: Trait Depression	Model 7 DV: Trait Depression	Model 8 DV: Trait Neuroticism	Model 9 DV: Trait Neuroticism	Model 10 DV: Missing working days	Model 11 DV: Missing working days	Model 12 DV: Anti-depressant drugs	Model 13 DV: Anti-depressant drugs
Loss of housing stock 1939-1945	-0.24*	0.05	-0.13	-0.11	-0.16	-0.32*	-0.32*	-0.21	-0.24^{+}	-0.04	-0.11	-0.04	-0.11
Expellees 1961					-0.08		0.06		-0.03		-0.14		-0.23^{+}
East Germans 1961					-0.06		-0.22^{+}		-0.09		-0.07		-0.24*
Foreigners 1961					-0.24*		-0.24		-0.25^{+}		-0.29*		-0.24^{+}
Constant	0.00	-0.00	0.04	-0.02	-0.01	-0.01	0.00	-0.02	-0.01	-0.03	-0.02	0.04	0.05
N	67	67	67	67	67	67	67	67	67	67	67	67	67
R^2 (adjusted)	0.045	-0.013	0.001	-0.003	0.027	0.087	0.189	0.030	0.073	-0.013	0.058	-0.014	0.168

Note.

Standardized coefficients are given. Standard errors are suppressed due to brevity. OLS regressions. All variables were z-standardized.

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

Table 8: Overview of results regarding contemporary migration as an robustness check

		DV: Trait Anxiety		DV: Trait Depression		DV: Trait Neuroticism		DV: Missing working days		DV: Anti-depressant drugs	
		Loss of housing stock 1939-1945 (Table A2)	Rubble 1945 (Table A7)	Loss of housing stock 1939-1945 (Table A3)	Rubble 1945 (Table A8)	Loss of housing stock 1939-1945 (Table A4)	Rubble 1945 (Table A9)	Loss of housing stock 1939-1945 (Table A5)	Rubble 1945 (Table A10)	Loss of housing stock 1939-1945 (Table A6)	Rubble 1945 (Table A11)
Strategic bombing indicators	β	-0.07	0.03	-0.31**	-0.37**	-0.17^{+}	-0.08	-0.14^{+}	0.03	-0.02	0.08
Interaction strategic bombing X GDP per capita (Model 3)	β	0.16	0.20	0.04	0.13	0.15	0.20	0.03	-0.02	0.15	-0.09
Interaction strategic bombing X unemployment rate (Model 4)	B	-0.30*	-0.29^{+}	-0.22^{+}	-0.19	-0.31*	-0.29*	-0.02	-0.11	-0.15*	-0.14
Interaction strategic bombing X population loss (Model 5)	β	-0.18	-0.45**	-0.09	-0.20^{+}	-0.18	-0.39**	0.04	-0.15	0.03	-0.12
Control variables including contemporary migration inflows		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N		89	69	89	69	89	69	89	69	89	69

Note.

Standardized coefficients are given. Standard errors are suppressed for brevity. The full models including the standard errors are not shown for brevity. The original OLS regressions include the control variables such as in Tables A2-A11as covariates. Additionally we control for the population share of foreigners in 2012, the population share inflowing ,of East Germans in 2012 and the population share of inflowing West Germans in 2012. All variables were z-standardized.

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

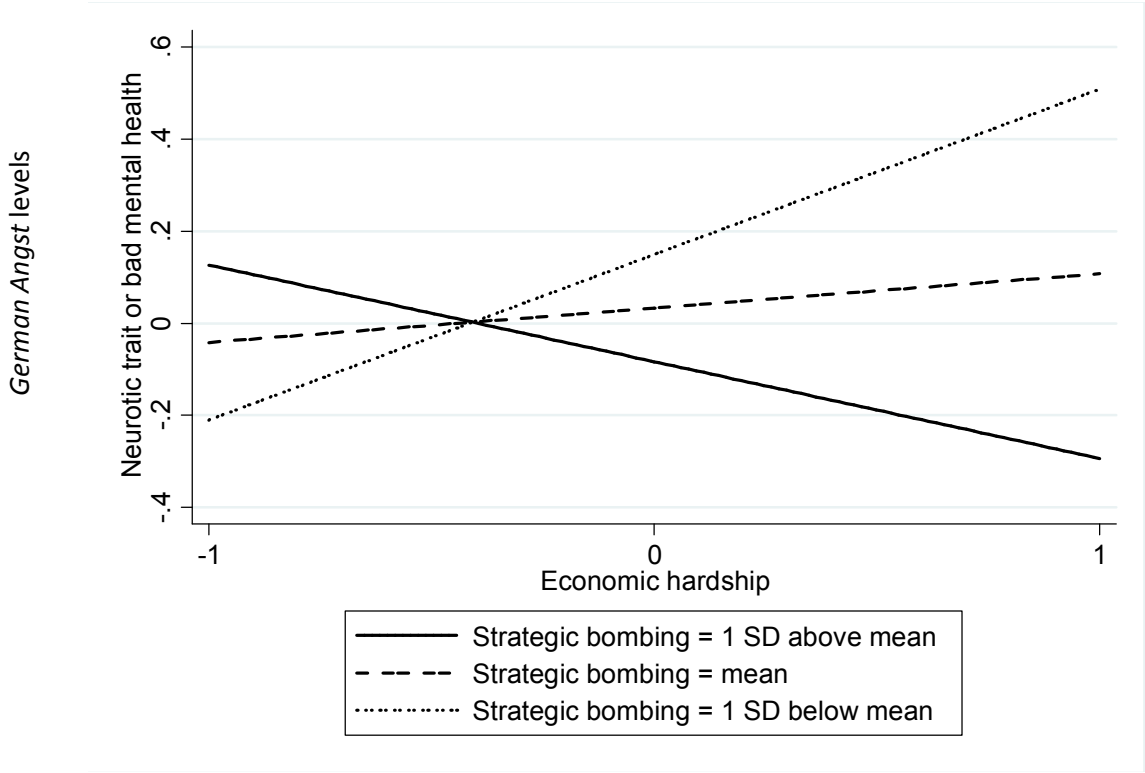

Figure 1: Prototypical observed interaction effect between strategic bombing and recent economic hardship in the prediction of neurotic traits and lower mental health as indicators of *German Angst* (regional level).

Note. This is a prototypical figure that is not based on concrete data but summarizes the observed interaction effects.

APPENDIX

Table A1: Data for main city-level variables

City	Trait Anxiety	Trait Depression	Trait Neuroticism	Loss of housing stock 1939-1945	Rubble 1945
Berlin West	3.02	3.14	3.05	37.0	12.7
Hamburg	2.94	3.10	2.98	53.5	20.9
München	2.98	3.12	3.02	33.0	6.5
Köln	2.98	3.10	3.00	70.0	31.2
Frankfurt am Main	2.91	3.02	2.94	45.0	21.1
Essen	2.97	3.12	2.99	50.5	22.4
Dortmund	3.05	3.17	3.07	65.8	30.9
Düsseldorf	2.97	3.12	3.01	50.9	18.5
Stuttgart	2.92	2.98	2.91	29.8	8.5
Bremen	2.94	3.04	2.95	51.6	17.6
Duisburg	3.02	3.17	3.05	64.8	12.9
Hannover	2.93	3.00	2.94	51.6	17.8
Nürnberg	3.10	3.27	3.13	49.0	25.3
Bochum	3.01	3.19	3.06	51.9	12.1
Wuppertal	3.02	3.16	3.06	39.0	18.9
Bielefeld	3.00	3.20	3.04	26.0	12.8
Mannheim	3.03	3.16	3.05	48.7	15.1
Gelsenkirchen	3.04	3.16	3.04	51.0	12.2
Bonn	2.95	3.14	2.99	47.2	9.4
Karlsruhe	2.97	3.04	2.99	24.8	7.4
Wiesbaden	2.91	3.07	2.95	22.3	3.1
Braunschweig	3.10	3.18	3.12	51.9	11.5
Mönchengladbach	3.05	3.16	3.08	24.3	17.8
Münster	2.94	3.04	2.99	39.3	17.7
Augsburg	3.05	3.22	3.08	23.8	6.3
Kiel	2.96	3.26	3.04	58.1	15.1
Krefeld	3.00	3.06	3.00	49.6	16.1
Aachen	2.98	3.10	3.01	47.9	21.2
Oberhausen	2.98	3.12	2.99	30.8	6.8
Lübeck	3.04	3.24	3.09	19.6	4.5
Hagen	2.96	3.14	2.99	41.1	7.2
Kassel	3.01	3.08	3.03	63.9	26.7
Saarbrücken	3.00	3.04	3.00	39.0	n.a.
Freiburg im Breisgau	2.98	3.05	2.99	34.2	9.4
Hamm	2.89	3.08	2.94	60.3	20.3
Mainz	3.02	3.16	3.05	54.0	13.3
Herne	3.22	3.40	3.26	14.6	0.7
Mülheim an der Ruhr	3.06	3.18	3.08	29.9	5.8
Solingen	3.02	3.09	3.04	20.1	10.3
Osnabrück	2.91	3.04	2.92	54.6	17.1
Ludwigshafen am Rhein	2.95	3.10	2.99	55.0	14.5
Leverkusen	3.12	3.30	3.15	10.7	2.4
Neuss	3.08	3.26	3.13	36.8	9.1
Oldenburg (Oldenburg)	3.04	3.25	3.09	1.4	n.a.
Darmstadt	3.08	3.07	3.06	61.6	26.0
Bremerhaven	3.10	3.21	3.10	36.4	7.3
Würzburg	3.00	3.05	3.00	74.1	31.3
Recklinghausen	3.06	3.27	3.11	21.9	1.3
Remscheid	2.94	3.12	3.01	50.6	19.7
Göttingen	3.05	3.27	3.10	2.1	1.2

Table A1 (continued): Data for main city-level variables

City	Trait Anxiety	Trait Depression	Trait Neuroticism	Loss of housing stock 1939-1945	Rubble 1945
Regensburg	3.09	3.25	3.13	7.2	0.9
Bottrop	3.01	3.16	3.05	38.6	3.7
Paderborn	3.10	3.18	3.10	95.6	13.7
Heilbronn	2.99	3.06	3.00	54.3	16.0
Pforzheim	3.01	3.23	3.07	62.1	24.3
Ulm	2.95	3.09	2.98	44.0	12.8
Koblenz	3.10	3.25	3.12	61.0	10.4
Siegen-Wittgenstein	3.03	3.22	3.06	75.3	11.9
Witten	3.18	3.22	3.17	50.4	4.5
Hildesheim	3.03	3.26	3.10	43.5	7.3
Moers	3.00	3.20	3.03	75.7	1.6
Bergisch Gladbach	2.92	3.09	2.97	35.8	0.9
Reutlingen	3.01	3.15	3.03	28.6	3.1
Ingolstadt	3.01	3.16	3.03	7.7	0.9
Erlangen	3.01	3.23	3.07	4.8	0.3
Fürth	2.86	3.17	2.94	10.6	2.6
Kaiserslautern	3.00	3.27	3.07	26.2	3.6
Wilhelmshaven	2.94	3.02	2.93	60.2	12.7
Trier	3.05	3.13	3.03	35.2	10.2
Bamberg	3.05	3.26	3.08	4.4	3.3
Wattenscheid	3.05	3.29	3.11	22.3	1.5
Flensburg	2.92	3.17	3.00	4.7	n.a.
Berlin Ost	3.01	3.09	3.02	37.0	n.a.
Leipzig	3.05	3.13	3.06	25.0	n.a.
Dresden	3.01	3.12	3.04	60.0	n.a.
Halle (Saale)	3.19	3.28	3.21	5.0	n.a.
Chemnitz	2.96	3.11	3.01	25.0	n.a.
Magdeburg	2.95	3.01	2.97	50.0	n.a.
Rostock	2.99	3.11	3.01	25.0	n.a.
Erfurt	2.95	3.08	2.98	5.0	n.a.
Potsdam	3.04	3.18	3.05	20.0	n.a.
Gera	2.94	3.17	3.01	10.0	n.a.
Schwerin	3.00	3.07	3.00	3.0	n.a.
Cottbus	3.04	3.23	3.09	20.0	n.a.
Zwickau	3.02	3.12	3.04	5.0	n.a.
Jena	2.93	3.01	2.95	15.0	n.a.
Frankfurt (Oder)	3.08	3.17	3.09	50.0	n.a.
Brandenburg an der Havel	2.97	3.15	3.05	20.0	n.a.
Dessau	2.96	3.02	2.97	40.0	n.a.

Note.

Regional means for Trait Anxiety, Trait Depression and Trait Neuroticism. The underlying individual-level data are based on the BFI inventory (5-point Likert scale 1 = disagree strongly, 5 = agree strongly). Loss of housing stock between 1939 and 1945 in %. Rubble in 1945 in m^3 per capita. Rubble data not available for all East German cities and three West German cities. The data on rubble and loss of housing stock were collected by Brakman, S., Garretsen, H., Schramm, M. (2004), The strategic bombing of German cities during World War II and its impact on city growth, Journal of Economic Geography, 4(2), 201-218.. We are grateful to these authors to use these data.

Table A2: Regional level regressions with loss of housing stock 1939-1945 as IV and Trait Anxiety as DV

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	β	SE	β	SE	β	SE	β	SE	β	SE
Strategic bombing										
Loss of housing stock 1939-1945	-0.08	(0.12)	-0.06	(0.11)	-0.05	(0.11)	-0.10	(0.11)	-0.09	(0.10)
Economic hardship			-0.22	(0.22)	-0.18	(0.23)	-0.21	(0.23)	-0.19	(0.23)
GDP per capita			-0.10	(0.29)	-0.04	(0.29)	-0.07	(0.29)	-0.05	(0.29)
Unemployment rate			0.17	(0.18)	0.15	(0.18)	0.15	(0.18)	0.14	(0.18)
Population loss			-0.22	(0.22)	-0.18	(0.23)	-0.21	(0.23)	-0.19	(0.23)
Interactions										
Interaction loss of housing stock 1939-1945 X GDP per capita					0.11	(0.13)				
Interaction loss of housing stock 1939-1945 X Unemployment rate							-0.27*	(0.12)		
Interaction loss of housing stock 1939-1945 X Population loss									-0.20^{+}	(0.12)
Regional controls										
East Germany			-0.17	(0.65)	-0.18	(0.64)	-0.27	(0.60)	-0.36	(0.63)
Crime rate			0.04	(0.13)	0.04	(0.13)	0.06	(0.13)	0.03	(0.12)
Creative class			0.24	(0.14)	0.27^{+}	(0.14)	0.33*	(0.13)	0.26^{+}	(0.14)
Foreigners			-0.17	(0.28)	-0.19	(0.28)	-0.09	(0.29)	-0.15	(0.29)
Regional religiosity			0.44^{+}	(0.25)	0.51*	(0.25)	0.54*	(0.25)	0.47^{+}	(0.25)
LBGT			-0.21	(0.14)	-0.20	(0.14)	-0.15	(0.13)	-0.17	(0.14)
Atmospheric particulate matter			0.43*	(0.20)	0.49*	(0.20)	0.58**	(0.20)	0.50*	(0.20)
Nitrogen dioxide			-0.54*	(0.25)	-0.59*	(0.26)	-0.68**	(0.25)	-0.60*	(0.26)
Ozone			-0.07	(0.15)	-0.04	(0.16)	-0.06	(0.15)	-0.03	(0.16)
July temperature			0.39*	(0.18)	0.36^{+}	(0.19)	0.34^{+}	(0.18)	0.33^{+}	(0.19)
July sunshine			0.01	(0.16)	0.04	(0.17)	0.03	(0.17)	0.04	(0.16)
July precipitation			0.21	(0.16)	0.23	(0.16)	0.22	(0.16)	0.21	(0.16)
Recreation area			0.23	(0.16)	0.22	(0.16)	0.22	(0.15)	0.23	(0.15)
Population size			-0.02	(0.10)	-0.03	(0.10)	-0.06	(0.10)	-0.05	(0.10)
Constant	-0.00	(0.11)	0.03	(0.17)	0.03	(0.17)	0.02	(0.16)	0.05	(0.17)
N	89		89		89		89		89	89
R^2 (adjusted)	-0.005		0.123		0.119		0.167		0.147	-0.005
ΔR^2 (adjusted)			0.128		-0.004		0.044		0.024	

Note.

OLS regressions. Standardized coefficients are given. Standard errors (SE) in parentheses. All variables were z-standardized.

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

Table A3: Regional level regressions with loss of housing stock 1939-1945 as IV and Trait Depression as DV

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	β	SE	β	SE	β	SE	β	SE	β	SE
Strategic bombing										
Loss of housing stock 1939-1945	-0.25*	(0.11)	-0.30**	(0.11)	-0.30**	(0.11)	-0.33**	(0.11)	-0.32**	(0.12)
Economic hardship										
GDP per capita			-0.25	(0.23)	-0.25	(0.23)	-0.25	(0.23)	-0.24	(0.23)
Unemployment rate			-0.06	(0.23)	-0.05	(0.24)	-0.04	(0.23)	-0.03	(0.23)
Population loss			0.12	(0.17)	0.11	(0.17)	0.11	(0.16)	0.10	(0.17)
Interactions										
Interaction loss of housing stock 1939-1945 X GDP per capita					0.01	(0.11)				
Interaction loss of housing stock 1939-1945 X Unemployment rate							-0.21^{+}	(0.11)		
Interaction loss of housing stock 1939-1945 X Population loss									-0.11	(0.10)
Regional controls										
East Germany			-0.60	(0.58)	-0.60	(0.58)	-0.67	(0.56)	-0.70	(0.58)
Crime rate			0.14	(0.13)	0.13	(0.13)	0.15	(0.13)	0.13	(0.13)
Creative class			0.18^{+}	(0.09)	0.18^{+}	(0.10)	0.25*	(0.10)	0.19*	(0.09)
Foreigners			-0.06	(0.26)	-0.07	(0.26)	0.00	(0.26)	-0.05	(0.27)
Regional religiosity			0.39	(0.24)	0.40	(0.27)	0.47^{+}	(0.26)	0.41^{+}	(0.24)
LBGT			-0.22*	(0.11)	-0.22*	(0.11)	-0.18^{+}	(0.10)	-0.20^{+}	(0.11)
Atmospheric particulate matter			0.47*	(0.18)	0.48*	(0.20)	0.59**	(0.19)	0.51**	(0.19)
Nitrogen dioxide			-0.40^{+}	(0.21)	-0.40^{+}	(0.22)	-0.51*	(0.21)	-0.44*	(0.21)
Ozone			-0.24	(0.17)	-0.24	(0.18)	-0.24	(0.17)	-0.22	(0.18)
July temperature			0.20	(0.23)	0.20	(0.24)	0.16	(0.23)	0.17	(0.24)
July sunshine			0.09	(0.18)	0.10	(0.18)	0.11	(0.18)	0.11	(0.18)
July precipitation			0.14	(0.16)	0.15	(0.16)	0.15	(0.15)	0.14	(0.15)
Recreation area			0.02	(0.13)	0.02	(0.13)	0.01	(0.12)	0.02	(0.12)
Population size			-0.06	(0.10)	-0.06	(0.10)	-0.08	(0.10)	-0.08	(0.11)
Constant	-0.00	(0.10)	0.11	(0.14)	0.11	(0.14)	0.10	(0.14)	0.13	(0.14)
N	89		89		89		89		89	
R^2 (adjusted)	0.054		0.231		0.220		0.254		0.232	
ΔR^2 (adjusted)			0.177		-0.011		0.022		0	

Note.

OLS regressions. Standardized coefficients are given. Standard errors (SE) in parentheses. All variables were z-standardized.

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

Table A4: Regional level regressions with loss of housing stock 1939-1945 as IV and Trait Neuroticism as DV

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	β	SE	β	SE	β	SE	β	SE	β	SE
Strategic bombing										
Loss of housing stock 1939-1945	-0.18	(0.11)	-0.16	(0.11)	-0.15	(0.11)	-0.20^{+}	(0.10)	-0.19^{+}	(0.10)
Economic hardship										
GDP per capita			-0.18	(0.22)	-0.15	(0.22)	-0.18	(0.22)	-0.15	(0.22)
Unemployment rate			0.03	(0.26)	0.08	(0.26)	0.06	(0.26)	0.07	(0.26)
Population loss			0.11	(0.17)	0.09	(0.17)	0.09	(0.16)	0.08	(0.17)
Interactions										
Interaction loss of housing stock 1939-1945 X GDP per capita					0.10	(0.12)				
Interaction loss of housing stock 1939-1945 X Unemployment rate							-0.29*	(0.12)		
Interaction loss of housing stock 1939-1945 X Population loss									-0.21^{+}	(0.11)
Regional controls										
East Germany			-0.53	(0.58)	-0.54	(0.56)	-0.63	(0.52)	-0.73	(0.56)
Crime rate			0.07	(0.13)	0.07	(0.13)	0.09	(0.12)	0.06	(0.12)
Creative class			0.21^{+}	(0.12)	0.24*	(0.12)	0.31**	(0.11)	0.24*	(0.11)
Foreigners			-0.21	(0.26)	-0.23	(0.26)	-0.13	(0.27)	-0.19	(0.27)
Regional religiosity			0.36	(0.23)	0.43^{+}	(0.24)	0.47*	(0.23)	0.40^{+}	(0.23)
LBGT			-0.30*	(0.13)	-0.29*	(0.12)	-0.24*	(0.11)	-0.25*	(0.12)
Atmospheric particulate matter			0.47*	(0.18)	0.52**	(0.19)	0.63**	(0.19)	0.54**	(0.19)
Nitrogen dioxide			-0.50*	(0.23)	-0.55*	(0.24)	-0.65**	(0.24)	-0.57*	(0.24)
Ozone			-0.10	(0.15)	-0.07	(0.16)	-0.09	(0.15)	-0.07	(0.16)
July temperature			0.34^{+}	(0.21)	0.31	(0.21)	0.29	(0.20)	0.29	(0.21)
July sunshine			0.05	(0.17)	0.07	(0.17)	0.07	(0.17)	0.08	(0.16)
July precipitation			0.23	(0.16)	0.24	(0.16)	0.24	(0.15)	0.22	(0.15)
Recreation area			0.16	(0.16)	0.15	(0.16)	0.15	(0.15)	0.17	(0.15)
Population size			-0.04	(0.10)	-0.04	(0.10)	-0.07	(0.09)	-0.07	(0.10)
Constant	0.00	(0.10)	0.10	(0.15)	0.10	(0.14)	0.08	(0.14)	0.12	(0.14)
N	89		89		89		89		89	
R^2 (adjusted)	0.0203		0.186		0.182		0.238		0.214	
ΔR^2 (adjusted)			0.166		-0.005		0.052		0.028	

Note.

OLS regressions. Standardized coefficients are given. Standard errors (SE) in parentheses. All variables were z-standardized.

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

Table A5: Regional level regressions with loss of housing stock 1939-1945 as IV and missing working days as DV

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	β	SE	β	SE	β	SE	β	SE	β	SE
Strategic bombing										
Loss of housing stock 1939-1945	0.02	(0.10)	-0.14^{+}	(0.08)	-0.13^{+}	(0.08)	-0.14^{+}	(0.08)	-0.13^{+}	(0.08)
Economic hardship										
GDP per capita			-0.23	(0.21)	-0.23	(0.22)	-0.23	(0.21)	-0.24	(0.21)
Unemployment rate			0.37	(0.27)	0.38	(0.28)	0.37	(0.27)	0.37	(0.28)
Population loss			-0.06	(0.12)	-0.06	(0.13)	-0.06	(0.13)	-0.06	(0.13)
Interactions										
Interaction loss of housing stock 1939-1945 X GDP per capita					0.02	(0.08)				
Interaction loss of housing stock 1939-1945 X Unemployment rate							-0.02	(0.09)		
Interaction loss of housing stock 1939-1945 X Population loss									0.03	(0.08)
Regional controls										
East Germany			-0.80	(0.63)	-0.80	(0.64)	-0.80	(0.64)	-0.77	(0.65)
Crime rate			0.19	(0.14)	0.19	(0.14)	0.19	(0.14)	0.19	(0.14)
Creative class			-0.05	(0.09)	-0.04	(0.09)	-0.04	(0.09)	-0.05	(0.09)
Foreigners			0.38	(0.23)	0.38	(0.24)	0.39^{+}	(0.23)	0.38	(0.23)
Regional religiosity			0.15	(0.24)	0.17	(0.24)	0.16	(0.24)	0.15	(0.24)
LBGT			0.07	(0.11)	0.07	(0.11)	0.07	(0.11)	0.06	(0.11)
Atmospheric particulate matter			0.47***	(0.14)	0.48**	(0.15)	0.48**	(0.16)	0.47**	(0.15)
Nitrogen dioxide			-0.09	(0.18)	-0.10	(0.18)	-0.10	(0.18)	-0.08	(0.17)
Ozone			-0.25	(0.17)	-0.25	(0.17)	-0.25	(0.17)	-0.26	(0.17)
July temperature			-0.17	(0.16)	-0.17	(0.17)	-0.17	(0.17)	-0.16	(0.18)
July sunshine			0.22^{+}	(0.12)	0.22^{+}	(0.13)	0.22^{+}	(0.12)	0.22^{+}	(0.13)
July precipitation			0.05	(0.10)	0.05	(0.11)	0.05	(0.11)	0.05	(0.11)
Recreation area			-0.03	(0.12)	-0.03	(0.12)	-0.03	(0.12)	-0.03	(0.12)
Population size			-0.11	(0.08)	-0.11	(0.08)	-0.12	(0.09)	-0.11	(0.08)
Constant	-0.00	(0.11)	0.15	(0.15)	0.15	(0.15)	0.15	(0.15)	0.15	(0.15)
N	89		89		89		89		89	
R^2 (adjusted)	-0.0112		0.515		0.508		0.509		0.509	
ΔR^2 (adjusted)			0.526		-0.007		-0.007		-0.006	

Note.

OLS regressions. Standardized coefficients are given. Standard errors (SE) in parentheses. All variables were z-standardized.

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

Table A6: Regional level regressions with loss of housing stock 1939-1945 as IV and anti-depressant drugs as DV

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	β	SE	β	SE	β	SE	β	SE	β	SE
Strategic bombing										
Loss of housing stock 1939-1945	0.22*	(0.10)	-0.01	(0.07)	0.00	(0.07)	-0.03	(0.07)	-0.00	(0.07)
Economic hardship										
GDP per capita			-0.18	(0.15)	-0.13	(0.16)	-0.18	(0.15)	-0.19	(0.14)
Unemployment rate			-0.18	(0.16)	-0.10	(0.17)	-0.16	(0.17)	-0.19	(0.16)
Population loss			0.17	(0.11)	0.14	(0.10)	0.16	(0.10)	0.17	(0.11)
Interactions										
Interaction loss of housing stock 1939-1945 X GDP per capita					0.15^{+}	(0.09)				
Interaction loss of housing stock 1939-1945 X Unemployment rate							-0.16*	(0.08)		
Interaction loss of housing stock 1939-1945 X Population loss									0.05	(0.06)
Regional controls										
East Germany			0.29	(0.46)	0.27	(0.46)	0.23	(0.46)	0.33	(0.45)
Crime rate			0.30***	(0.08)	0.29***	(0.07)	0.31***	(0.07)	0.30***	(0.08)
Creative class			-0.04	(0.08)	-0.00	(0.08)	0.02	(0.09)	-0.05	(0.08)
Foreigners			0.34^{+}	(0.18)	0.31^{+}	(0.18)	0.39*	(0.18)	0.33^{+}	(0.19)
Regional religiosity			0.78***	(0.18)	0.88***	(0.21)	0.84***	(0.20)	0.77***	(0.19)
LBGT			-0.09	(0.09)	-0.07	(0.08)	-0.06	(0.08)	-0.10	(0.09)
Atmospheric particulate matter			0.37**	(0.12)	0.45**	(0.13)	0.46***	(0.13)	0.36**	(0.13)
Nitrogen dioxide			-0.39**	(0.14)	-0.46**	(0.15)	-0.47**	(0.16)	-0.37*	(0.15)
Ozone			-0.02	(0.13)	0.03	(0.12)	-0.01	(0.12)	-0.03	(0.12)
July temperature			0.09	(0.15)	0.05	(0.15)	0.06	(0.14)	0.10	(0.15)
July sunshine			0.01	(0.11)	0.04	(0.12)	0.02	(0.11)	0.00	(0.11)
July precipitation			0.20*	(0.09)	0.21*	(0.09)	0.20*	(0.09)	0.20*	(0.09)
Recreation area			-0.11	(0.08)	-0.12	(0.07)	-0.12	(0.08)	-0.11	(0.08)
Population size			-0.11^{+}	(0.06)	-0.12*	(0.05)	-0.13*	(0.05)	-0.10^{+}	(0.06)
Constant	0.00	(0.10)	-0.05	(0.10)	-0.06	(0.11)	-0.07	(0.10)	-0.06	(0.10)
N	89		89		89		89		89	
R^2 (adjusted)	0.0364		0.639		0.649		0.654		0.636	
ΔR^2 (adjusted)			0.602		0.010		0.016		-0.003	

Note.

OLS regressions. Standardized coefficients are given. Standard errors (SE) in parentheses. All variables were z-standardized.

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

Table A7: Regional level regressions with rubble 1945 as IV and Trait Anxiety as DV

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	β	SE	β	SE	β	SE	β	SE	β	SE
Strategic bombing										
Rubble 1945	-0.22^{+}	(0.13)	-0.01	(0.14)	-0.02	(0.13)	-0.05	(0.14)	-0.07	(0.12)
Economic hardship										
GDP per capita			0.07	(0.30)	0.10	(0.32)	0.05	(0.32)	0.18	(0.33)
Unemployment rate			0.23	(0.36)	0.27	(0.37)	0.20	(0.37)	0.35	(0.36)
Population loss			0.15	(0.24)	0.15	(0.24)	0.15	(0.23)	0.08	(0.22)
Interactions										
Interaction rubble 1945 X GDP per capita					0.19	(0.13)				
Interaction rubble 1945 X Unemployment rate							-0.24^{+}	(0.13)		
Interaction rubble 1945 X Population loss									-0.44**	(0.14)
Regional controls										
East Germany			-		-		-		-	
Crime rate			0.07	(0.17)	0.10	(0.16)	0.12	(0.16)	0.05	(0.14)
Creative class			0.16	(0.17)	0.24	(0.18)	0.26	(0.17)	0.22	(0.15)
Foreigners			-0.37	(0.35)	-0.34	(0.34)	-0.24	(0.34)	-0.35	(0.32)
Regional religiosity			0.09	(0.23)	0.13	(0.21)	0.13	(0.22)	0.08	(0.20)
LBGT			-0.32^{+}	(0.16)	-0.32*	(0.15)	-0.29*	(0.14)	-0.28*	(0.13)
Atmospheric particulate matter			0.45	(0.31)	0.56^{+}	(0.32)	0.59*	(0.29)	0.59*	(0.27)
Nitrogen dioxide			-0.51	(0.41)	-0.65	(0.41)	-0.70^{+}	(0.39)	-0.72^{+}	(0.37)
Ozone			0.07	(0.21)	0.12	(0.22)	0.10	(0.20)	0.20	(0.21)
July temperature			0.39	(0.25)	0.35	(0.25)	0.34	(0.25)	0.31	(0.24)
July sunshine			0.12	(0.23)	0.13	(0.23)	0.06	(0.23)	0.14	(0.22)
July precipitation			0.24	(0.18)	0.26	(0.18)	0.26	(0.18)	0.32*	(0.16)
Recreation area			0.05	(0.18)	0.05	(0.18)	0.05	(0.19)	0.10	(0.18)
Population size			-0.06	(0.16)	-0.08	(0.15)	-0.06	(0.15)	-0.14	(0.13)
Constant	0.00	(0.12)	-0.00	(0.12)	-0.03	(0.12)	-0.01	(0.11)	-0.02	(0.11)
N	69		69		69		69		69	
R^2 (adjusted)	0.032		0.084		0.099		0.120		0.210	
ΔR^2 (adjusted)			0.0520		0.014		0.036		0.125	

Note.

OLS regressions. Standardized coefficients are given. Standard errors (SE) in parentheses. All variables were z-standardized.

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

Table A8: Regional level regressions with rubble 1945 as IV and Trait Depression as DV

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	β	SE	β	SE	β	SE	β	SE	β	SE
Strategic bombing										
Rubble 1945	-0.44***	(0.11)	-0.38**	(0.12)	-0.38**	(0.12)	-0.40**	(0.12)	-0.40**	(0.12)
Economic hardship										
GDP per capita			-0.24	(0.28)	-0.23	(0.28)	-0.26	(0.28)	-0.19	(0.27)
Unemployment rate			-0.01	(0.30)	0.01	(0.29)	-0.04	(0.29)	0.04	(0.28)
Population loss			0.18	(0.20)	0.17	(0.20)	0.17	(0.20)	0.15	(0.20)
Interactions										
Interaction rubble 1945 X GDP per capita					0.12	(0.10)				
Interaction rubble 1945 X Unemployment rate							-0.18	(0.11)		
Interaction rubble 1945 X Population loss									-0.20^{+}	(0.11)
Regional controls										
East Germany			-		-		-		-	
Crime rate			0.18	(0.16)	0.20	(0.17)	0.22	(0.17)	0.18	(0.16)
Creative class			0.21*	(0.10)	0.26*	(0.11)	0.28**	(0.10)	0.23*	(0.10)
Foreigners			0.19	(0.28)	0.21	(0.28)	0.28	(0.29)	0.20	(0.27)
Regional religiosity			0.29	(0.19)	0.31	(0.19)	0.32	(0.20)	0.29	(0.19)
LBGT			-0.21	(0.13)	-0.21^{+}	(0.12)	-0.19^{+}	(0.11)	-0.20^{+}	(0.11)
Atmospheric particulate matter			0.39	(0.24)	0.47^{+}	(0.25)	0.50*	(0.23)	0.46*	(0.23)
Nitrogen dioxide			-0.44	(0.36)	-0.53	(0.38)	-0.57	(0.35)	-0.53	(0.35)
Ozone			-0.29	(0.21)	-0.26	(0.21)	-0.27	(0.21)	-0.23	(0.22)
July temperature			0.18	(0.31)	0.16	(0.31)	0.14	(0.31)	0.15	(0.31)
July sunshine			0.10	(0.22)	0.11	(0.22)	0.06	(0.23)	0.11	(0.22)
July precipitation			0.07	(0.17)	0.09	(0.17)	0.09	(0.17)	0.11	(0.17)
Recreation area			0.01	(0.14)	0.01	(0.14)	0.00	(0.14)	0.03	(0.14)
Population size			0.01	(0.16)	-0.01	(0.15)	0.00	(0.15)	-0.03	(0.15)
Constant	0.00	(0.11)	-0.00	(0.10)	-0.02	(0.11)	-0.01	(0.10)	-0.01	(0.10)
N	69		69		69		69		69	
R^2 (adjusted)	0.186		0.252		0.250		0.265		0.267	
ΔR^2 (adjusted)			0.066		-0.001		0.013		0.016	

Note.

OLS regressions. Standardized coefficients are given. Standard errors (SE) in parentheses. All variables were z-standardized.

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

Table A9: Regional level regressions with rubble 1945 as IV and Trait Neuroticism as DV

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	β	SE	β	SE	β	SE	β	SE	β	SE
Strategic bombing										
Rubble 1945	-0.30*	(0.12)	-0.11	(0.13)	-0.11	(0.12)	-0.15	(0.13)	-0.16	(0.12)
Economic hardship										
GDP per capita			0.00	(0.29)	0.02	(0.31)	-0.02	(0.30)	0.09	(0.29)
Unemployment rate			0.25	(0.34)	0.29	(0.34)	0.21	(0.34)	0.35	(0.32)
Population loss			0.10	(0.22)	0.10	(0.22)	0.10	(0.21)	0.04	(0.20)
Interactions										
Interaction rubble 1945 X GDP per capita					0.19^{+}	(0.11)				
Interaction rubble 1945 X Unemployment rate							-0.25*	(0.12)		
Interaction rubble 1945 X Population loss									-0.38**	(0.12)
Regional controls										
East Germany			-		-		-		-	
Crime rate			0.09	(0.16)	0.12	(0.16)	0.14	(0.17)	0.07	(0.15)
Creative class			0.19	(0.14)	0.27^{+}	(0.14)	0.29*	(0.13)	0.24^{+}	(0.12)
Foreigners			-0.23	(0.30)	-0.20	(0.30)	-0.10	(0.31)	-0.22	(0.28)
Regional religiosity			0.12	(0.20)	0.16	(0.19)	0.16	(0.20)	0.11	(0.18)
LBGT			-0.36*	(0.16)	-0.36*	(0.14)	-0.33*	(0.13)	-0.33**	(0.12)
Atmospheric particulate matter			0.49	(0.30)	0.61*	(0.30)	0.64*	(0.27)	0.61*	(0.26)
Nitrogen dioxide			-0.53	(0.40)	-0.67	(0.41)	-0.72^{+}	(0.38)	-0.71^{+}	(0.37)
Ozone			-0.05	(0.20)	0.00	(0.20)	-0.01	(0.19)	0.07	(0.20)
July temperature			0.36	(0.27)	0.32	(0.27)	0.30	(0.28)	0.28	(0.27)
July sunshine			0.12	(0.22)	0.13	(0.22)	0.06	(0.23)	0.14	(0.21)
July precipitation			0.22	(0.17)	0.25	(0.18)	0.25	(0.17)	0.30^{+}	(0.16)
Recreation area			0.03	(0.17)	0.03	(0.17)	0.02	(0.17)	0.07	(0.17)
Population size			-0.06	(0.15)	-0.08	(0.14)	-0.06	(0.14)	-0.13	(0.13)
Constant	-0.00	(0.12)	-0.00	(0.11)	-0.03	(0.11)	-0.01	(0.11)	-0.02	(0.10)
N	69		69		69		69		69	
R^2 (adjusted)	0.073		0.162		0.178		0.201		0.253	
ΔR^2 (adjusted)			0.088		0.016		0.039		0.091	

Note.

OLS regressions. Standardized coefficients are given. Standard errors (SE) in parentheses. All variables were z-standardized.

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

Table A10: Regional level regressions with rubble 1945 as IV and missing working days as DV

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	β	SE	β	SE	β	SE	β	SE	β	SE
Strategic bombing										
Rubble 1945	0.04	(0.11)	0.01	(0.11)	0.01	(0.11)	-0.00	(0.10)	-0.01	(0.10)
Economic hardship										
GDP per capita			-0.15	(0.25)	-0.15	(0.25)	-0.15	(0.25)	-0.11	(0.25)
Unemployment rate			0.33	(0.27)	0.32	(0.28)	0.32	(0.27)	0.36	(0.27)
Population loss			0.08	(0.15)	0.08	(0.15)	0.08	(0.15)	0.06	(0.14)
Interactions										
Interaction rubble 1945 X GDP per capita					-0.02	(0.08)				
Interaction rubble 1945 X Unemployment rate							-0.08	(0.09)		
Interaction rubble 1945 X Population loss									-0.14	(0.10)
Regional controls										
East Germany			-		-		-		-	
Crime rate			0.12	(0.15)	0.11	(0.15)	0.14	(0.15)	0.11	(0.15)
Creative class			-0.04	(0.10)	-0.05	(0.11)	-0.01	(0.12)	-0.02	(0.11)
Foreigners			0.21	(0.25)	0.20	(0.25)	0.25	(0.26)	0.21	(0.25)
Regional religiosity			-0.08	(0.19)	-0.08	(0.19)	-0.06	(0.20)	-0.08	(0.20)
LBGT			0.07	(0.10)	0.07	(0.10)	0.08	(0.10)	0.08	(0.09)
Atmospheric particulate matter			0.66**	(0.22)	0.64**	(0.22)	0.71**	(0.23)	0.70**	(0.22)
Nitrogen dioxide			-0.23	(0.27)	-0.21	(0.28)	-0.29	(0.28)	-0.30	(0.27)
Ozone			-0.18	(0.20)	-0.18	(0.20)	-0.17	(0.21)	-0.13	(0.22)
July temperature			-0.14	(0.20)	-0.14	(0.20)	-0.16	(0.20)	-0.17	(0.20)
July sunshine			0.27	(0.17)	0.27	(0.17)	0.26	(0.16)	0.28^{+}	(0.16)
July precipitation			0.09	(0.12)	0.08	(0.12)	0.09	(0.12)	0.11	(0.12)
Recreation area			-0.02	(0.12)	-0.02	(0.12)	-0.02	(0.12)	-0.00	(0.12)
Population size			-0.20	(0.14)	-0.20	(0.15)	-0.20	(0.15)	-0.23	(0.15)
Constant	-0.00	(0.12)	-0.00	(0.08)	0.00	(0.09)	-0.00	(0.08)	-0.01	(0.08)
N	69		69		69		69		69	
R^2 (adjusted)	-0.014		0.534		0.525		0.531		0.540	
ΔR^2 (adjusted)			0.547		-0.009		-0.003		0.006	

Note.

OLS regressions. Standardized coefficients are given. Standard errors (SE) in parentheses. All variables were z-standardized.

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

Table A11: Regional level regressions with rubble 1945 as IV and anti-depressant drugs as DV

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	β	SE	β	SE	β	SE	β	SE	β	SE
Strategic bombing										
Rubble 1945	0.03	(0.12)	0.15	(0.13)	0.15	(0.13)	0.12	(0.12)	0.13	(0.13)
Economic hardship										
GDP per capita			0.01	(0.32)	0.00	(0.32)	0.00	(0.32)	0.04	(0.33)
Unemployment rate			-0.05	(0.35)	-0.07	(0.36)	-0.07	(0.34)	-0.01	(0.35)
Population loss			0.33	(0.22)	0.34	(0.22)	0.33	(0.21)	0.31	(0.22)
Interactions										
Interaction rubble 1945 X GDP per capita					-0.09	(0.13)				
Interaction rubble 1945 X Unemployment rate							-0.17	(0.12)		
Interaction rubble 1945 X Population loss									-0.12	(0.14)
Regional controls										
East Germany			-		-		-		-	
Crime rate			0.30*	(0.12)	0.28*	(0.12)	0.33*	(0.13)	0.29*	(0.13)
Creative class			-0.12	(0.13)	-0.16	(0.12)	-0.05	(0.14)	-0.11	(0.13)
Foreigners			0.20	(0.31)	0.18	(0.31)	0.28	(0.31)	0.20	(0.31)
Regional religiosity			0.32	(0.21)	0.30	(0.21)	0.35	(0.22)	0.32	(0.22)
LBGT			-0.22	(0.15)	-0.22	(0.16)	-0.20	(0.13)	-0.21	(0.14)
Atmospheric particulate matter			0.67**	(0.23)	0.61*	(0.27)	0.77**	(0.25)	0.71**	(0.24)
Nitrogen dioxide			-0.84**	(0.27)	-0.77*	(0.30)	-0.97**	(0.29)	-0.90**	(0.28)
Ozone			0.04	(0.24)	0.01	(0.24)	0.06	(0.24)	0.07	(0.25)
July temperature			0.36	(0.25)	0.38	(0.25)	0.32	(0.25)	0.33	(0.25)
July sunshine			0.08	(0.20)	0.08	(0.20)	0.05	(0.21)	0.09	(0.20)
July precipitation			0.34**	(0.12)	0.33**	(0.12)	0.36**	(0.13)	0.37**	(0.13)
Recreation area			-0.11	(0.12)	-0.11	(0.12)	-0.12	(0.12)	-0.10	(0.11)
Population size			-0.21	(0.15)	-0.20	(0.15)	-0.21	(0.15)	-0.23	(0.15)
Constant	-0.00	(0.12)	-0.00	(0.10)	0.01	(0.10)	-0.01	(0.10)	-0.01	(0.10)
N	69		69		69		69		69	
R^2 (adjusted)	-0.014		0.320		0.314		0.332		0.317	
ΔR^2 (adjusted)			0.334		-0.006		0.012		-0.002	

Note.

OLS regressions. Standardized coefficients are given. Standard errors (SE) in parentheses. All variables were z-standardized.

$^{+}p < .10$. *p < .05. **p < .01. ***p < .001.

Table A12: Regional level regressions with loss of housing stock 1939-1945 as IV and **weighted** Trait Anxiety as DV

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	β	SE	β	SE	β	SE	β	SE	β	SE
Strategic bombing										
Loss of housing stock 1939-1945	-0.12	(0.13)	-0.11	(0.13)	-0.10	(0.13)	-0.14	(0.13)	-0.15	(0.12)
Economic hardship										
GDP per capita			-0.16	(0.27)	-0.14	(0.27)	-0.16	(0.28)	-0.12	(0.27)
Unemployment rate			-0.04	(0.38)	-0.01	(0.40)	-0.02	(0.38)	0.02	(0.36)
Population loss			0.14	(0.24)	0.13	(0.25)	0.13	(0.23)	0.11	(0.23)
Interactions										
Interaction loss of housing stock 1939-1945 X GDP per capita					0.07	(0.15)				
Interaction loss of housing stock 1939-1945 X Unemployment rate							-0.22	(0.16)		
Interaction loss of housing stock 1939-1945 X Population loss									-0.25^{+}	(0.14)
Regional controls										
East Germany			0.14	(0.73)	0.13	(0.73)	0.06	(0.71)	-0.10	(0.65)
Crime rate			0.08	(0.13)	0.07	(0.13)	0.09	(0.14)	0.06	(0.14)
Creative class			0.28^{+}	(0.16)	0.30*	(0.15)	0.36*	(0.14)	0.31*	(0.15)
Foreigners			0.33	(0.29)	0.31	(0.29)	0.40	(0.31)	0.36	(0.30)
Regional religiosity			0.14	(0.29)	0.19	(0.29)	0.22	(0.29)	0.18	(0.28)
LBGT			-0.12	(0.20)	-0.12	(0.20)	-0.08	(0.18)	-0.07	(0.19)
Atmospheric particulate matter			0.07	(0.24)	0.10	(0.26)	0.19	(0.26)	0.15	(0.26)
Nitrogen dioxide			-0.55^{+}	(0.30)	-0.58^{+}	(0.31)	-0.66*	(0.31)	-0.63*	(0.31)
Ozone			-0.09	(0.18)	-0.07	(0.19)	-0.08	(0.19)	-0.04	(0.18)
July temperature			0.38*	(0.19)	0.36^{+}	(0.20)	0.33^{+}	(0.19)	0.30	(0.20)
July sunshine			-0.22	(0.19)	-0.21	(0.19)	-0.21	(0.19)	-0.19	(0.18)
July precipitation			0.14	(0.17)	0.15	(0.17)	0.15	(0.17)	0.14	(0.16)
Recreation area			0.14	(0.18)	0.14	(0.18)	0.14	(0.17)	0.15	(0.17)
Population size			-0.10	(0.10)	-0.10	(0.11)	-0.12	(0.11)	-0.14	(0.10)
Constant	-0.00	(0.11)	-0.03	(0.17)	-0.03	(0.17)	-0.04	(0.17)	-0.00	(0.17)
N	89		89		89		89		89	
R^2 (adjusted)	0.002		-0.062		-0.074		-0.039		-0.019	
ΔR^2 (adjusted)			-0.048		-0.012		0.023		0.043	

Note.

The DV was computed by weighting the underlying individual respondents in the personality data set by the cities age x gender distribution. OLS regressions. Standardized coefficients are given. Standard errors (SE) in parentheses. All variables were z-standardized.

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

Table A13: Regional level regressions with loss of housing stock 1939-1945 as IV and **weighted** Trait Depression as DV

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	β	SE	β	SE	β	SE	β	SE	β	SE
Strategic bombing										
Loss of housing stock 1939-1945	-0.25*	(0.11)	-0.20^{+}	(0.12)	-0.19	(0.12)	-0.24*	(0.11)	-0.23^{+}	(0.12)
Economic hardship										
GDP per capita			-0.09	(0.27)	-0.05	(0.29)	-0.08	(0.28)	-0.06	(0.28)
Unemployment rate			0.14	(0.36)	0.19	(0.38)	0.17	(0.35)	0.19	(0.35)
Population loss			-0.03	(0.19)	-0.05	(0.19)	-0.04	(0.18)	-0.05	(0.19)
Interactions										
Interaction loss of housing stock 1939-1945 X GDP per capita					0.10	(0.16)				
Interaction loss of housing stock 1939-1945 X Unemployment rate							-0.28*	(0.14)		
Interaction loss of housing stock 1939-1945 X Population loss									-0.19^{+}	(0.11)
Regional controls										
East Germany			0.15	(0.64)	0.14	(0.64)	0.05	(0.63)	-0.03	(0.64)
Crime rate			0.27*	(0.13)	0.27*	(0.13)	0.28*	(0.14)	0.26^{+}	(0.13)
Creative class	-0.01	(0.11)	0.06	(0.13)	0.09	(0.14)	0.16	(0.13)	0.09	(0.13)
Foreigners	0.23	(0.20)	0.22	(0.29)	0.21	(0.29)	0.31	(0.29)	0.25	(0.29)
Regional religiosity	0.14	(0.16)	0.23	(0.26)	0.30	(0.28)	0.34	(0.27)	0.27	(0.27)
LBGT	-0.32*	(0.16)	-0.37*	(0.17)	-0.36*	(0.17)	-0.31*	(0.15)	-0.33^{+}	(0.17)
Atmospheric particulate matter	0.26	(0.20)	0.28	(0.22)	0.33	(0.24)	0.43^{+}	(0.23)	0.34	(0.23)
Nitrogen dioxide	-0.54*	(0.26)	-0.51^{+}	(0.26)	-0.56^{+}	(0.29)	-0.66*	(0.27)	-0.57*	(0.27)
Ozone	-0.24	(0.16)	-0.14	(0.17)	-0.11	(0.19)	-0.13	(0.17)	-0.11	(0.17)
July temperature	0.29	(0.20)	0.21	(0.22)	0.19	(0.23)	0.16	(0.22)	0.16	(0.23)
July sunshine	-0.05	(0.18)	-0.01	(0.18)	0.02	(0.18)	0.02	(0.18)	0.02	(0.18)
July precipitation	0.07	(0.15)	0.11	(0.17)	0.12	(0.17)	0.12	(0.17)	0.11	(0.17)
Recreation area	0.07	(0.16)	-0.03	(0.17)	-0.04	(0.17)	-0.04	(0.15)	-0.03	(0.16)
Population size	-0.14^{+}	(0.08)	-0.19^{+}	(0.11)	-0.20^{+}	(0.11)	-0.23*	(0.11)	-0.22^{+}	(0.11)
Constant	-0.00	(0.10)	-0.03	(0.17)	-0.03	(0.17)	-0.05	(0.17)	-0.01	(0.16)
N	89		89		89		89		89	
R^2 (adjusted)	0.050		0.082		0.075		0.128		0.102	
ΔR^2 (adjusted)			-0.009		-0.007		0.046		0.020	

Note.

The DV was computed by weighting the underlying individual respondents in the personality data set by the cities age x gender distribution. OLS regressions. Standardized coefficients are given. Standard errors (SE) in parentheses. All variables were z-standardized.

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

Table A14: Regional level regressions with loss of housing stock 1939-1945 as IV and **weighted** Trait Neuroticism as DV

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	β	SE	β	SE	β	SE	β	SE	β	SE
Strategic bombing										
Loss of housing stock 1939-1945	-0.19	(0.12)	-0.15	(0.12)	-0.14	(0.12)	-0.18	(0.12)	-0.19	(0.12)
Economic hardship										
GDP per capita			-0.12	(0.27)	-0.09	(0.27)	-0.11	(0.28)	-0.08	(0.27)
Unemployment rate			0.08	(0.36)	0.13	(0.38)	0.12	(0.36)	0.15	(0.34)
Population loss			0.11	(0.22)	0.10	(0.23)	0.10	(0.22)	0.08	(0.22)
Interactions										
Interaction loss of housing stock 1939-1945 X GDP per capita					0.10	(0.15)				
Interaction loss of housing stock 1939-1945 X Unemployment rate							-0.27^{+}	(0.15)		
Interaction loss of housing stock 1939-1945 X Population loss									-0.27^{+}	(0.14)
Regional controls										
East Germany			0.15	(0.65)	0.14	(0.66)	0.05	(0.64)	-0.11	(0.59)
Crime rate			0.15	(0.13)	0.15	(0.13)	0.17	(0.14)	0.14	(0.13)
Creative class			0.20	(0.14)	0.23^{+}	(0.13)	0.30*	(0.13)	0.24^{+}	(0.13)
Foreigners			0.31	(0.28)	0.29	(0.28)	0.40	(0.30)	0.34	(0.28)
Regional religiosity			0.18	(0.28)	0.24	(0.28)	0.29	(0.28)	0.22	(0.28)
LBGT			-0.26	(0.19)	-0.25	(0.18)	-0.21	(0.16)	-0.21	(0.18)
Atmospheric particulate matter			0.19	(0.23)	0.24	(0.25)	0.34	(0.25)	0.28	(0.25)
Nitrogen dioxide			-0.61*	(0.29)	-0.66*	(0.30)	-0.76*	(0.30)	-0.70*	(0.30)
Ozone			-0.06	(0.18)	-0.03	(0.18)	-0.05	(0.19)	-0.02	(0.18)
July temperature			0.30	(0.20)	0.27	(0.20)	0.24	(0.20)	0.22	(0.21)
July sunshine			-0.12	(0.19)	-0.10	(0.19)	-0.10	(0.19)	-0.08	(0.18)
July precipitation			0.16	(0.16)	0.17	(0.16)	0.16	(0.16)	0.15	(0.15)
Recreation area			0.06	(0.19)	0.06	(0.18)	0.06	(0.17)	0.07	(0.17)
Population size			-0.12	(0.10)	-0.12	(0.10)	-0.15	(0.10)	-0.16	(0.10)
Constant			-0.03	(0.15)	-0.03	(0.16)	-0.05	(0.16)	-0.00	(0.15)
N	89		89		89		89		89	
R^2 (adjusted)	0.022		-0.005		-0.013		0.038		0.046	
ΔR^2 (adjusted)			-0.028		-0.008		0.043		0.051	

Note.

The DV was computed by weighting the underlying individual respondents in the personality data set by the cities age x gender distribution. OLS regressions. Standardized coefficients are given. Standard errors (SE) in parentheses. All variables were z-standardized.

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

Table A15: Regional level regressions with rubble 1945 as IV and **weighted** Trait Anxiety as DV

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	β	SE	β	SE	β	SE	β	SE	β	SE
Strategic bombing										
Rubble 1945	-0.08	(0.14)	0.01	(0.13)	0.01	(0.13)	-0.01	(0.14)	-0.04	(0.13)
Economic hardship										
GDP per capita			0.25	(0.36)	0.25	(0.37)	0.23	(0.38)	0.33	(0.37)
Unemployment rate			0.62	(0.48)	0.62	(0.50)	0.60	(0.47)	0.71	(0.46)
Population loss			-0.18	(0.29)	-0.18	(0.30)	-0.19	(0.29)	-0.24	(0.27)
Interactions										
Interaction rubble 1945 X GDP per capita					0.00	(0.18)				
Interaction rubble 1945 X Unemployment rate							-0.14	(0.18)		
Interaction rubble 1945 X Population loss									-0.35^{+}	(0.18)
Regional controls										
East Germany			-		-		-		-	
Crime rate			0.14	(0.15)	0.14	(0.17)	0.17	(0.17)	0.13	(0.15)
Creative class			0.21	(0.20)	0.21	(0.20)	0.27	(0.20)	0.25	(0.18)
Foreigners			-0.10	(0.34)	-0.10	(0.35)	-0.03	(0.36)	-0.09	(0.34)
Regional religiosity			-0.07	(0.23)	-0.07	(0.22)	-0.04	(0.22)	-0.08	(0.22)
LBGT			-0.29	(0.26)	-0.29	(0.26)	-0.28	(0.23)	-0.26	(0.21)
Atmospheric particulate matter			0.10	(0.39)	0.10	(0.45)	0.18	(0.43)	0.21	(0.38)
Nitrogen dioxide			-0.48	(0.50)	-0.48	(0.56)	-0.58	(0.55)	-0.64	(0.50)
Ozone			0.15	(0.17)	0.15	(0.20)	0.16	(0.18)	0.25	(0.19)
July temperature			0.30	(0.24)	0.30	(0.25)	0.27	(0.25)	0.24	(0.24)
July sunshine			-0.13	(0.24)	-0.13	(0.24)	-0.16	(0.26)	-0.10	(0.24)
July precipitation			0.19	(0.20)	0.19	(0.20)	0.21	(0.20)	0.26	(0.18)
Recreation area			-0.01	(0.19)	-0.02	(0.19)	-0.02	(0.19)	0.02	(0.19)
Population size			-0.18	(0.19)	-0.18	(0.20)	-0.18	(0.18)	-0.24	(0.19)
Constant			-0.00	(0.13)	-0.00	(0.13)	-0.01	(0.13)	-0.02	(0.12)
N	69		69		69		69		69	
R^2 (adjusted)	-0.008		-0.111		-0.133		-0.114		-0.041	
ΔR^2 (adjusted)			-0.015		-0.022		-0.004		0.069	

Note.

The DV was computed by weighting the underlying individual respondents in the personality data set by the cities age x gender distribution. OLS regressions. Standardized coefficients are given. Standard errors (SE) in parentheses. All variables were z-standardized.

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

Table A16: Regional level regressions with rubble 1945 as IV and **weighted** Trait Depression as DV

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	β	SE	β	SE	β	SE	β	SE	β	SE
Strategic bombing										
Rubble 1945	-0.21	(0.14)	-0.19	(0.12)	-0.19	(0.12)	-0.21	(0.13)	-0.21^{+}	(0.13)
Economic hardship										
GDP per capita			-0.05	(0.34)	-0.04	(0.34)	-0.06	(0.35)	-0.01	(0.35)
Unemployment rate			0.19	(0.42)	0.20	(0.43)	0.17	(0.42)	0.24	(0.43)
Population loss			-0.08	(0.25)	-0.08	(0.25)	-0.08	(0.24)	-0.11	(0.25)
Interactions										
Interaction rubble 1945 X GDP per capita					0.04	(0.15)				
Interaction rubble 1945 X Unemployment rate							-0.13	(0.15)		
Interaction rubble 1945 X Population loss									-0.18	(0.16)
Regional controls										
East Germany			-		-		-		-	
Crime rate			0.33*	(0.16)	0.33^{+}	(0.17)	0.35^{+}	(0.18)	0.32^{+}	(0.16)
Creative class			0.05	(0.15)	0.07	(0.15)	0.10	(0.15)	0.07	(0.14)
Foreigners			0.21	(0.30)	0.21	(0.31)	0.27	(0.33)	0.21	(0.31)
Regional religiosity			0.13	(0.21)	0.14	(0.21)	0.15	(0.22)	0.13	(0.22)
LBGT			-0.37	(0.22)	-0.37	(0.22)	-0.35^{+}	(0.20)	-0.35^{+}	(0.20)
Atmospheric particulate matter			0.35	(0.36)	0.37	(0.39)	0.42	(0.37)	0.41	(0.36)
Nitrogen dioxide			-0.50	(0.43)	-0.53	(0.47)	-0.60	(0.46)	-0.59	(0.45)
Ozone			-0.10	(0.22)	-0.09	(0.23)	-0.08	(0.22)	-0.04	(0.23)
July temperature			0.11	(0.28)	0.10	(0.29)	0.08	(0.29)	0.07	(0.29)
July sunshine			0.03	(0.22)	0.03	(0.22)	-0.00	(0.23)	0.04	(0.22)
July precipitation			0.10	(0.19)	0.11	(0.20)	0.12	(0.20)	0.14	(0.19)
Recreation area			-0.01	(0.18)	-0.01	(0.19)	-0.01	(0.19)	0.01	(0.19)
Population size			-0.17	(0.17)	-0.17	(0.17)	-0.17	(0.16)	-0.20	(0.17)
Constant			-0.00	(0.12)	-0.01	(0.12)	-0.01	(0.12)	-0.01	(0.12)
N	69		69		69		69		69	
R^2 (adjusted)	0.031		0.003		-0.015		-0.002		0.009	
ΔR^2 (adjusted)			-0.001		-0.019		-0.005		0.005	

Note.

The DV was computed by weighting the underlying individual respondents in the personality data set by the cities age x gender distribution. OLS regressions. Standardized coefficients are given. Standard errors (SE) in parentheses. All variables were z-standardized.

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

Table A17: Regional level regressions with rubble 1945 as IV and **weighted** Trait Neuroticism as DV

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	β	SE	β	SE	β	SE	β	SE	β	SE
Strategic bombing										
Rubble 1945	-0.12	(0.14)	-0.04	(0.12)	-0.04	(0.13)	-0.06	(0.13)	-0.07	(0.12)
Economic hardship										
GDP per capita			0.13	(0.36)	0.13	(0.36)	0.12	(0.38)	0.20	(0.37)
Unemployment rate			0.55	(0.47)	0.56	(0.49)	0.54	(0.46)	0.63	(0.46)
Population loss			-0.21	(0.27)	-0.21	(0.28)	-0.21	(0.27)	-0.25	(0.26)
Interactions										
Interaction rubble 1945 X GDP per capita					0.01	(0.17)				
Interaction rubble 1945 X Unemployment rate							-0.15	(0.18)		
Interaction rubble 1945 X Population loss									-0.30^{+}	(0.18)
Regional controls										
East Germany			-		-		-		-	
Crime rate			0.21	(0.15)	0.21	(0.16)	0.24	(0.17)	0.20	(0.15)
Creative class			0.17	(0.17)	0.17	(0.18)	0.22	(0.17)	0.20	(0.16)
Foreigners			0.03	(0.30)	0.03	(0.30)	0.10	(0.33)	0.04	(0.30)
Regional religiosity			-0.02	(0.21)	-0.01	(0.21)	0.01	(0.21)	-0.02	(0.22)
LBGT			-0.40	(0.25)	-0.40	(0.25)	-0.38^{+}	(0.22)	-0.37^{+}	(0.21)
Atmospheric particulate matter			0.27	(0.37)	0.28	(0.42)	0.36	(0.40)	0.37	(0.37)
Nitrogen dioxide			-0.60	(0.47)	-0.61	(0.52)	-0.71	(0.51)	-0.74	(0.48)
Ozone			0.08	(0.18)	0.08	(0.20)	0.10	(0.19)	0.17	(0.20)
July temperature			0.21	(0.26)	0.20	(0.26)	0.17	(0.27)	0.15	(0.26)
July sunshine			-0.04	(0.23)	-0.04	(0.23)	-0.07	(0.24)	-0.02	(0.22)
July precipitation			0.19	(0.19)	0.19	(0.19)	0.21	(0.19)	0.25	(0.18)
Recreation area			-0.01	(0.19)	-0.01	(0.19)	-0.01	(0.19)	0.03	(0.19)
Population size			-0.21	(0.17)	-0.21	(0.19)	-0.21	(0.17)	-0.27	(0.18)
Constant			-0.00	(0.12)	-0.00	(0.12)	-0.01	(0.12)	-0.02	(0.12)
N	69		69		69		69		69	
R^2 (adjusted)	0.001		-0.039		-0.060		-0.041		0.007	
ΔR^2 (adjusted)			0.003		-0.021		-0.002		0.047	

Note.

The DV was computed by weighting the underlying individual respondents in the personality data set by the cities age x gender distribution. OLS regressions. Standardized coefficients are given. Standard errors (SE) in parentheses. All variables were z-standardized.

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

Table A18: Individual-level regressions with loss of housing stock 1939-1945 as IV and Trait Anxiety as DV

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	β	SE	β	SE	β	SE	β	SE	β	SE
Strategic bombing										
Loss of housing stock 1939-1945	-0.01	(0.01)	-0.01^{+}	(0.01)	-0.01	(0.01)	-0.01^{+}	(0.01)	-0.01^{+}	(0.01)
Economic hardship										
GDP per capita			-0.02	(0.02)	-0.02	(0.02)	-0.02	(0.02)	-0.02	(0.02)
Unemployment rate			0.00	(0.03)	0.01	(0.03)	0.00	(0.03)	0.01	(0.03)
Population loss			0.01	(0.01)	0.01	(0.01)	0.01	(0.01)	0.00	(0.01)
Interactions										
Interaction loss of housing stock 1939-1945 X GDP per capita					0.01	(0.01)				
Interaction loss of housing stock 1939-1945 X Unemployment rate							-0.01	(0.01)		
Interaction loss of housing stock 1939-1945 X Population loss									-0.02**	(0.01)
Regional controls										
East Germany			-0.05*	(0.03)	-0.05*	(0.03)	-0.06*	(0.03)	-0.06*	(0.03)
Crime rate			0.02^{+}	(0.01)	0.02^{+}	(0.01)	0.02*	(0.01)	0.02^{+}	(0.01)
Creative class			0.02^{+}	(0.01)	0.02*	(0.01)	0.02*	(0.01)	0.02*	(0.01)
Foreigners			-0.00	(0.02)	-0.00	(0.02)	0.00	(0.02)	0.00	(0.02)
Regional religiosity			0.02	(0.01)	0.02	(0.02)	0.02	(0.02)	0.02	(0.01)
LBGT			-0.00	(0.01)	-0.00	(0.01)	-0.00	(0.01)	0.00	(0.01)
Atmospheric particulate matter			0.02	(0.02)	0.02	(0.02)	0.02	(0.02)	0.02	(0.02)
Nitrogen dioxide			-0.04*	(0.02)	-0.04*	(0.02)	-0.04*	(0.02)	-0.04*	(0.02)
Ozone			0.01	(0.01)	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)
July temperature			0.02	(0.01)	0.01	(0.01)	0.02	(0.01)	0.01	(0.01)
July sunshine			-0.02	(0.01)	-0.02	(0.01)	-0.02	(0.01)	-0.02	(0.01)
July precipitation			0.01	(0.01)	0.01	(0.01)	0.01	(0.01)	0.00	(0.01)
Recreation area			0.02	(0.01)	0.02	(0.01)	0.01	(0.01)	0.02	(0.01)
Population size			-0.02	(0.02)	-0.02	(0.02)	-0.02	(0.02)	-0.02	(0.02)
Individual controls										
Age			-0.09***	(0.01)	-0.09***	(0.01)	-0.09***	(0.01)	-0.09***	(0.01)
Gender (1=Male, 0=Female)			-0.23***	(0.01)	-0.23***	(0.01)	-0.23***	(0.01)	-0.23***	(0.01)
Non-caucasian ethnicity			-0.00	(0.01)	-0.00	(0.01)	-0.00	(0.01)	-0.01	(0.01)
No high-school degree			0.06***	(0.01)	0.06***	(0.01)	0.06***	(0.01)	0.06***	(0.01)
Bachelor degree or higher			-0.04***	(0.01)	-0.04***	(0.01)	-0.04***	(0.01)	-0.04***	(0.01)
Individual religiosity			0.01^{+}	(0.01)	0.01^{+}	(0.01)	0.01^{+}	(0.01)	0.01^{+}	(0.01)
Individual LBGT			0.06***	(0.01)	0.06***	(0.01)	0.06***	(0.01)	0.06***	(0.01)
Constant	0.00	(0.01)	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)
N	20,811		20,811		20,811		20,811		20,811	
Level-1 R^2	0.0001		0.0799		0.0799		0.0800		0.0803	
Level-2 R^2	-0.002		0.133		0.133		0.133		0.133	

Note.

Multi-level regressions. Standardized coefficients are given. Standard errors (SE) in parentheses. All variables were z-standardized. Snijders/Boskers R^2 are given

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

Table A19: Individual-level regressions with loss of housing stock 1939-1945 as IV and Trait Depression as DV

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	β	SE	β	SE	β	SE	β	SE	β	SE
Strategic bombing										
Loss of housing stock 1939-1945	-0.02*	(0.01)	-0.02**	(0.01)	-0.02**	(0.01)	-0.02**	(0.01)	-0.02**	(0.01)
Economic hardship										
GDP per capita			-0.00	(0.02)	0.00	(0.02)	-0.00	(0.02)	-0.00	(0.02)
Unemployment rate			0.01	(0.03)	0.01	(0.03)	0.01	(0.03)	0.01	(0.03)
Population loss			0.01	(0.01)	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)
Interactions										
Interaction loss of housing stock 1939-1945 X GDP per capita					0.00	(0.01)				
Interaction loss of housing stock 1939-1945 X Unemployment rate							-0.00	(0.01)		
Interaction loss of housing stock 1939-1945 X Population loss									-0.01	(0.01)
Regional controls										
East Germany			-0.07**	(0.03)	-0.07**	(0.03)	-0.07**	(0.03)	-0.07**	(0.03)
Crime rate			0.01	(0.01)	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)
Creative class			0.02^{+}	(0.01)	0.02^{+}	(0.01)	0.02^{+}	(0.01)	0.02*	(0.01)
Foreigners			-0.01	(0.02)	-0.01	(0.02)	-0.01	(0.02)	-0.01	(0.02)
Regional religiosity			0.02	(0.01)	0.02	(0.02)	0.02	(0.02)	0.02	(0.01)
LBGT			-0.01	(0.01)	-0.01	(0.01)	-0.01	(0.01)	-0.00	(0.01)
Atmospheric particulate matter			0.02	(0.02)	0.02	(0.02)	0.02	(0.02)	0.02	(0.02)
Nitrogen dioxide			-0.03	(0.02)	-0.03	(0.02)	-0.03	(0.02)	-0.03	(0.02)
Ozone			-0.01	(0.01)	-0.01	(0.01)	-0.01	(0.01)	-0.01	(0.01)
July temperature			0.02	(0.01)	0.02	(0.01)	0.02	(0.01)	0.02	(0.01)
July sunshine			-0.01	(0.01)	-0.01	(0.01)	-0.01	(0.01)	-0.01	(0.01)
July precipitation			0.02^{+}	(0.01)	0.02^{+}	(0.01)	0.02^{+}	(0.01)	0.02^{+}	(0.01)
Recreation area			0.01	(0.01)	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)
Population size			-0.01	(0.02)	-0.01	(0.02)	-0.01	(0.02)	-0.01	(0.02)
Individual controls										
Age			-0.15***	(0.01)	-0.15***	(0.01)	-0.15***	(0.01)	-0.15***	(0.01)
Gender (1=Male, 0=Female)			-0.17***	(0.01)	-0.17***	(0.01)	-0.17***	(0.01)	-0.17***	(0.01)
Non-caucasian ethnicity			0.00	(0.01)	0.00	(0.01)	0.00	(0.01)	0.00	(0.01)
No high-school degree			0.06***	(0.01)	0.06***	(0.01)	0.06***	(0.01)	0.06***	(0.01)
Bachelor degree or higher			-0.06***	(0.01)	-0.06***	(0.01)	-0.06***	(0.01)	-0.06***	(0.01)
Individual religiosity			0.01	(0.01)	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)
Individual LBGT			0.08***	(0.01)	0.08***	(0.01)	0.08***	(0.01)	0.08***	(0.01)
Constant	0.00	(0.01)	0.01^{+}	(0.01)	0.01^{+}	(0.01)	0.01^{+}	(0.01)	0.01^{+}	(0.01)
N	20,811		20,811		20,811		20,811		20,811	
Level-1 R^2	0.0001		0.0819		0.0819		0.0819		0.0819	
Level-2 R^2	-0.005		0.133		0.133		0.133		0.133	

Note.

Multi-level regressions. Standardized coefficients are given. Standard errors (SE) in parentheses. All variables were z-standardized. Snijders/Boskers R^2 are given

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

Table A20: Individual-level regressions with loss of housing stock 1939-1945 as IV and Trait Neuroticism as DV

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	β	SE	β	SE	β	SE	β	SE	β	SE
Strategic bombing										
Loss of housing stock 1939-1945	-0.01^{+}	(0.01)	-0.02*	(0.01)	-0.02*	(0.01)	-0.02*	(0.01)	-0.02*	(0.01)
Economic hardship										
GDP per capita			-0.01	(0.02)	-0.01	(0.02)	-0.01	(0.02)	-0.01	(0.02)
Unemployment rate			0.01	(0.03)	0.01	(0.03)	0.01	(0.03)	0.02	(0.03)
Population loss			0.00	(0.01)	0.00	(0.01)	0.00	(0.01)	0.00	(0.01)
Interactions										
Interaction loss of housing stock 1939-1945 X GDP per capita					0.01	(0.01)				
Interaction loss of housing stock 1939-1945 X Unemployment rate							-0.01	(0.01)		
Interaction loss of housing stock 1939-1945 X Population loss									-0.02**	(0.01)
Regional controls										
East Germany			-0.06*	(0.02)	-0.06*	(0.02)	-0.06*	(0.03)	-0.06*	(0.03)
Crime rate			0.02^{+}	(0.01)	0.02^{+}	(0.01)	0.02^{+}	(0.01)	0.02^{+}	(0.01)
Creative class			0.02*	(0.01)	0.02*	(0.01)	0.02*	(0.01)	0.02*	(0.01)
Foreigners			-0.01	(0.02)	-0.01	(0.02)	-0.01	(0.02)	-0.01	(0.02)
Regional religiosity			0.02	(0.01)	0.02	(0.02)	0.02	(0.01)	0.02	(0.01)
LBGT			-0.01	(0.01)	-0.00	(0.01)	-0.00	(0.01)	-0.00	(0.01)
Atmospheric particulate matter			0.02	(0.02)	0.02	(0.02)	0.02	(0.02)	0.02	(0.02)
Nitrogen dioxide			-0.03	(0.02)	-0.03	(0.02)	-0.03	(0.02)	-0.03	(0.02)
Ozone			-0.00	(0.01)	-0.00	(0.01)	-0.00	(0.01)	0.00	(0.01)
July temperature			0.02	(0.01)	0.02	(0.01)	0.02	(0.01)	0.01	(0.01)
July sunshine			-0.01	(0.01)	-0.01	(0.01)	-0.01	(0.01)	-0.01	(0.01)
July precipitation			0.02	(0.01)	0.02	(0.01)	0.02	(0.01)	0.01	(0.01)
Recreation area			0.01	(0.01)	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)
Population size			-0.02	(0.02)	-0.02	(0.02)	-0.02	(0.02)	-0.02	(0.02)
Individual controls										
Age			-0.10***	(0.01)	-0.10***	(0.01)	-0.10***	(0.01)	-0.10***	(0.01)
Gender (1=Male, 0=Female)			-0.23***	(0.01)	-0.23***	(0.01)	-0.23***	(0.01)	-0.23***	(0.01)
Non-caucasian ethnicity			-0.00	(0.01)	-0.00	(0.01)	-0.00	(0.01)	-0.00	(0.01)
No high-school degree			0.07***	(0.01)	0.07***	(0.01)	0.07***	(0.01)	0.07***	(0.01)
Bachelor degree or higher			-0.05***	(0.01)	-0.05***	(0.01)	-0.05***	(0.01)	-0.05***	(0.01)
Individual religiosity			0.01	(0.01)	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)
Individual LBGT			0.08***	(0.01)	0.08***	(0.01)	0.08***	(0.01)	0.08***	(0.01)
Constant	0.00	(0.01)	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)
N	20,811		20,811		20,811		20,811		20,811	
Level-1 R^2	0.0001		0.0889		0.0889		0.0890		0.0892	
Level-2 R^2	-0.003		0.139		0.139		0.139		0.139	

Note.

Multi-level regressions. Standardized coefficients are given. Standard errors (SE) in parentheses. All variables were z-standardized. Snijders/Boskers R^2 are given

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

Table A21: Individual-level regressions with rubble 1945 as IV and Trait Anxiety as DV

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	β	SE	β	SE	β	SE	β	SE	β	SE
Strategic bombing										
Rubble 1945	-0.01	(0.01)	-0.01	(0.01)	-0.01	(0.01)	-0.01	(0.01)	-0.01	(0.01)
Economic hardship										
GDP per capita			-0.04	(0.03)	-0.04	(0.03)	-0.04	(0.03)	-0.03	(0.03)
Unemployment rate			-0.01	(0.03)	-0.01	(0.03)	-0.01	(0.03)	-0.01	(0.03)
Population loss			0.01	(0.02)	0.01	(0.02)	0.01	(0.02)	0.01	(0.02)
Interactions										
Interaction rubble 1945 X GDP per capita					-0.00	(0.01)				
Interaction rubble 1945 X Unemployment rate							0.00	(0.01)		
Interaction rubble 1945 X Population loss									-0.00	(0.01)
Regional controls										
East Germany			-		-		-		-	
Crime rate			0.03*	(0.01)	0.03*	(0.01)	0.03*	(0.01)	0.03*	(0.01)
Creative class			0.02^{+}	(0.01)	0.02^{+}	(0.01)	0.02^{+}	(0.01)	0.02*	(0.01)
Foreigners			0.02	(0.02)	0.02	(0.02)	0.02	(0.02)	0.02	(0.02)
Regional religiosity			0.02	(0.02)	0.02	(0.02)	0.02	(0.02)	0.02	(0.02)
Regional LBGT			0.01	(0.01)	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)
Atmospheric particulate matter			0.03	(0.02)	0.03	(0.02)	0.03	(0.02)	0.03	(0.02)
Nitrogen dioxide			-0.06*	(0.02)	-0.06*	(0.03)	-0.06*	(0.03)	-0.06*	(0.02)
Ozone			0.00	(0.02)	0.00	(0.02)	0.00	(0.02)	0.00	(0.02)
July temperature			0.02	(0.02)	0.02	(0.02)	0.02	(0.02)	0.02	(0.02)
July sunshine			-0.02	(0.02)	-0.02	(0.02)	-0.02	(0.02)	-0.02	(0.02)
July precipitation			0.01	(0.01)	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)
Recreation area			0.01	(0.01)	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)
Population size			-0.02	(0.02)	-0.02	(0.02)	-0.02	(0.02)	-0.02	(0.02)
Individual controls										
Age			-0.09***	(0.01)	-0.09***	(0.01)	-0.09***	(0.01)	-0.09***	(0.01)
Gender (1=Male, 0=Female)			-0.23***	(0.01)	-0.23***	(0.01)	-0.23***	(0.01)	-0.23***	(0.01)
Non-caucasian ethnicity			-0.01	(0.01)	-0.01	(0.01)	-0.01	(0.01)	-0.01	(0.01)
No high-school degree			0.06***	(0.01)	0.06***	(0.01)	0.06***	(0.01)	0.06***	(0.01)
Bachelor degree or higher			-0.05***	(0.01)	-0.05***	(0.01)	-0.05***	(0.01)	-0.05***	(0.01)
Individual religiosity			0.00	(0.01)	0.00	(0.01)	0.00	(0.01)	0.00	(0.01)
Individual LBGT			0.06***	(0.01)	0.06***	(0.01)	0.06***	(0.01)	0.06***	(0.01)
Constant	0.01	(0.01)	0.00	(0.01)	0.00	(0.01)	-0.00	(0.01)	0.00	(0.01)
N	16,062		16,062		16,062		16,062		16,062	
Level-1 R^2	0.001		0.0815		0.0815		0.0815		0.0815	
Level-2 R^2	-0.001		0.102		0.102		0.102		0.102	

Note.

Multi-level regressions. Standardized coefficients are given. Standard errors (SE) in parentheses. All variables were z-standardized. Snijders/Boskers R^2 are given

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

Table A22: Individual-level regressions with rubble 1945 as IV and Trait Depression as DV

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	β	SE	β	SE	β	SE	β	SE	β	SE
Strategic bombing										
Rubble 1945	-0.03**	(0.01)	-0.02*	(0.01)	-0.02*	(0.01)	-0.02*	(0.01)	-0.02*	(0.01)
Economic hardship										
GDP per capita			-0.01	(0.03)	-0.01	(0.03)	-0.01	(0.03)	-0.01	(0.03)
Unemployment rate			-0.02	(0.03)	-0.02	(0.03)	-0.01	(0.03)	-0.02	(0.03)
Population loss			0.02	(0.02)	0.02	(0.02)	0.02	(0.02)	0.02	(0.02)
Interactions										
Interaction rubble 1945 X GDP per capita					0.00	(0.01)				
Interaction rubble 1945 X Unemployment rate							0.01	(0.01)		
Interaction rubble 1945 X Population loss									-0.00	(0.01)
Regional controls										
East Germany			-		-		-		-	
Crime rate			0.02^{+}	(0.01)	0.02^{+}	(0.01)	0.02^{+}	(0.01)	0.02^{+}	(0.01)
Creative class			0.02^{+}	(0.01)	0.02^{+}	(0.01)	0.01	(0.01)	0.02^{+}	(0.01)
Foreigners			0.01	(0.02)	0.01	(0.02)	0.01	(0.02)	0.01	(0.02)
Regional religiosity			0.03^{+}	(0.02)	0.03^{+}	(0.02)	0.03^{+}	(0.02)	0.03^{+}	(0.02)
Regional LBGT			0.00	(0.01)	0.00	(0.01)	0.00	(0.01)	0.00	(0.01)
Atmospheric particulate matter			0.04^{+}	(0.02)	0.04^{+}	(0.02)	0.03	(0.02)	0.04^{+}	(0.02)
Nitrogen dioxide			-0.06**	(0.02)	-0.06*	(0.02)	-0.06*	(0.02)	-0.07**	(0.02)
Ozone			-0.03^{+}	(0.02)	-0.03^{+}	(0.02)	-0.03^{+}	(0.02)	-0.03^{+}	(0.02)
July temperature			0.04*	(0.02)	0.04*	(0.02)	0.04*	(0.02)	0.04*	(0.02)
July sunshine			-0.01	(0.02)	-0.01	(0.02)	-0.00	(0.02)	-0.01	(0.02)
July precipitation			0.03*	(0.01)	0.03*	(0.01)	0.02^{+}	(0.01)	0.03*	(0.01)
Recreation area			0.01	(0.01)	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)
Population size			0.00	(0.02)	0.00	(0.02)	0.00	(0.02)	-0.00	(0.02)
Individual controls										
Age			-0.15***	(0.01)	-0.15***	(0.01)	-0.15***	(0.01)	-0.15***	(0.01)
Gender (1=Male, 0=Female)			-0.18***	(0.01)	-0.18***	(0.01)	-0.18***	(0.01)	-0.18***	(0.01)
Non-caucasian ethnicity			-0.00	(0.01)	-0.00	(0.01)	-0.00	(0.01)	-0.00	(0.01)
No high-school degree			0.06***	(0.01)	0.06***	(0.01)	0.06***	(0.01)	0.06***	(0.01)
Bachelor degree or higher			-0.06***	(0.01)	-0.06***	(0.01)	-0.06***	(0.01)	-0.06***	(0.01)
Individual religiosity			-0.00	(0.01)	-0.00	(0.01)	-0.00	(0.01)	-0.00	(0.01)
Individual LBGT			0.08***	(0.01)	0.08***	(0.01)	0.08***	(0.01)	0.08***	(0.01)
Constant	0.00	(0.01)	0.00	(0.01)	-0.00	(0.01)	-0.00	(0.01)	0.00	(0.01)
N	16,062		16,062		16,062		16,062		16,062	
Level-1 R^2	0.0005		0.0855		0.0855		0.0856		0.0855	
Level-2 R^2	0.001		0.112		0.112		0.112		0.112	

Note.

Multi-level regressions. Standardized coefficients are given. Standard errors (SE) in parentheses. All variables were z-standardized. Snijders/Boskers R^2 are given

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

Table A23: Individual-level regressions with rubble 1945 as IV and Trait Neuroticism as DV

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	β	SE	β	SE	β	SE	β	SE	β	SE
Strategic bombing										
Rubble 1945	-0.02^{+}	(0.01)	-0.01	(0.01)	-0.01	(0.01)	-0.01	(0.01)	-0.01	(0.01)
Economic hardship										
GDP per capita			-0.02	(0.03)	-0.02	(0.03)	-0.02	(0.03)	-0.02	(0.03)
Unemployment rate			-0.01	(0.03)	-0.01	(0.03)	-0.01	(0.03)	-0.01	(0.03)
Population loss			0.01	(0.02)	0.01	(0.02)	0.01	(0.02)	0.00	(0.02)
Interactions										
Interaction rubble 1945 X GDP per capita					-0.00	(0.01)				
Interaction rubble 1945 X Unemployment rate							0.01	(0.01)		
Interaction rubble 1945 X Population loss									-0.01	(0.01)
Regional controls										
East Germany			-		-		-		-	
Crime rate			0.03*	(0.01)	0.03*	(0.01)	0.03*	(0.01)	0.03*	(0.01)
Creative class			0.02*	(0.01)	0.02*	(0.01)	0.02*	(0.01)	0.02*	(0.01)
Foreigners			0.02	(0.02)	0.02	(0.02)	0.02	(0.02)	0.02	(0.02)
Regional religiosity			0.02	(0.02)	0.02	(0.02)	0.02	(0.02)	0.02	(0.02)
Regional LBGT			0.01	(0.01)	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)
Atmospheric particulate matter			0.04^{+}	(0.02)	0.04^{+}	(0.02)	0.03	(0.02)	0.04^{+}	(0.02)
Nitrogen dioxide			-0.07**	(0.02)	-0.07**	(0.02)	-0.06*	(0.02)	-0.07**	(0.02)
Ozone			-0.01	(0.02)	-0.01	(0.02)	-0.01	(0.02)	-0.01	(0.02)
July temperature			0.03^{+}	(0.02)	0.03^{+}	(0.02)	0.03^{+}	(0.02)	0.03^{+}	(0.02)
July sunshine			-0.02	(0.02)	-0.02	(0.02)	-0.02	(0.02)	-0.02	(0.02)
July precipitation			0.02	(0.01)	0.02	(0.01)	0.02	(0.01)	0.02	(0.01)
Recreation area			0.01	(0.01)	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)
Population size			-0.02	(0.02)	-0.02	(0.02)	-0.02	(0.02)	-0.02	(0.02)
Individual controls										
Age			-0.10***	(0.01)	-0.10***	(0.01)	-0.10***	(0.01)	-0.10***	(0.01)
Gender (1=Male, 0=Female)			-0.24***	(0.01)	-0.24***	(0.01)	-0.24***	(0.01)	-0.23***	(0.01)
Non-caucasian ethnicity			-0.01	(0.01)	-0.01	(0.01)	-0.01	(0.01)	-0.01	(0.01)
No high-school degree			0.06***	(0.01)	0.06***	(0.01)	0.06***	(0.01)	0.06***	(0.01)
Bachelor degree or higher			-0.05***	(0.01)	-0.05***	(0.01)	-0.05***	(0.01)	-0.05***	(0.01)
Individual religiosity			-0.00	(0.01)	-0.00	(0.01)	-0.00	(0.01)	-0.00	(0.01)
Individual LBGT			0.08***	(0.01)	0.08***	(0.01)	0.08***	(0.01)	0.08***	(0.01)
Constant	0.00	(0.01)	-0.00	(0.01)	0.00	(0.01)	-0.00	(0.01)	0.00	(0.01)
N	16,062		16,062		16,062		16,062		16,062	
Level-1 R^2	0.0002		0.0918		0.0918		0.0918		0.0918	
Level-2 R^2	-0.0007		0.113		0.113		0.113		0.113	

Note.

Multi-level regressions. Standardized coefficients are given. Standard errors (SE) in parentheses. All variables were z-standardized. Snijders/Boskers R^2 are given

$^{+}$p < .10. *p < .05. **p < .01. ***p < .001.

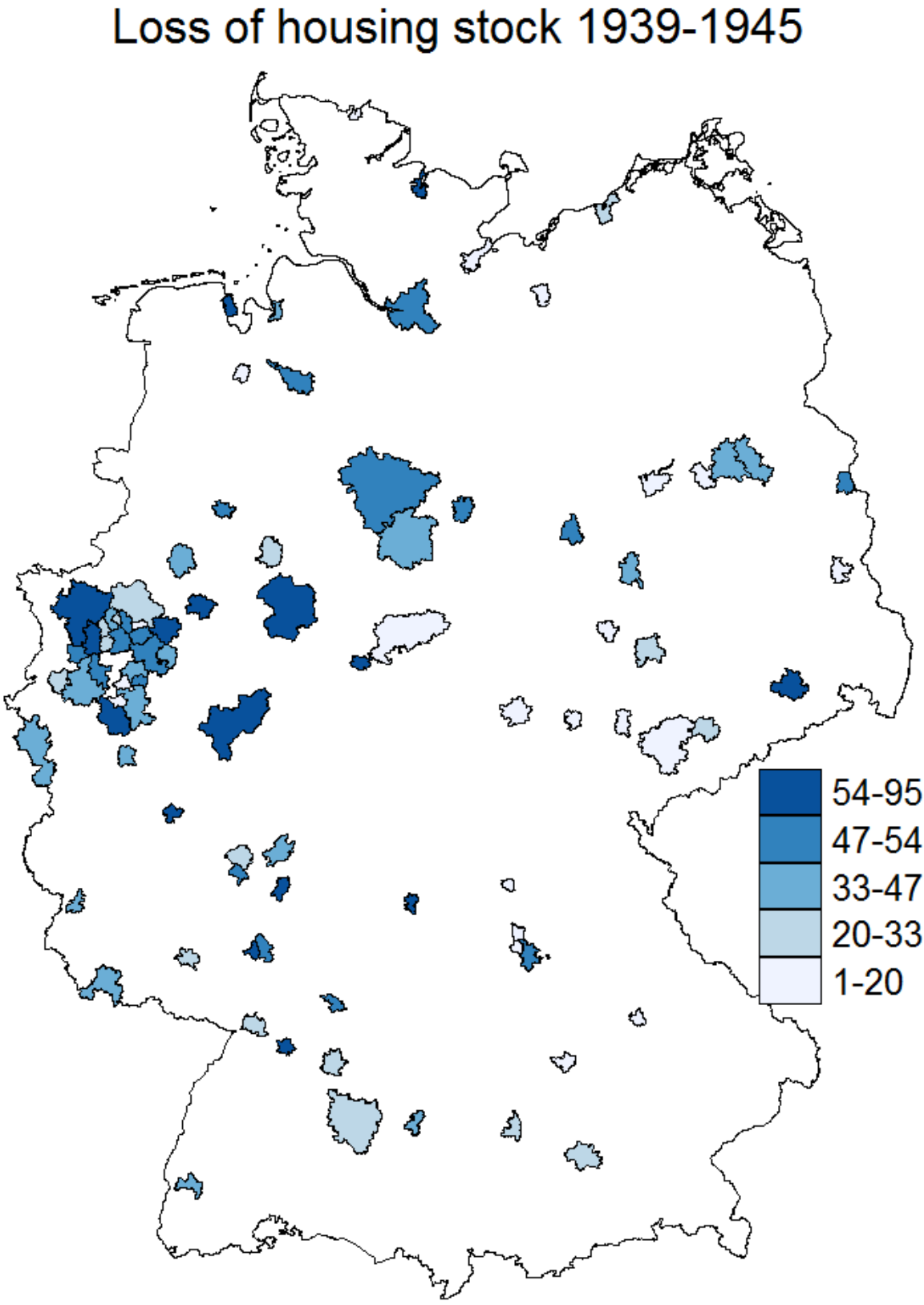

Figure A1: Loss of housing stock 1939-1945 in %, 89 cities. Source: Brakman et al. (2004)

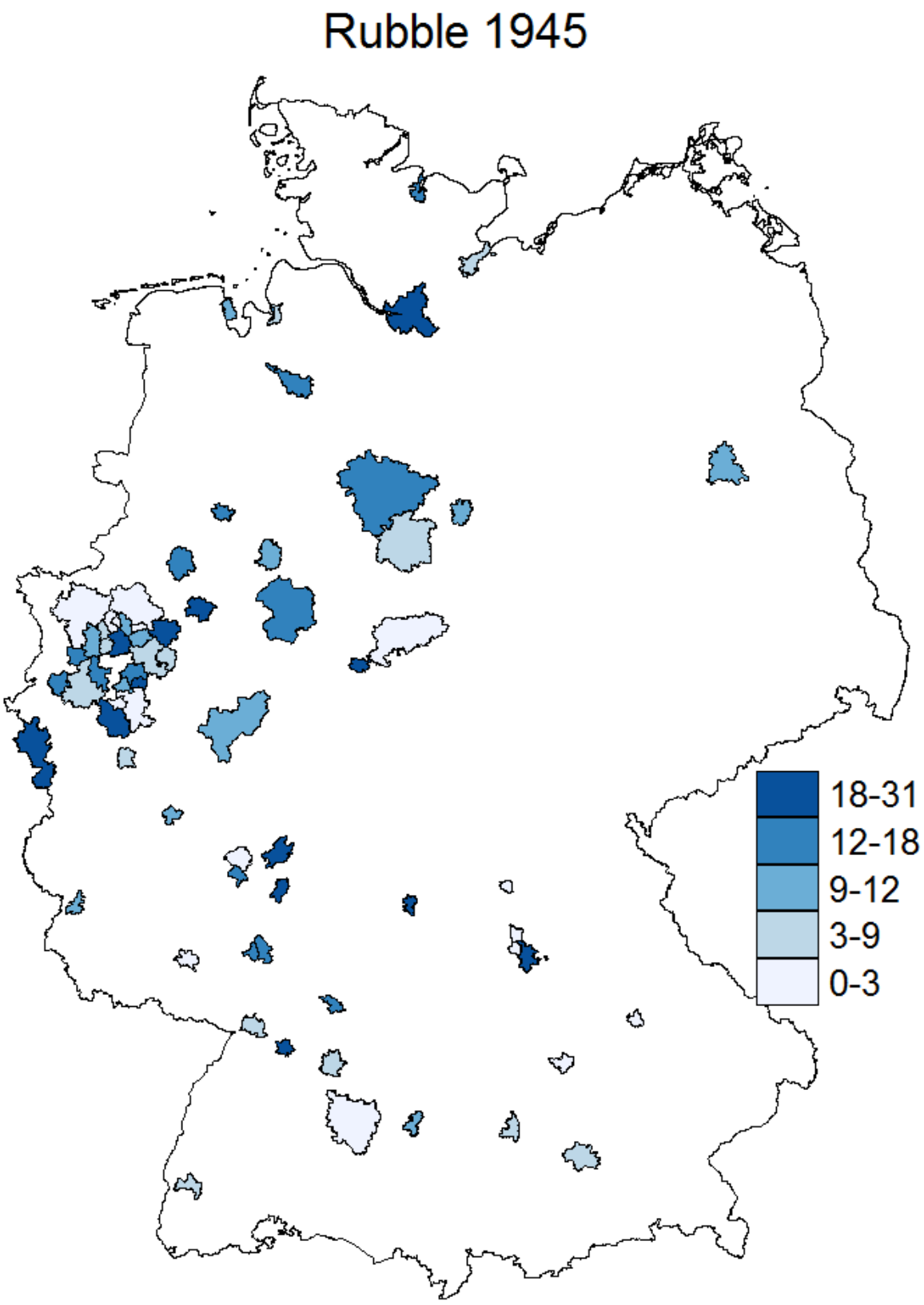

Figure A2: Rubble 1945 in m^3 per capita, 69 cities. Source: Brakman et al. (2004)

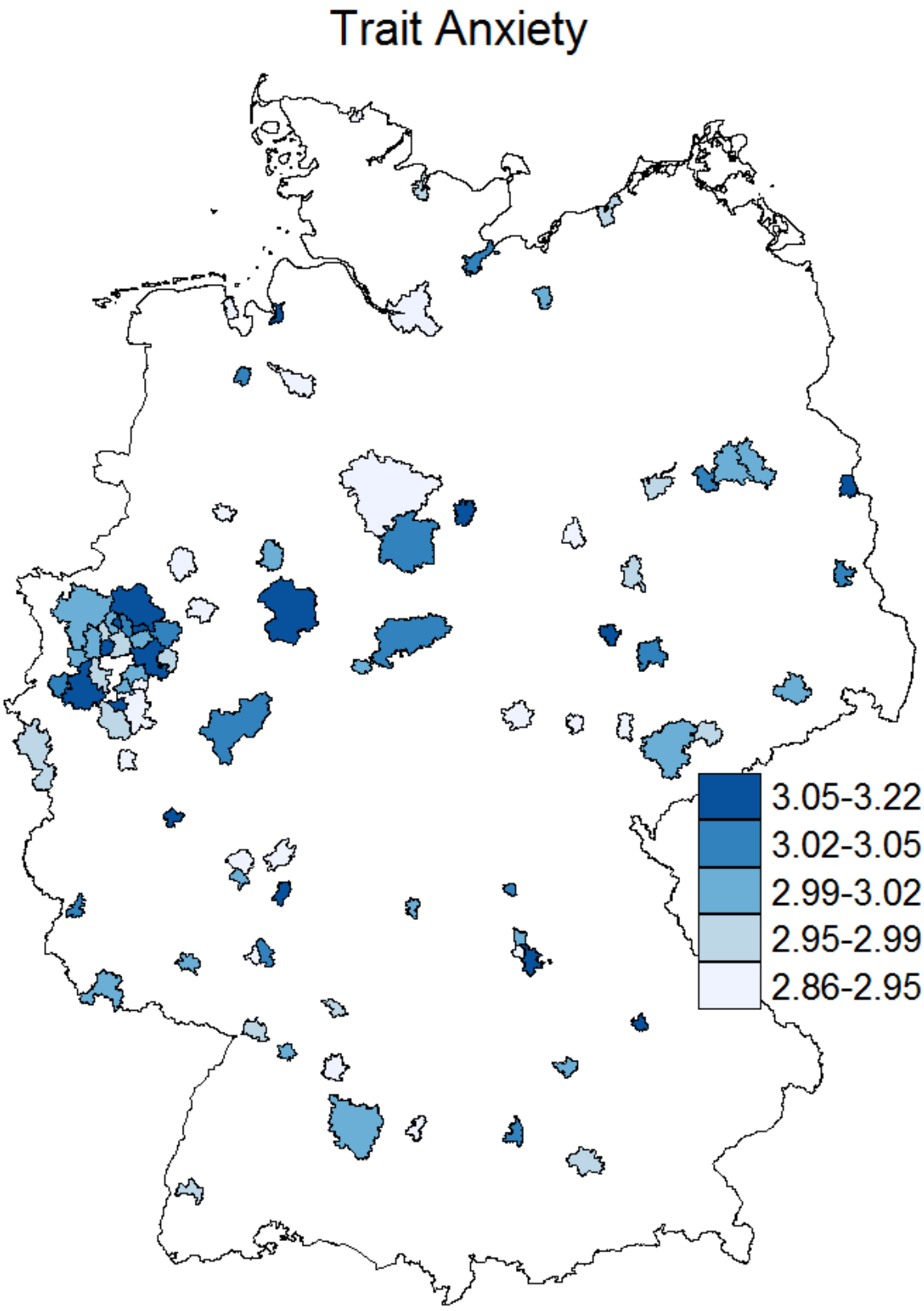

Figure A3: Trait Anxiety, 89 cities. Source: Gosling-Potter Internet project

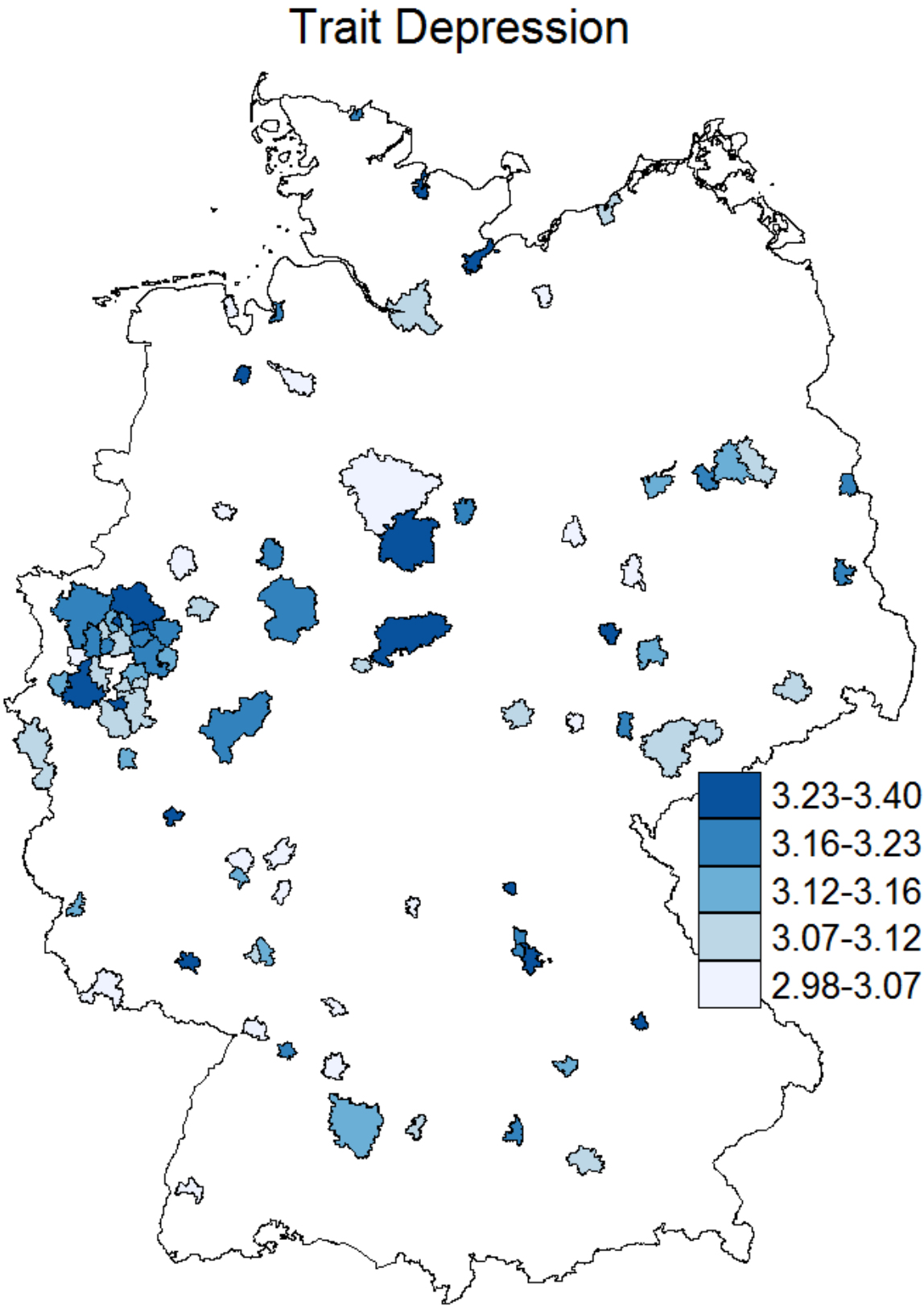

Figure A4: Trait Depression, 89 cities. Source: Gosling-Potter Internet project

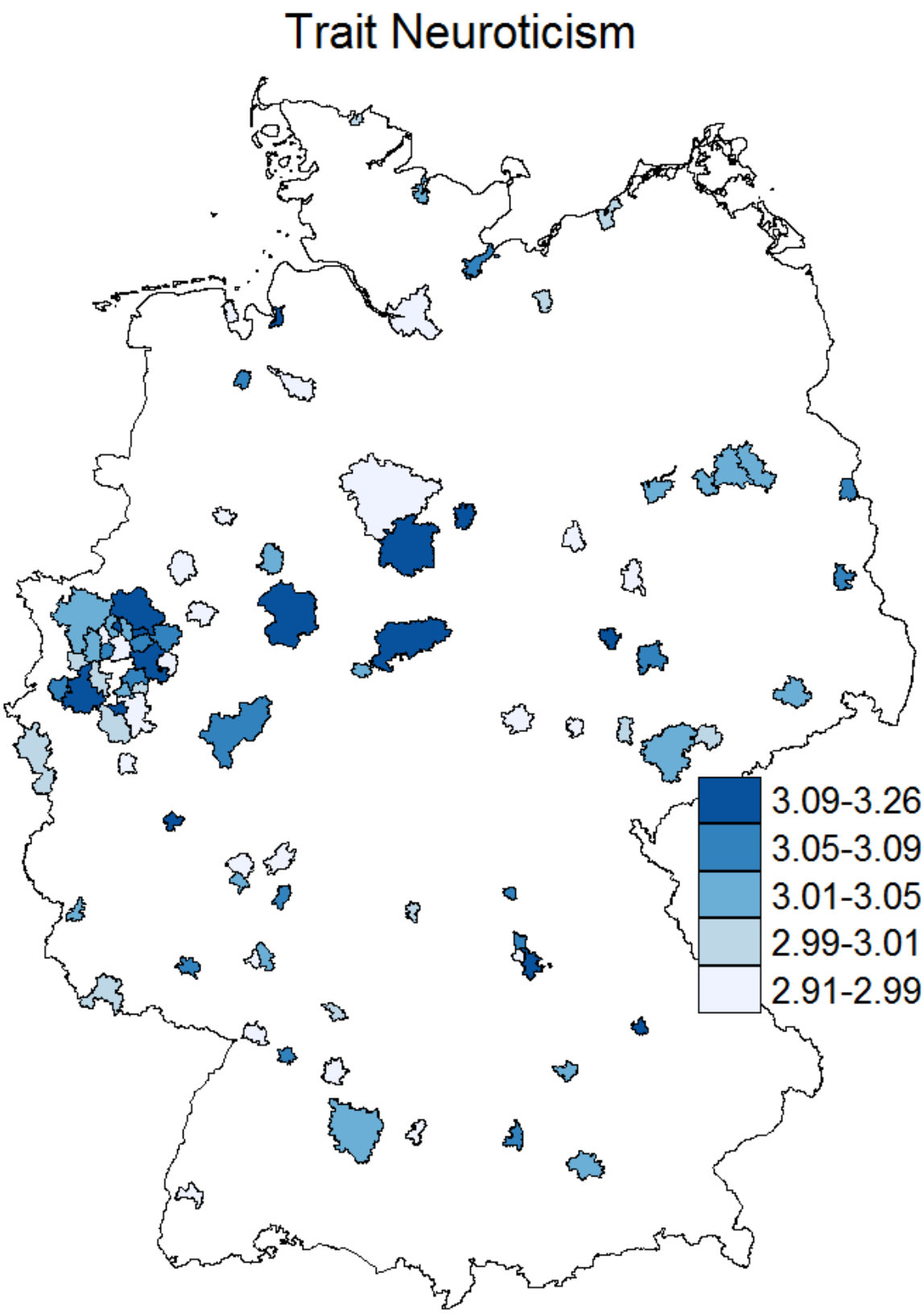

Figure A5: Trait Neuroticism, 89 cities. Source: Gosling-Potter Internet project.

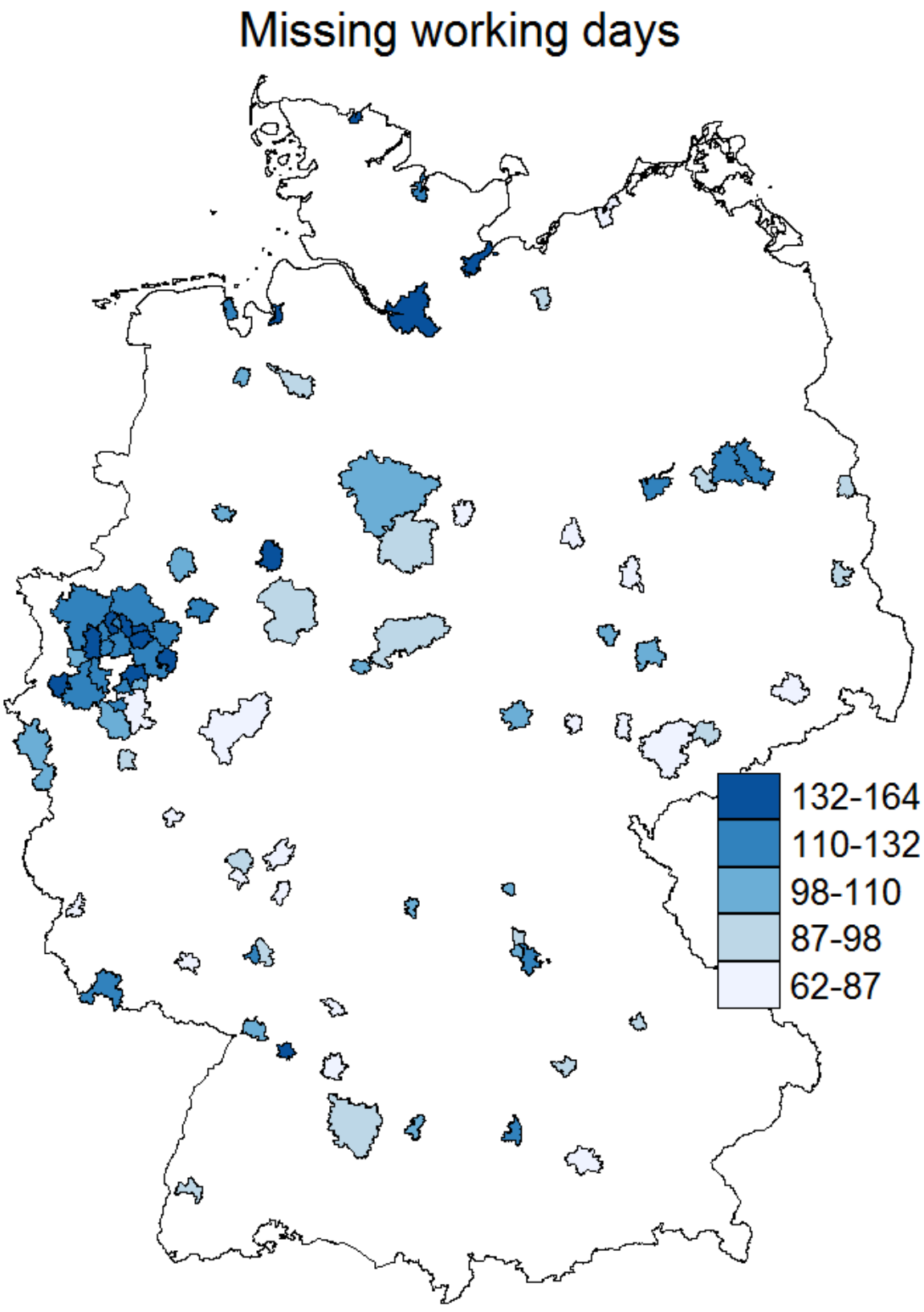

Figure A6: Number of working days missed due to depression disorder per 100 insurance years for each, 89 cities. Source: TKK.

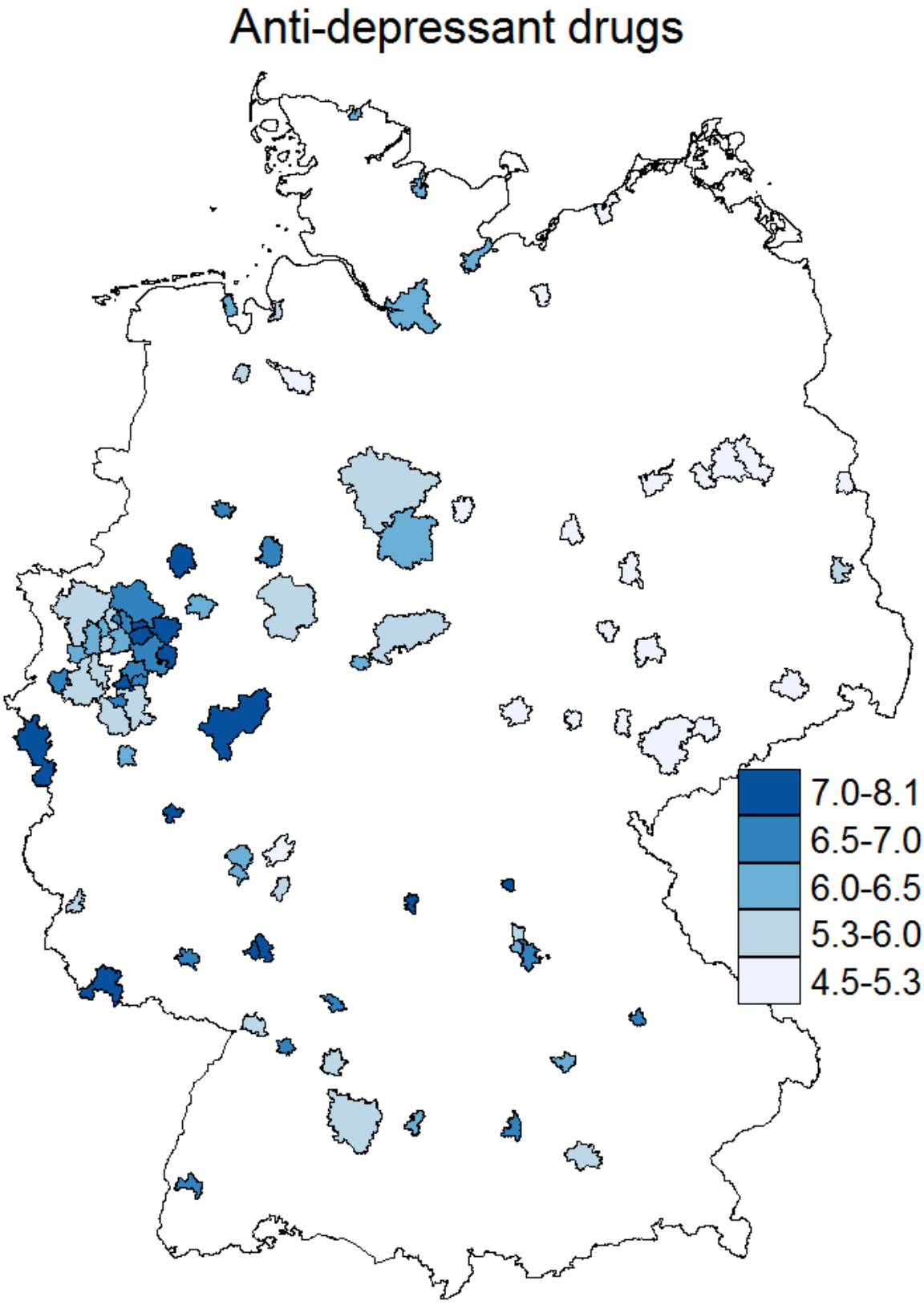

Figure A7: Share of persons with prescriptions of *antidepressant drugs* as treatment for depression, 89 cities. Source: TKK.

Figure A8: Illustration of interaction effects between loss of housing stock 1939-1945 and unemployment rate in the prediction of Trait Anxiety (regional level).

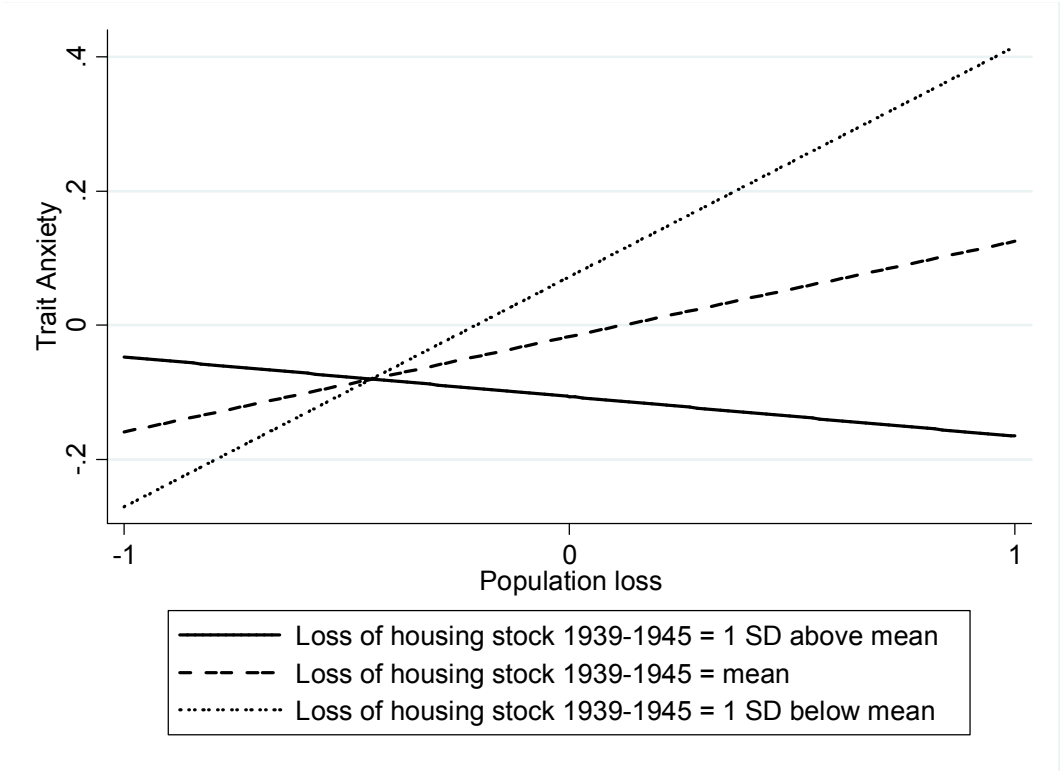

Figure A9: Illustration of interaction effects between loss of housing stock 1939-1945 and population loss in the prediction of Trait Anxiety (regional level).

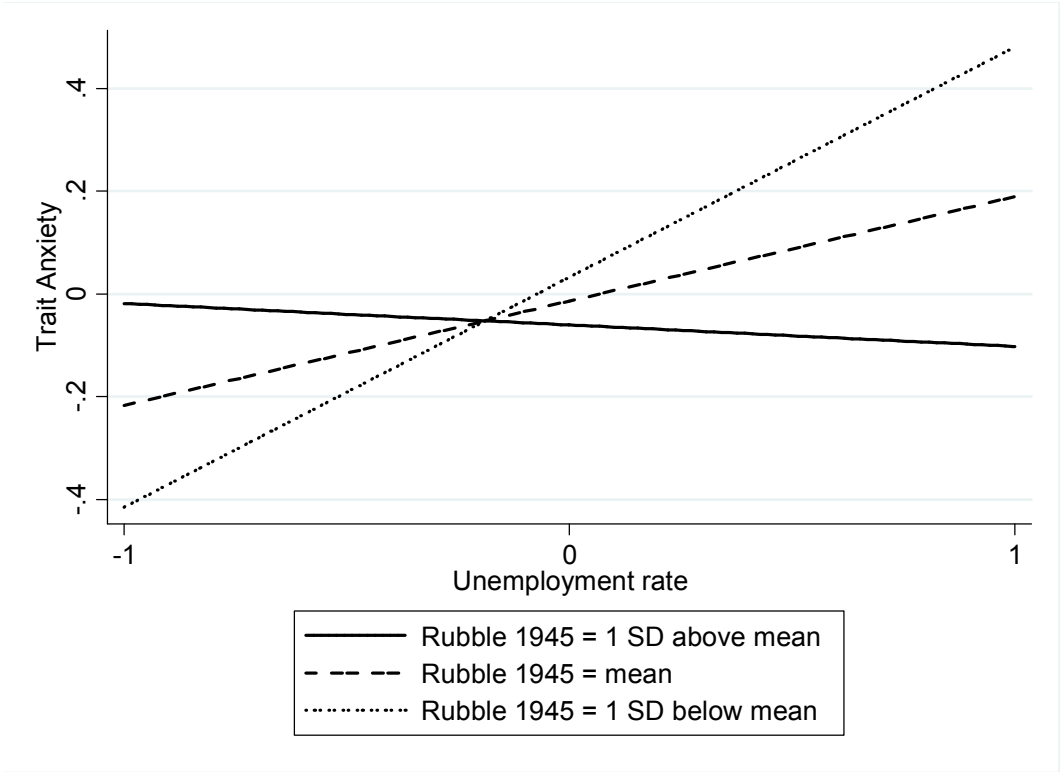

Figure A10: Illustration of interaction effects between rubble in 1945 and unemployment rate in the prediction of Trait Anxiety (regional level).

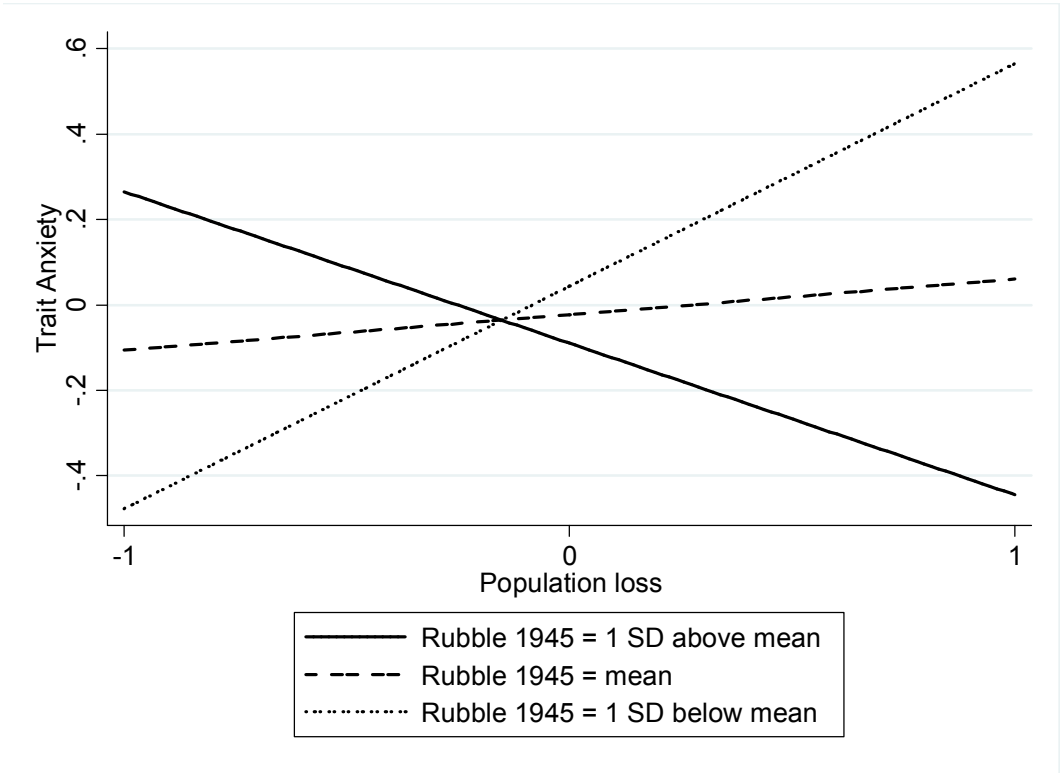

Figure A11: Illustration of interaction effects between rubble 1945 and population loss in the prediction of Trait Anxiety (regional level).

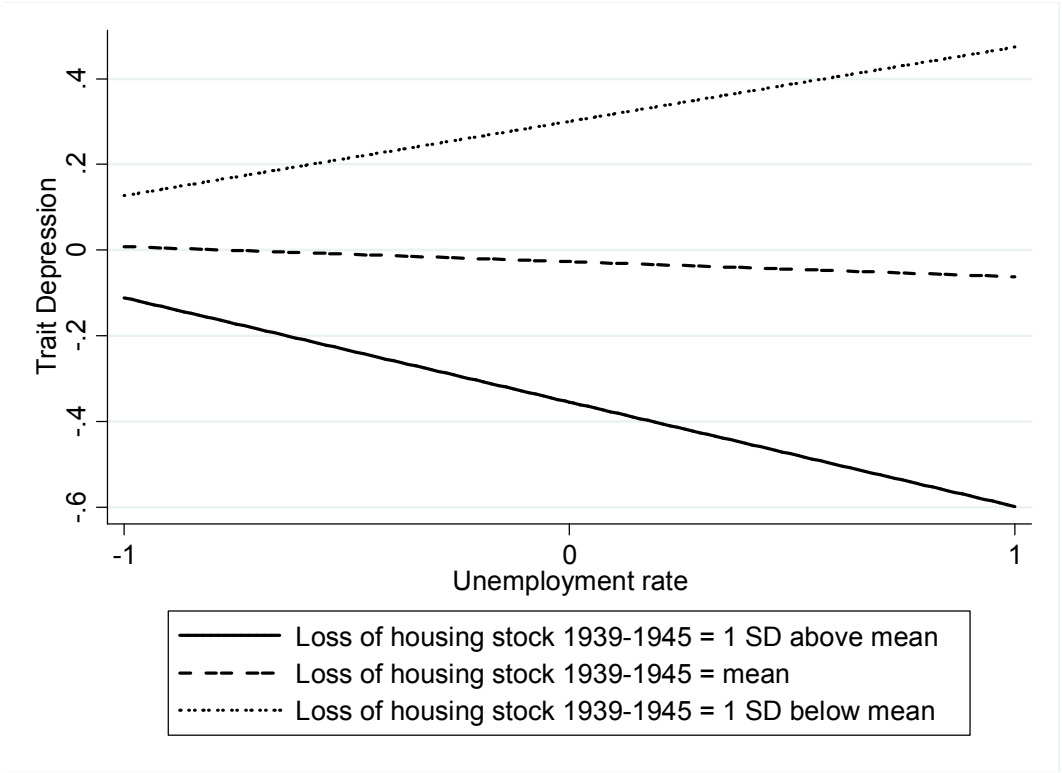

Figure A12: Illustration of interaction effects between loss of housing stock 1939-1945 and unemployment rate in the prediction of Trait Depression (regional level).

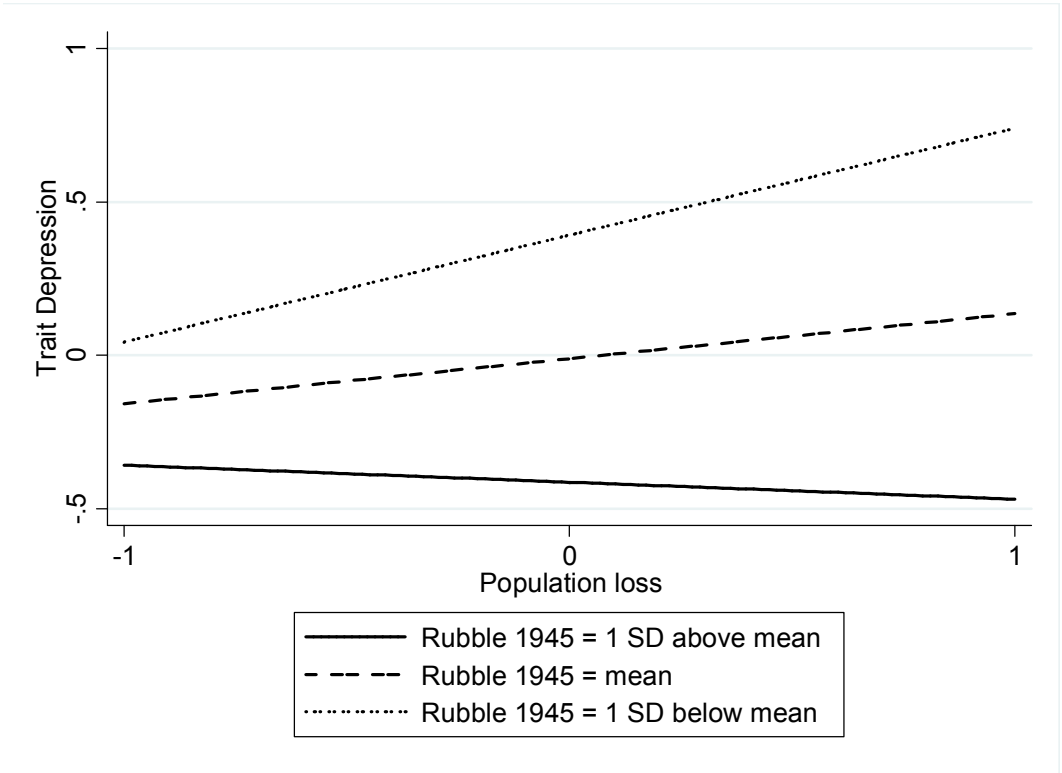

Figure A13: Illustration of interaction effects between rubble 1945 and population loss in the prediction of Trait Depression (regional level).

Figure A14: Illustration of interaction effects between loss of housing stock 1939-1945 and unemployment rate in the prediction of Trait Neuroticism (regional level).

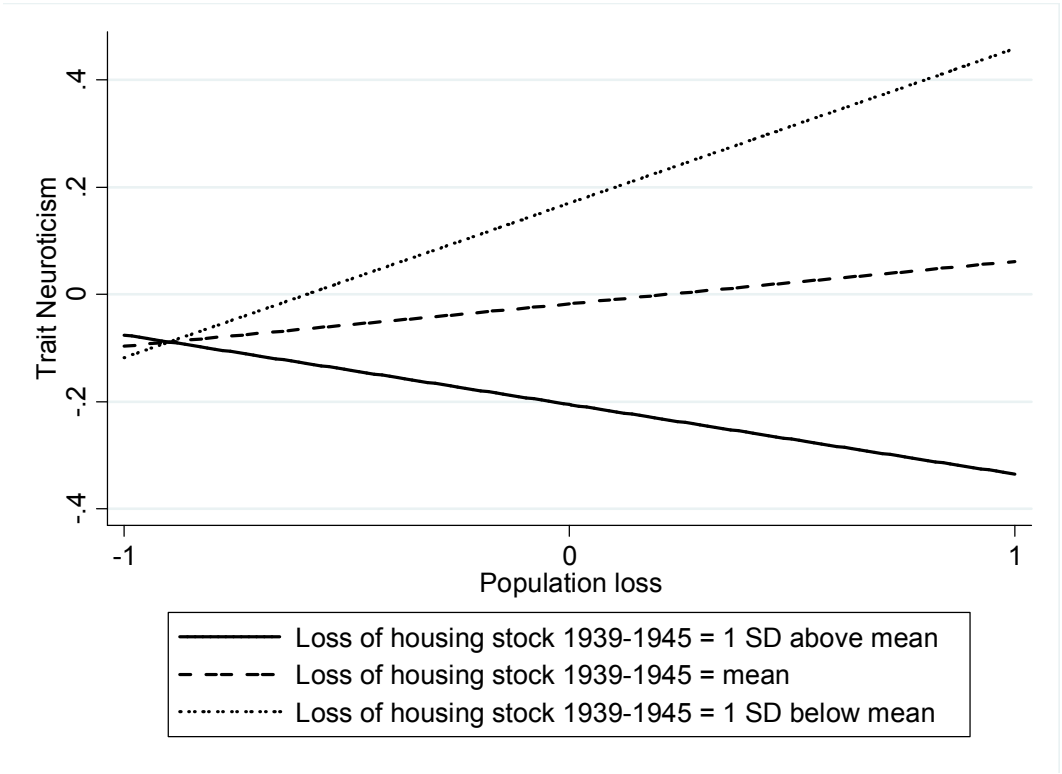

Figure A15: Illustration of interaction effects between loss of housing stock 1939-1945 and population loss in the prediction of Trait Neuroticism (regional level).

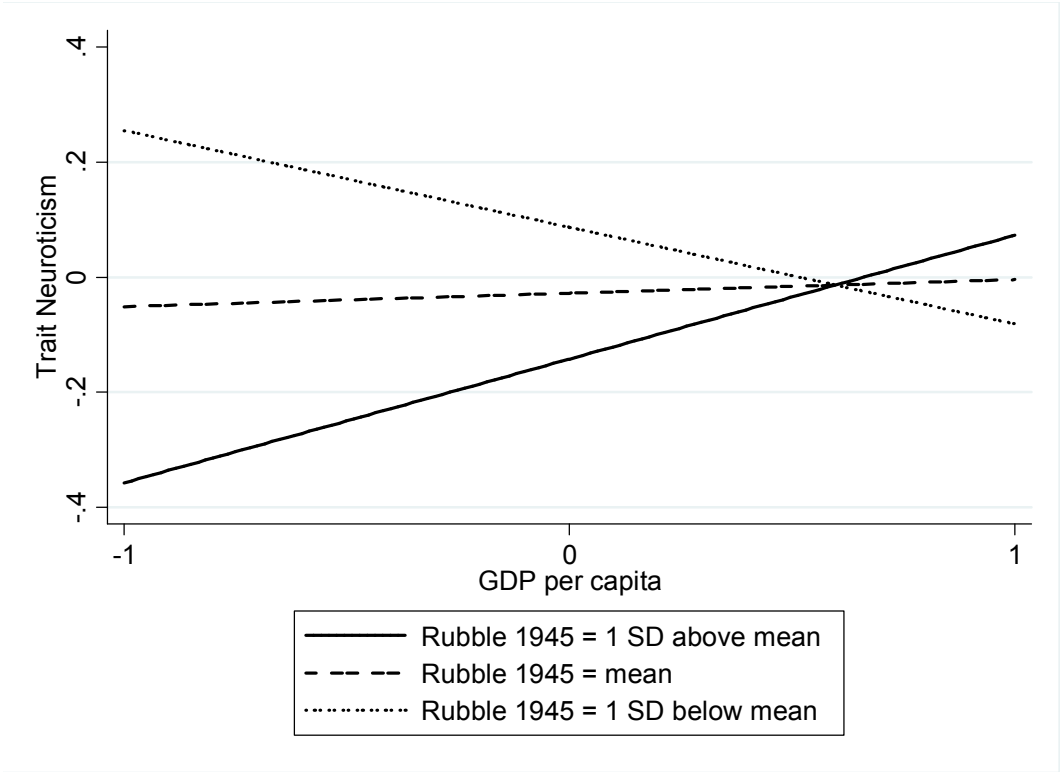

Figure A16: Illustration of interaction effects between rubble 1945 and GDP per capita in the prediction of Trait Neuroticism (regional level).

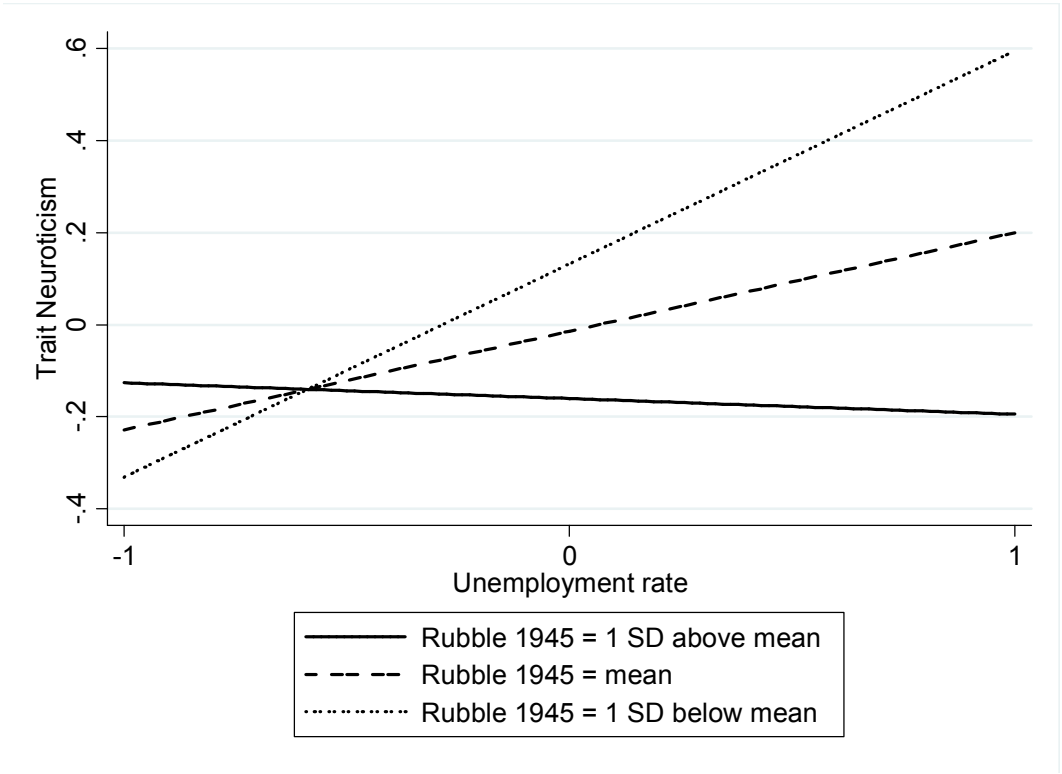

Figure A17: Illustration of interaction effects between rubble 1945 and unemployment rate in the prediction of Trait Neuroticism (regional level).

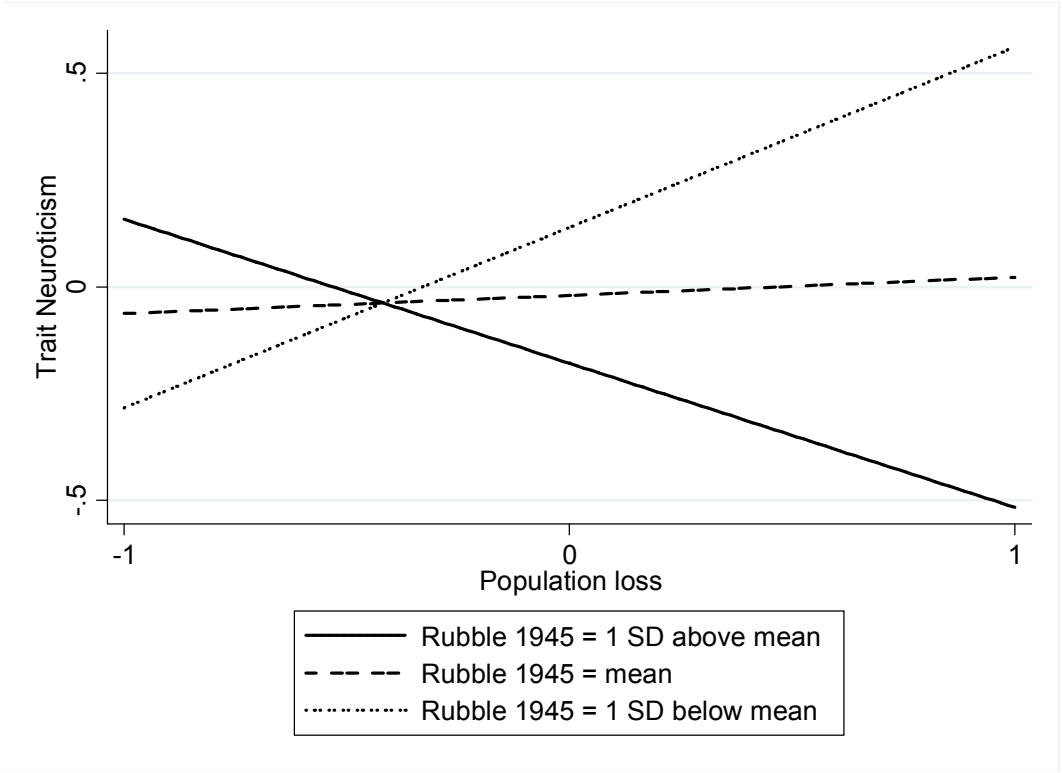

Figure A18: Illustration of interaction effects between rubble 1945 and population loss in the prediction of trait Neuroticism (regional level).

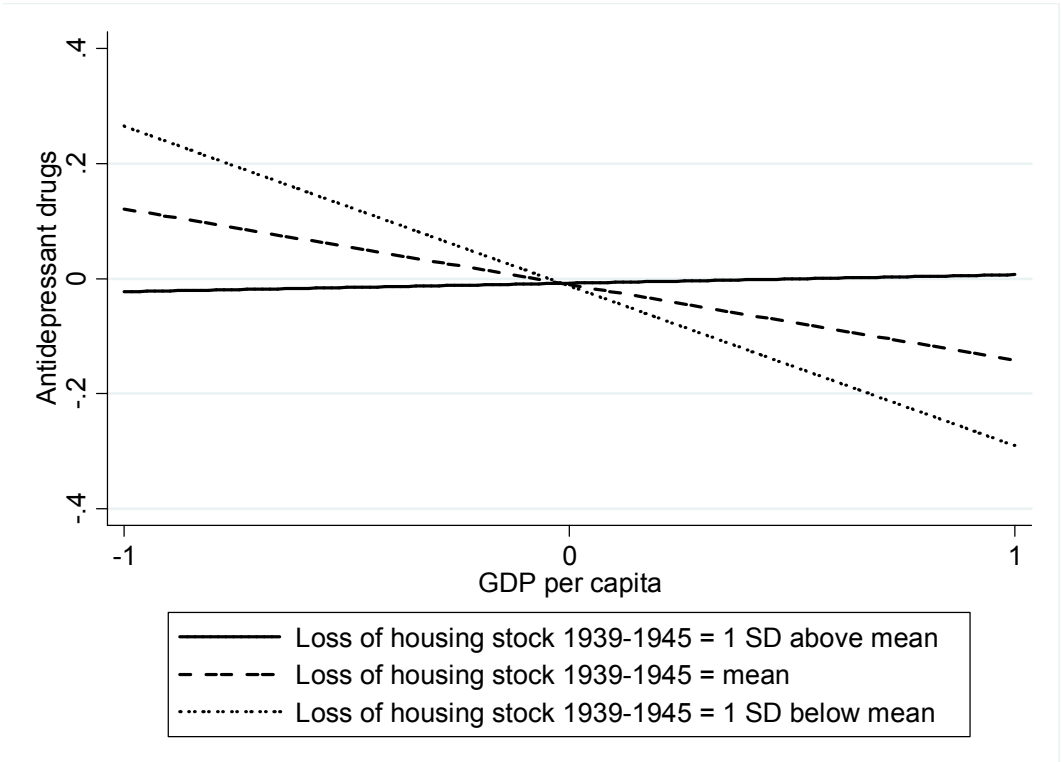

Figure A19: Illustration of interaction effects between loss of housing stock 1939-1945 and GDP per capita in the prediction of anti-depressant drugs (regional level).

Figure S20: Illustration of interaction effects between loss of housing stock 1939-1945 and unemployment rate in the prescription of anti-depressant drugs (regional level).