Does School Social Work Work? The Impact of School Social Workers on Youth Crime and Education*

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Abstract

I study the impact of school social workers on youth crime and education. As a political reaction to a school rampage, a large German state introduced funding for school social workers, resulting in a strong increase in their numbers. Using the spatial and temporal variation in its implementation and unique administrative crime data, I find that school social workers reduce youth crime by 16% per year, lower victimization from violent crimes, and help uncover sexual offenses. They also improve educational outcomes by reducing grade retention. The results emphasize the crucial role of school personnel beyond teachers in shaping youth development.

Keywords: School Social Work, Education, Crime, Victimization, Youth
JEL Codes: I20, I24, J13, K42

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1 Introduction

Schools are essential in shaping students' cognitive and non-cognitive skills, with profound short- and long-term effects on labor market success and crime reduction (Carlsson et al., 2015; Jackson, 2018; Rose et al., 2022). However, schools and their staff are increasingly confronted with a growing array of challenges. Teachers rank student behavior as their most pressing challenge, with nearly half reporting incidents of psychological or physical violence among students (Robert Bosch Stiftung, 2024). Although teachers devote a large portion of their instructional time to crisis management, many still feel they lack the time to adequately address students' needs (Robert Bosch Stiftung, 2022). The ongoing teacher shortage is likely to intensify these challenges.

These circumstances underscore the need for confidential, specially trained staff for students' problems, while also alleviating the burden on teachers. School-based social workers present a solution to this. The goal of school social workers is to promote students' academic success, improve their future prospects and reduce violent behavior. The activities of school social workers are broad and typically include one-on-one support for students, parents and teachers, and group work. The one-on-one support mostly focuses on difficulties at school, conflicts with teachers, parents, or other students, and health and behavioral problems. In contrast, the group work is more preventive and promotes social skills. Despite the growing recognition of their role, the effects of school social workers on youth development remain largely understudied.

In this paper I examine the impact of specially trained school social workers on youth delinquency, victimization and education using unique crime register data and administrative education data from Germany from the school year 2006 to 2018. To evaluate the impact of school social workers, I exploit the regional variation in the increase of school social workers induced by a policy reform in a generalized difference-in-differences design. After the Winnenden rampage in 2009[1], the state of Baden-Wuerttemberg[2] launched a political program in 2012 to fund school social workers. As a consequence, from 2012 to 2018, the number of school social workers in Baden-Wuerttemberg schools almost doubled from 1,286 to 2,379,

[1]In March 2009, a 17-year-old started a shooting rampage at his school in the town of Winnenden in Baden-Wuerttemberg, where he killed 15 people and ultimately himself. Eleven other people, some of them seriously injured, were taken to hospital. Compared to the U.S., school rampages in Germany are a rare occurrence. Since 1999, there have been 12 acts of severe targeted school violence in Germany (BMBF, 2018), while in the U.S. there were more than 230 school shootings (WP, 2023).

[2]Baden-Wuerttemberg's population size is roughly 11 million (comparable to Sweden).

reaching a ratio of more than 1.6 school social workers per 1,000 students, which is about three times higher than in the United States (Mann et al., 2019). School social workers are specially trained professionals who usually have a university degree in social work or related fields. The outreach of school social workers in Baden-Wuerttemberg is high, both for pupils and teachers. In the 2018 school year, over 20% of students had contact with school social workers in individual meetings, more than 30% participated in group work sessions, and nearly all teachers had meetings with the school social workers (KVJS, 2020). Given this support from specially trained school social workers, I expect potential benefits to students in terms of criminal behavior, victimization and education.

I find evidence that school social workers reduce youth criminal activity, and victimization rates. The funded school social work results in a 2% reduction in overall youth crime per year. The crime reductions are seen among both boys and girls, and adolescents with and without a migration background. In addition to the reduction in criminal activity, there is a significant drop in the victimization rate among adolescents, particularly due to violent crime. The presence of school social workers increases the number of victims of sexual offenses, suggesting that school social workers play a vital role in identifying them. Also funded school social work contributes to improved educational outcomes as the program reduces grade retention rates by about 1.3%. I do not find evidence on the impact of school social workers on dropout rates, or the transition from elementary schools to a *Gymnasium*, the academic track in the secondary school system that is closely linked to higher lifetime income (Dustmann, 2004). Back-of-the-envelope calculations suggest that the estimated benefits of a school social worker in terms of crime prevention and education outweigh their costs.

To test the identifying assumption (i.e., parallel trends in absence of the reform) and mitigate concerns regarding reverse causality or other time-varying confounders such as changes in policing, I conduct multiple validity and robustness checks. In particular, I show that changes in youth outcomes prior the reform do not predict changes in the number of school social workers. Additionally, I estimate a distributed lag model and demonstrate that counties with different school social worker expansion paths had similar youth crime trends prior the policy was implemented. Moreover, I test for simultaneous changes in policing by looking at crime detection rates or criminal behavior of age groups not affected by the reform, and my results suggest that no such changes happened.

While there is a substantial literature body on the impact of teachers on education (Rivkin

et al., 2005; Chetty et al., 2014; Bau & Das, 2020; Mulhern, 2023) and, more recently, on crime (Rose et al., 2022), this particular dimension of school work has been largely neglected in the quantitative literature despite its political and social relevance. There is a growing but still scarce literature examining the impact of school personnel other than teachers on youth outcomes. Weisburst (2019) analyses the impact of school police, who are tasked with safeguarding the campus and providing students with information on safety and legal issues. She finds that school police increase disciplinary rates for middle school students, and decrease both high school graduation and college enrollment rates, with the effects being largest for Black and low-income students. Mulhern (2023) examines the impact of school counselors on educational outcomes. The results show that counselors improve high school graduation and college attendance, and that the impact of counselors on educational attainment is of a similar magnitude as for teachers. Abrahamsen et al. (2023) analyse the effects of school nurses and conclude that school nurses reduce teen births, increase college attendance, and have long-term beneficial outcomes such as a reduced uptake of welfare benefits. Golberstein et al. (2023) study the impact of school-based mental health services and find that these services increase the utilization of outpatient mental health services and decrease suicide attempts. In addition, school-based mental health services have an impact on suspensions and involvement in the juvenile justice system, but not on test scores. My research focuses on school social workers, who differ from the school personnel examined in previous studies in that they provide preventive support and address a wide range of individual challenges, including academic, behavioral, familial, and health-related issues. To the best of my knowledge, this is the first paper to examine the impact of school social workers on youth crime, victimization and educational outcomes.

The paper also adds to the broader literature assessing the effects of interventions targeted at adolescents on criminal behavior and educational outcomes. Interest in interventions during adolescence is growing, as this phase has proven effective, particularly for shaping non-cognitive skills (Cunha & Heckman, 2007). The literature on adolescent interventions includes papers on mentoring programs (Rodriguez-Planas, 2012; Rodríguez-Planas, 2017; Resnjanskij et al., 2024), cognitive behavioral therapy-based programs (Heller et al., 2017), summer jobs programs (Modestino, 2019; Davis & Heller, 2020), support for relocating to better neighbourhoods (Kling et al., 2005, 2007), school choice (Deming, 2011; Deming et al., 2014; Lavy, 2021), charter schools access (Dobbie & Fryer Jr, 2015) and comprehensive student support programs outside the school (Lavecchia et al., 2020, 2024).[3] School social workers differ from the programs mentioned above in that they are either professionally

[3]For a more detailed literature overview see Lavecchia et al. (2024).

trained, or based directly within schools, which reduces barriers to student access, or are deployed universally, not only in disadvantaged schools.

This paper proceeds as follows. Section 2 presents the institutional background. Section 3 introduces the data, and provides summary statistics. Section 4 explains the empirical strategy. Section 5 presents the results, validity checks, and a cost-benefit-analysis. Finally, section 6 concludes.

2 Institutional Background

Reform-Induced Expansion of School Social Workers - Following the Winnenden shooting rampage in 2009, in which a 17-year-old boy killed 15 people at his school, a political program was launched in Baden-Wuerttemberg that provides state funding for school social work in all public schools since 2012.[4] The subsidy amounts to 16,700€ per full-time position of a school social worker; for part-time positions, the subsidy is reduced accordingly. The state funds are intended to cover a third of the costs of a school social worker position, while the remaining two thirds should be covered equally by the counties and municipalities. From 2012 until 2018, the number of social workers in Baden-Wuerttemberg's schools increased from 1,286 to 2,379, reaching a ratio of more than 1.6 social workers per 1,000 pupils, which is roughly three times higher than in the United States (Mann et al., 2019).

School social workers were already in place before 2012. In the early 1990s, the expansion of school social work concentrated exclusively on schools with special pedagogical and social tasks. In 2000, school social work was funded by the state for the first time, but the focus remained on so-called at-risk schools, including Hauptschulen, special schools and the vocational preparation year at vocational schools. Due to financial constraints, state funding for school social workers in at-risk schools was discontinued in 2005. While the number of school social workers continued to increase marginally in the following years, a substantial expansion did not occur until 2012. That year, the new state government resumed funding, but with a change in content. The goal of the funding was now to expand school social work in all schools, not just in at-high-risk schools. In total, 69% of all public schools participate

[4]There were some other policy reforms introduced directly after the rampage, such as special alarm systems in schools, and more restrictive gun laws. With respect to the gun laws, the minimum age for shooting large-caliber weapons was raised from 14 to 18. Additionally, firearm owners had to accept inspections of their gun storage without suspicion. Given these highly targeted reforms and their direct introduction in 2009, I do not expect these reforms to confound my results on education, crime and victimization.

in the state program. While approximately 90% of all Gymnasien and Realschulen have a school social worker, only 55% of primary schools do (KVJS, 2020).[5] Not only the quantitative expansion of school social work is pushed since 2012, also the quality of school social work is promoted by offering school social workers expert advice, training, and possibilities to exchange experiences (KVJS, 2018). Today, school social work is regarded as a quality feature of a school.

To benefit from the funding for school social workers, a school has to first report a need for school social workers to the public school provider (i.e. municipalities). The municipal council then discusses the necessity and financial possibility of funding school social work. If the decision is positive, public school providers must submit funding applications for a school social worker for the upcoming school year[6] by no later than July 31. The grant is approved for one school year upon application, and the approval process is promptly provided, with funds disbursed by the Ministry of Social Affairs and Integration.[7] The funds are then paid out in the summer semester, and only once the position has actually been filled and the Municipal Association for Youth and Social Affairs (KVJS) has been informed of the name, qualifications and actual scope of the assigned school social worker in the respective funding period. To receive state funding, new school social workers have to hold a university degree in social work, social pedagogy or comparable courses of study in the field of social services (KVJS, 2020). In addition, school social workers should have their own office in the school where they can hold confidential discussions (e.g. not next to the teacher's room).

Hence, hiring of school social workers should mainly depend on three factors: Firstly, whether the schools register a need for school social workers, secondly, whether the need is recognized by the local parties, and thirdly, the financial possibilities of a municipality to finance school social workers. The financial situation of a county might play a particularly important role in the hiring decisions and consequently in the different expansion of school social workers across counties. As the state funding for school social workers was initially limited for a two-year-period, the local authorities had to ensure that they could continue to finance the

[5]These figures relate to the positions requested for the year 2019/2020. For comparison: In the first year of funding (2012/13), 44% of all public schools were in the state program, including 45% of all Gymnasien, 76% of all Realschulen and 32% of all primary schools.

[6]The school year usually starts in the beginning of September

[7]School social workers are not in the responsibility of the Federal Ministry of Education in every state in Germany. In the case of Baden-Wuerttemberg, the Ministry of Social Affairs supports measures of school social workers within the realm of youth welfare. The execution of youth welfare, including school social work, is delegated to the authorities in the respective counties. There are 46 youth welfare offices as the local authorities, and the Municipal Association for Youth and Social Affairs (KVJS) is the the supra-local authority.

positions after that. This initially limited funding prevented some municipalities from hiring the desired number of school social workers. In addition, the funding of €16,700 per full-time position has not been increased since 2014, meaning that the state can no longer maintain the intended one-third contribution to school social worker funding outlined during the reform's introduction. Thus, counties and municipalities have to finance the position of school social workers by more than two-thirds, making it more difficult to hire school social workers. Furthermore, due to funding difficulties, school social workers are often only employed on a temporary basis. Temporary positions make it difficult to find suitable staff. To better understand if the local financial situation or other factors drive the expansion of school social workers, I regress the post-policy change in the number of school social workers per 1,000 students separately on various county-level economic and socio-demographic characteristics measured in 2011, prior to the policy. The financial situation of the counties, as indicated by revenues and debts, appears to be uncorrelated with the expansion of school social workers. Similarly, there is no correlation with the need for school social workers, as proxied by the (youth) unemployment rate and dropout rates, or with the recognition of this need by local parties, as measured by the vote shares of either the conservative or social party. However, a higher share of migrant students (significant only at the 10% level), a higher disposable income, and a higher level of school social workers prior the reform are associated with a lower rate of expansion (see Table B.2 column (1) in the Appendix). When adjusting the p-values for multiple hypotheses, only the negative correlation between the number of school social workers prior the reform and the change in school social workers remains significant (see Table B.2 column (2)). Additionally, I also regress the level of school social workers separately on county-level characteristics and time and year fixed effects. The findings indicate that none of the variables are statistically significantly associated with the expansion of school social workers (see Table B.2 column (3) and (4)). Next, I follow Pei et al. (2019) and use controls as dependent, rather than independent variables, to examine whether the expansion of school social workers is correlated with various county-level outcomes. I again find evidence that these outcomes are not related to the expansion of school social workers (see Table B.2 column (5)). Together, the results suggest that the large set of county characteristics fail to predict the expansion of school social workers. Nonetheless, I control for these factors in my main specification.

Activities, Outreach and Background of School Social Workers - School social work includes one-on-one support for individual problems for students as well as group work and projects with school classes. The most common issues discussed in one-on-one support are difficulties at school, conflicts with teachers, parents, or other students, mental health prob-

Table 1: Supply and demand of selected activities over time

	One-to-one support	Protection of child maltreatment	Support teachers	Support parents	Group work with classes
2018/19	225,717	5,579	131,240	62,383	351,362
2016/17	178,055	4,471	101,022	51,820	497.379
2014/15	127,188	3,807	73,304	40,611	221,509
2012/13	110,248	3,685	67,630	38,166	165,079

Notes: The numbers are from reports from the KVJS (e.g. KVJS, 2020).

lems, personal development issues such as low self-esteem, criminal and violent behaviour, and future prospects. The focus of the group work is on promoting social skills and the ability to resolve conflicts. Also, issues such as bullying, violence, addiction, and educational orientation are addressed. Group work and projects often serve as preventive measures. However, group projects with school social workers are also conducted in case of troubles in the classroom (KVJS, 2018). Furthermore, school social workers are obligated to conduct risk assessments if they become aware of substantial indications of child maltreatment (KVJS, 2020). The support of school social workers extends beyond students to include teachers and parents as well. Parents may contact school social workers voluntarily, or the social workers may reach out to parents—with the students' consent—to address concerns. They conduct sessions with parents in both their school offices and at home. Furthermore, school social workers collaborate with the youth welfare office and other professional services to provide comprehensive support for students and their families.

The scope and use of these selected activities have increased steadily and have roughly doubled since 2012 (see Table 1). In the 2018/19 school year, around 20% of all pupils had a one-on-one meeting with school social workers, and almost a third of pupils had contact with school social workers as part of group work. For more than 5,500 pupils a risk assessment of child maltreatment was conducted. Furthermore, nearly all teachers had interactions with school social workers (KVJS, 2020).

In the majority of schools (77%), there is only one school social worker employed. School social workers can work in up to three different schools. In the school year 2018/19 most school social workers (68%) were assigned to a single school, while 25% worked at two schools, and 7% served at three locations. Since the reform, new school social workers must have a college degree in social work, social pedagogy, or related fields to receive state funding, meaning almost all school social workers held such qualifications. Around 75% of these professionals were female, and 13% had a migration background. On average, school social workers were 41 years old and had approximately six years of experience (KVJS, 2020).

Expected Effects of School Social Work - Because school social work provides a wide range of services, there are many ways in which the expansion of school social work might impact the students. First, school social workers might reduce juvenile crime. School social workers can directly influence juvenile delinquency by actively working with students on behavioral issues such as violence, bullying and drugs in one-on-one and group work sessions. Also, addressing criminal behavior of individual students might spill-over to other students as youth crimes are often committed together (Billings et al., 2019; Padilla-Romo & Peluffo, 2023). Furthermore, school social workers indirectly influence juvenile delinquency, if school social workers improve educational outcomes. Research shows, for example, that dropping out of high school or grade retention can lead to criminal behavior (Bjerk, 2012; Sweeten et al., 2009; Eren et al., 2022).

Second, school social workers have the potential to influence victimization in two key ways. They can reduce victimization by mitigating a student's own violent behavior, thereby reducing his or her vulnerability to victimization, or by minimizing the presence of violent peers, thereby reducing the risk that non-violent youth will become victims. Also, since school social workers conduct risk assessments and discuss students' problems, they might identify victims, such as those experiencing abuse or violence at home. This would lead to an increase in reported victimization rates in the short-run, given the high prevalence of unreported cases.

Third, school social workers can positively impact educational outcomes. School social workers actively work with students who are struggling in school, who have problems at home or who use substances. Their support can reduce school absenteeism, which in turn leads to lower grade retention or dropout rates (Aucejo & Romano, 2016; Liu et al., 2021). Since school social workers collaborate with teachers and reduce their workload, also absenteeism of teachers might be reduced, leading to better educational outcomes for students (Herrmann & Rockoff, 2012). Moreover, the one-on-one meetings with students displaying disruptive or violent behavior, along with group work aimed at improving social skills, have the potential to positively influence the classroom climate. An enhanced classroom climate creates an environment where teachers can concentrate on instruction without the need to address behavioral issues among students, leading potentially to better educational outcomes (Rivkin & Schiman, 2015; Andersen et al., 2016).

3 Data and Summary Statistics

To analyse the impact of school social work on education, crime and victimization, I merge data on school social workers from the Municipal Association for Youth and Social Affair (KVJS) with unique data on crime from the State Office of Criminal Investigation, and data on educational outcomes from the State Statistical Office of Baden-Wuerttemberg at the county level.

School Social Work - Data on the number of school social workers for Baden-Wuerttemberg come from the KVJS. For the school years 2006/07 to 2018/19[8], I have the number of school social workers in full-time equivalents at the county level. To build the key variable of interest, the number of school social workers per 1,000 students, I merge the school social workers to administrative data on the number of students at the county level. Table 2 shows that in 2006, the number of school social workers was rather low at 0.43 school social workers per 1,000 students. In the following years, the number of school social workers increased slightly, but it is only since the policy reform that the number of school social workers has risen sharply. In 2012, the first year of the reform, the number of school social workers climbed to 0.97. By 2018, the number of school social workers had more than doubled to 1.66 compared to 0.72 in 2011, the last year before the reform. While all counties increased the number of school social workers, the expansion in school social workers varies across counties. Figure 1 presents school social worker per 1,000 students across the counties in 2011 (pre-reform) and 2018 (post-reform). While the average number of school social workers was below 1.05 for the majority of counties in 2011, almost all counties had more than 1.05 school social worker per 1,000 students in 2018, with notable regional differences in the rate of expansion[9] (see Figure 2).

Crime - The administrative crime data come from the State Office of Criminal Investigation of Baden-Wuerttemberg. The data include all police reported cases from Baden-Wuerttemberg from the school year 2006 to 2018.[10] For all criminal cases, I have detailed data on the type, date, and the location of the crime, as well as information on gender and age of both the victim and the suspect and their relationship to each other. Moreover, I have information about the suspects' location of residence but not their school location. To

[8]The number of school social workers are collected per school year. In Germany, the school year usually begins in September.

[9]see chapter 2 for a discussion of the factors associated with the expansion of school social workers.

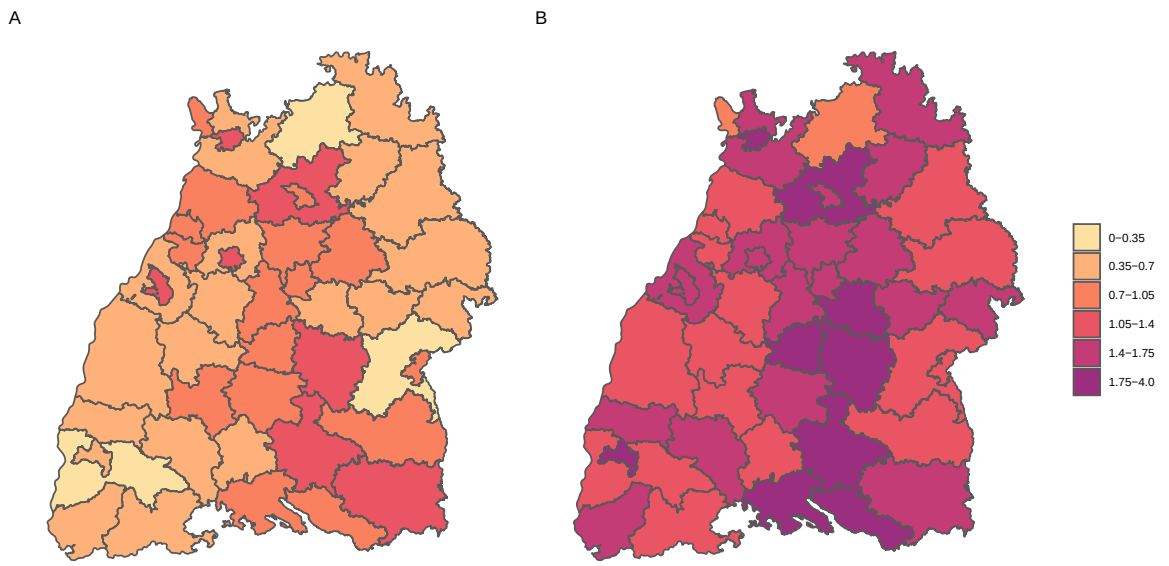
[10]Since the data on school social workers refers to a school year, I aggregate the number of crimes by school year (school always starts in September, e.g. the year 2018 starts on 09/09/2018 and lasts until 10/09/2019. The exact dates are varying each year.)

Table 2: The number of school social workers over time

Year	Mean	Median	S.D	Min	Max
2006	0.43	0.41	0.22	0.09	1.25
2008	0.58	0.55	0.22	0.19	1.02
2010	0.67	0.65	0.26	0.16	1.16
2012	0.97	0.95	0.28	0.41	1.44
2014	1.24	1.22	0.28	0.75	1.79
2016	1.52	1.46	0.40	0.86	3.20
2018	1.66	1.56	0.39	0.95	3.17
Total	1.01	0.97	0.53	0.09	3.52

Notes: The table shows the average number of school social workers per 1,000 students across counties in the state Baden-Wuerttemberg, and standard deviations, median, minimum, and maximum values. While I only show binomial years, the data is provided for years 2006-2018. The policy reform was first introduced in the year 2012.

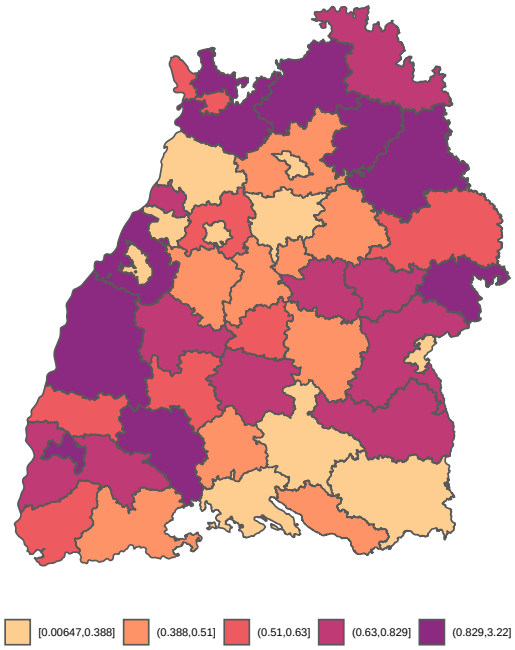
Figure 1: The number of school social workers by county



Notes: The left panel shows the number of school social workers per 1,000 students 2011, the right panel shows the number of school social workers per 1,000 students 2018.

capture the students that attend school and interact with social workers in the same county where the offense occurs, I restrict the dataset to suspects who commit crimes in their county of residence, as almost all students attend school within their home county (Statistis-

Figure 2: Expansion of school social workers over time by county



Notes: The figure shows the change in the number of school social workers per 1,000 students from 2012 to 2018 by county.

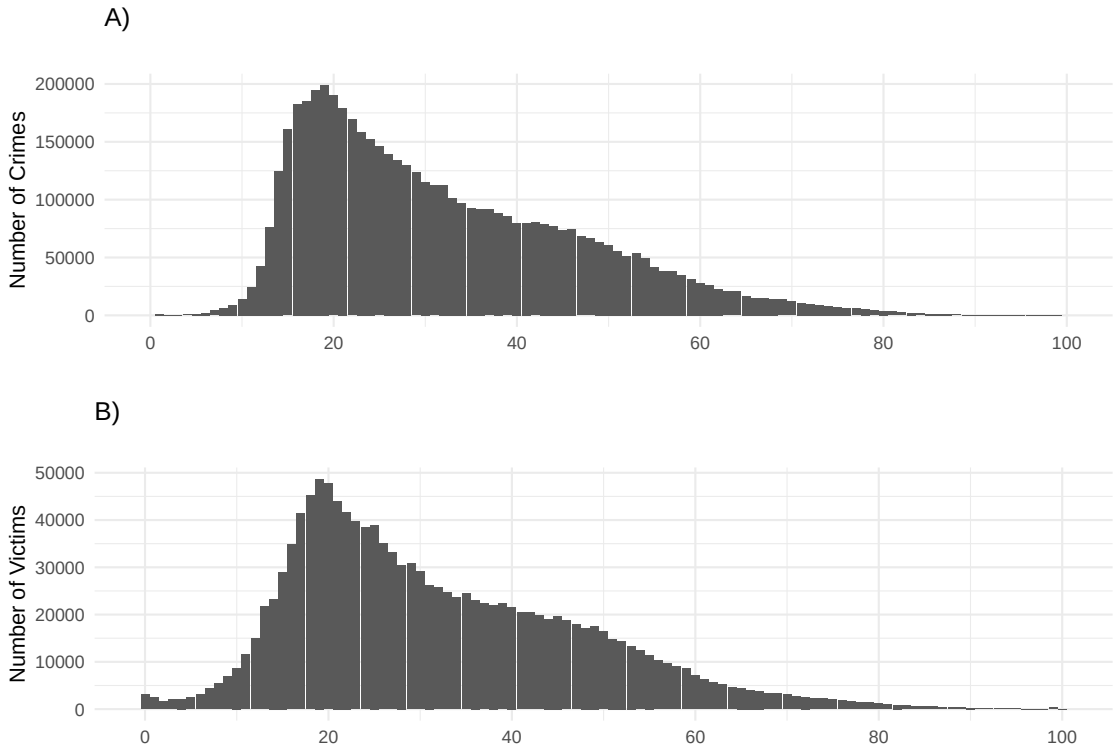
ches Landesamt Baden-Württemberg, 2017).[11] For the observation period, I observe around 3,5 million crimes, including about 800,000 committed by individuals under the age of 19, and more than 1,4 million victims. The number of crimes committed increases considerably during the teenage years, peaks at the age of 19 and then decreases again (see Figure 3 Panel A)). Victimization also shows a similar pattern: it increases during the teenage years and decreases thereafter (see Figure 3 Panel B)). Persons under the age of 19 account for more than 30% of offenders in property offenses, 27% in violent offenses and 20% in drug offenses.[12]

Education - I obtain data on educational outcomes at the county level from 2006 to 2018 from the State Statistical Office of Baden-Wuerttemberg. More specifically, I measure educational outcomes by grade retention and dropouts rates, as well as transition rates of

[11]The effects remain unchanged if I do not restrict my sample so that the county of residence matches the county of the crime scene.

[12]See Table B.1 for a overview of types of crimes. As individuals can be convicted of more than one type of offense, these main categories are not mutually exclusive.

Figure 3: Perpetrators and victims by age



Notes: This figure illustrates A) the number of crimes committed by age and B) the number of victims by age during the entire observation period 2006-2018.

children from elementary school (4th grade) to *Gymnasium*. The *Gymnasium* represents the academic track in the secondary school system, and attending a *Gymnasium* is strongly associated with university education and higher lifetime income (Dustmann, 2004). On average, 42% of students go to a *Gymnasium* after elementary school, up to 2% of students have to repeat a grade, and 5% of students drop out of school each year, meaning they leave secondary school without a diploma.

Additional County Level Information - The data set also includes further county level information for the years 2006 to 2018 sourced from the State Statistical Office of Baden-Wuerttemberg. This additional county level data encompasses the population by age, the number of students, the share of migrant students, population density, GDP per capita, the disposable household income, the unemployment rate, interpolated vote shares for political parties in the municipal elections, revenues, debts, and the number of teachers.[13]

[13]Data for the last three variables is unavailable for the entire observation period (2006-2018).

4 Empirical Strategy

I exploit the spatial and temporal variation of the policy-induced increase in school social workers in a generalized difference-in-differences design along the lines of the following regression equation:

$$Y_{\mathrm{ct}} = \beta s_{ct} + \varphi_c + \tau_t + \gamma X_{ct} + \varepsilon_{\mathrm{ct}}, \tag{1}$$

where Y_{ct} is either the crime rate, the victimization rate, or education outcomes. To be more precise, the crime rate measures the number of crimes committed per 1,000 people in the same age category within a specific county c and year t.[14] The victimization rate is defined as the number of victims per 1,000 people in the respective age category per county c per year t. s_{ct} is the number of social workers per 1,000 pupils in county c in year t, ϕ_c are county fixed effects, that account of time-constant differences between counties, and τ_t are year fixed effects that account for state-wide shocks. In addition, I include time-varying county level control variables X. I add the share of migrant students as well as the disposable household income as their pre-policy levels are correlated with the expansion of school social workers (see section 2). Also, I control for the unemployment rate, GDP per capita, population density, and the political power at the local level by adding the vote share of a Conservative party at the county level[15], as these variables may play an important role in the decision to expand school social work, and may also be correlated with youth outcomes. Controlling for the number of teachers per 1,000 students may also be important, as teachers might correlate with social workers and also affect education and youth delinquency (Rose et al., 2022).[16] However, data on the number of teachers on the county level is only available since 2009. In order not to lose too many observations, I do not include the number of teachers in the main regression, but use them in a robustness test to show that the effect size and significance

[14] Crime rates are generally measured as the number of crimes per 100,000 individuals. Given that I am examining the effect of adding one school social worker per 1,000, I maintain this approach for consistency.

[15] Replacing the Conservative Party with the Social Party at the county level does not affect the result.

[16] Another important control variable could be the number of social workers employed in open youth work rather than in schools, as they may influence youth development and their numbers could potentially decline following the introduction of school-based social workers. Unfortunately, I do not have data necessary to address this concern. However, some county-specific regulations stipulate that no open youth work positions may be reduced for newly created school social work positions. Therefore, I expect that the results will not change depending on the inclusion of social workers in open youth work. Similarly, it would be important to control for the number of school psychologists, but county-level data on this is again unavailable. Given that the overall number of school psychologists in Baden-Wuerttemberg is low—only 12% of schools employed one in 2019, compared to nearly 70% that had at least one school social worker—the omission of school psychologists is not much of a concern.

remain unchanged.[17]

The identifying assumption is that conditional on year and county fixed-effects and the set of time-varying county control variables, there are no further unobserved characteristics of a county that vary over time and are correlated with the expansion of school social workers and changes in my outcome variables. One natural concern would be that counties that are experiencing a strong rise in youth crime also employ more school social workers to combat it. If this is the case, my effects would be too conservative. As already shown in section 2, the pre-policy level of youth crime is uncorrelated with the expansion of school social workers. Furthermore, in section 5.2 I test whether a change in youth crime rates prior the reform influences the expansion of school social workers. Additionally, I estimate a distributed lag model and test whether future expansions (leads) predict reductions in crime rates. A further concern would be that counties that are particularly committed to combating crime employ more school social workers and also change their policing. To alleviate such concerns, I examine changes in police activity by using detection rates as a proxy. Additionally, I use a placebo age group (i.e. individuals of a certain age that should not be affected by school social workers), and conduct both a difference-in-differences and triple-differences regression. All these validity checks support my identifying assumption.

This specification of difference-in-differences has a continuous treatment, comparing high- and low-expanding counties. In this type of difference-in-differences models, an additional identifying assumption is that the "average treatment effect function" does not vary with the dose of treatment. Low-dose units serve as the counterfactual outcomes for high-dose units. I must assume that high-dose units would have had the same treatment effects, in addition to untreated potential outcomes, as the low-dose groups. This assumption is likely satisfied if the treatment dose is not correlated with other observed variables (Callaway et al., 2024; Cook et al., 2023). To check whether the treatment dose is uncorrelated with observed factors, I regress the number of school social workers on each specific time-varying characteristics included in my main model, and find no evidence of correlations (see section 5.2).

[17]The other county-level characteristics listed in Table B.2 (debts, revenue, and youth unemployment rate) are not included as control variables due to the unavailability of data for the entire observation period.

5 Results

5.1 Baseline Results

Table 3: The impact of school social workers on crime

	(1)	(2)	(3)	(4)	(5)
	All	All	Property Crime	Violent Crime	Drug Crime
Social Worker	−8.737***	−9.811***	−6.075***	−1.284***	−0.474
	(2.125)	(1.799)	(1.417)	(0.343)	(0.565)
Mean	58.63	58.63	29.08	4.87	5.59
Num.Obs.	572	572	572	572	572
Std.Errors	County	County	County	County	County
County	X	X	X	X	X
Year	X	X	X	X	X
Control Variables		X	X	X	X

Notes: This table shows the results of the generalized difference-in-differences regression in equation (1). The outcome variables are defined as the number of crimes per 1,000 people in the respective age category per county. Control variables include the county's unemployment rate, GDP per capita, disposable household income, population density, the interpolated vote share at the local level, and the share of migrant students. Standard errors in parentheses are clustered at the county level. *p<0.1; **p<0.05; ***p<0.01.

I start with the generalized difference-in-difference-regression (see equation (1)), but without any control variables, and find that the presence of school social workers contributes to a notable decline in youth crime. Adding one additional school social worker per 1,000 students, effectively doubling the current staff, reduces the number of crimes among 10-18 year olds by around 8.7 per 1,000 individuals in that age range (Table 3, columm (1)). In column (2), I further include time-varying control variables at the county level and show that the results hardly change: One additional school social worker per 1,000 students lowers the number of crimes among 10-18 year olds by around 9.8 per 1,000 individuals in that age range, which corresponds to a decrease of more than 16% compared to the mean value.[18] Given that the reform increased staffing by an average of 0.13 school social workers per 1,000 students annually, the program resulted in an estimated 2% reduction in youth crime per year (0.13*16). Table 3 breaks crime incidence further down by crime types. The introduction of an extra school social worker per 1,000 students leads to a significant reduction of over 20% in property crimes and violent crimes for 10-18 year olds. As the number of school social workers increases on average by 0.13 per year, this corresponds to a decline in property and violent crime of more than 2.6% per year due to the funded school social workers. Table B.3 in the Appendix shows that the decrease in property crime can be attributed to a decrease in thefts, damage to property and forgery of documents. The decrease in violent crimes

[18]To put the size of the effect in a different perspective: Crime participation decreases by 8.4% and crime incidence by about 13.5% in counties at the 75th percentile of the treatment distribution compared to counties at the 25th percentile.

is primarily due to a decrease in aggravated assaults. Overall, the findings suggest that if the program resulted in the addition of one school social worker per 1,000 students, the impact is considerable and in line with previous research. For example, studies examining policies like raising the minimum legal school dropout age show that arrests decrease by 6% to 17.2% (Bell et al., 2022; Anderson, 2014). Fischer & Argyle (2018) find that students with a four-day school week instead of a five-day school week experience about a 20% increase in juvenile criminal offenses. Villa (2024) reports that adolescents commit 14% more crimes following austerity-induced closures of youth clubs in London.

Table 4: The impact of school social workers on victimization

	(1)	(2)	(3)	(4)	(5)	(6)
	Perpetrator: Adolescent			Perpetrator: Adult		
	All	Violent Crime	Sex Offense	All	Violent Crime	Sex Offense
Social Worker	−1.261***	−0.733***	0.057	−0.326	−0.209***	0.188**
	(0.363)	(0.205)	(0.084)	(0.198)	(0.070)	(0.090)
Mean	7.436805	2.372732	0.4821087	4.54873	0.7306213	0.7807444
Num.Obs.	572	572	572	572	572	572
Std.Errors	County	County	County	County	County	County
County	X	X	X	X	X	X
Year	X	X	X	X	X	X

Notes: This table shows the results of the generalized difference-in-differences regression in equation (1). The outcome variables are defined as the number of victims per 1,000 people in the respective age category per county. Control variables include the county's unemployment rate, GDP per capita, disposable household income, population density, the interpolated vote share at the local level, and the share of migrant students. Standard errors in parentheses are clustered at the county level. *p<0.1; **p<0.05; ***p<0.01.

In a next step, I investigate the impact of school social workers on victimization.[19] It is essential to consider not only the perpetrators but also the victims as victimization has adverse consequences for physical and mental health, labor market outcomes (Bindler & Ketel, 2022; Bindler et al., 2020), and criminal activity (Currie & Tekin, 2012). As depicted in Table 4, results suggest that school social workers reduce victimization via reducing the number of violent crimes, and are able to uncover victims of sexual offenses. When perpetrators are adolescents, the presence of one additional school social worker per 1,000 students reduces victimization rates among 10–18-year-olds by 17% for all crimes and by over 30% for violent crimes (Table 4, columns (1) and (2)). Similarly, when the perpetrator is an adult (aged 25 or older), adolescent victimization from violent crimes falls by nearly 30% (Table 4, column (5)). With an average annual increase of 0.13 school social workers per 1,000 students, the program resulted in an estimated 2% reduction in overall victimization by other adolescents and a 3.9% decrease in violent crime victimization by both juvenile and adult offenders. These findings suggest that violent crime victimization decreases both by mitigating a stu-

[19] I do not report property crimes here as victims of property crimes are not included in the police reports.

dent's own violent behavior, thereby reducing their vulnerability to victimization, and by minimizing the presence of violent peers, thereby reducing the risk of nonviolent youth becoming victims. While, I observe a significant decrease in victimization due to violent crime, I find a significant increase in the victimization of sexual offenses (Table 4, column (6)). One additional school social worker increases the victimization of sexual offenses by around 25% over the baseline. With an average annual increase of 0.13 school social workers, the program led to an estimated 3% rise in reported cases. The rise in victimization of sexual offenses could be attributed to the risk assessments conducted by school social workers, coupled with students confiding in these professionals and reporting such incidents. This finding underscores the crucial role of school social workers in identifying instances of abuse. Also, this finding aligns with recent research highlighting the importance of schools in detecting child maltreatment (Benson et al., 2025; Baron et al., 2020). For example, Baron et al. (2020) find that school closures during Covid-19 lead to a significant drop in the reporting of child maltreatment. Further exploration of the results based on the relationship between the perpetrator and the victim indicates that the observed changes in sexual offense victimization can be attributed to shifts in victimization of family members (see table B.4 in the Appendix). This result confirms my interpretation of the vital role of school social workers in detecting sexual offenses by family members and eliminates concerns that sexual offenses increase due to school social workers who commit such crimes.

Also, I explore the effects of school social workers on educational outcomes, and find that they significantly decrease grade retention. Results in Table 5 show that employing one additional school social worker per 1,000 students significantly reduces grade retention rates of older adolescents (grades 10 and above) by 0.2 percentage points, which is a 10% decrease over the baseline of 2%. Given the average annual increase of 0.13 school social workers, this implies a yearly reduction in grade retention of about 1.3%. Existing research shows that grade retention results in lower lifetime earnings and higher adult crime rates (Jacob & Lefgren, 2009; Eren et al., 2022). Consequently, the observed reduction in grade retention rates may carry long-term implications for both individuals and society. For other measures of educational outcomes, such as dropout rates, I do not find significant reductions. Also, results show no discernible impact of school social workers on transition to academic tracks after elementary school (see Table B.5 in Appendix).

Table 5: The impact of school social workers on education

	(1)	(2)	(3)	(4)
	Dropout Rate	Retention Grade 5-6	Retention Grade 7-9	Retention Grade 10-13
Social Worker	−0.001	0.001	−0.001	−0.002**
	(0.004)	(0.001)	(0.001)	(0.001)
Mean	0.05	0.01	0.02	0.02
Num.Obs.	572	572	572	572
Std.Errors	County	County	County	County
County	X	X	X	X
Year	X	X	X	X

Notes: This table shows the results of the generalized difference-in-differences regression in equation (1) using educational outcomes as dependent variables. Control variables include the county's unemployment rate, GDP per capita, disposable household income, population density, the interpolated vote share at the local level, the share of migrant students. Standard errors in parentheses are clustered at the county level. *p<0.1; **p<0.05; ***p<0.01.

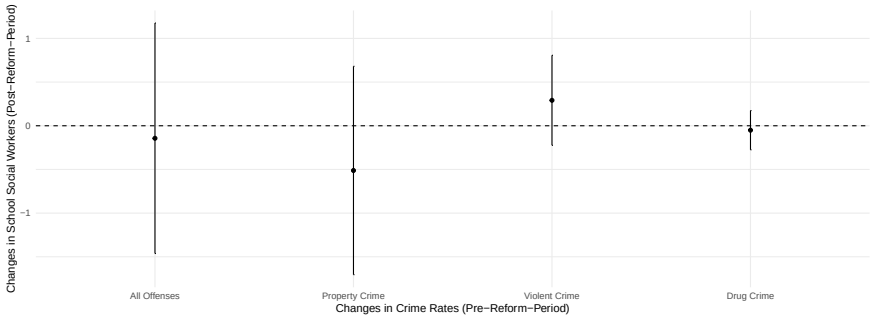
5.2 Validity Checks and Robustness Checks

The identifying assumption of the DiD approach is that conditional on year and county fixed-effects and the set of time-varying county control variables, there are no further unobserved characteristics of a county that vary over time and are correlated with the expansion of school social workers and changes in crime, victimization and education. One natural concern would be that counties that experience a strong rise in youth crime also employ more school social workers to combat it. If this is the case, my effects would be too conservative. To test for reverse causality and the parallel trends assumption, I employ two validity checks.

First, I follow Fischer et al. (2018) and estimate the impact of the change in crime rates in the pre-reform-period (i.e. 2006-2011) on the change in the number of school social workers in the post-reform-period (i.e. 2012-2018). The endogeneity concern arises if changes in crime rates during the pre-reform period are associated with changes in the number of school social workers in the post-reform period, implying that counties on specific crime trajectories may respond by hiring more school social workers. Figure 4 shows no significant impact of the change in crime rates on school social workers, providing evidence for the identifying assumption. In Figure A.1 and Figure A.2 in the Appendix I repeat this analysis for victimization rates and educational outcomes. I find no evidence of a relationship between changes in victimization rates or educational outcomes in the pre-reform-period and subsequent expansion of school social workers.

Second, I follow Schmidheiny & Siegloch (2023) and Sandner et al. (2024) and include three

Figure 4: The impact of changes in crime rates prior the reform on school social workers



Notes: This figure shows the results of a validity test, in which I estimate the changes in crime rates from 2006 to 2011 on the changes in school social workers from 2012 to 2018. Horizontal lines give the 95-percent confidence intervals.

leads and lags for the change of school social workers.[20] If future increases in school social workers (leads) are correlated with current crime, this would suggest that counties with different expansion trajectories already exhibited different crime trends before the policy. Figure 5 shows that while I find negative and significant effects for the contemporaneous and lagged coefficients, the coefficients for leads are statistically insignificant, further supporting the identifying assumption of parallel trends. In Figure A.4 and Figure A.5 in the Appendix I repeat this analysis for victimization rates and educational outcomes. I find again no evidence of future increases increases in school social workers these outcomes.

A related concern is that the observed effects are due to county-specific shocks (e.g. different trends in the expansion of police resources or in the reporting of crimes) rather than the expansion of school social workers. To alleviate this concern, I examine whether there is any change in police activity following the implementation of school social workers by using crime detection rates as a proxy. To do so, I compute the detection rates, defined as the

[20] Following Schmidheiny & Siegloch (2023) and Sandner et al. (2024), I estimate the subsequent regression:

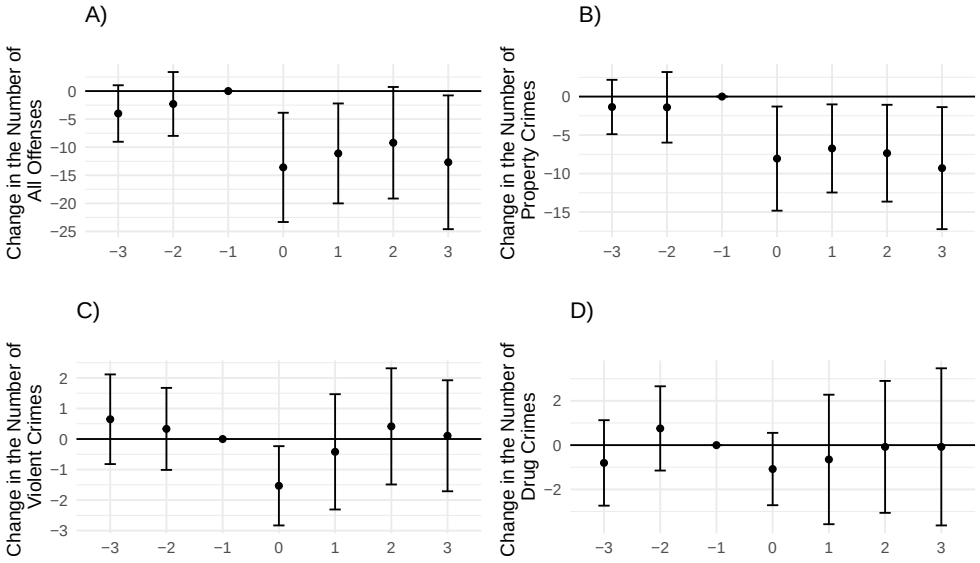
$$y_{ct} = \sum_{\nu=-3}^{3} \beta_\nu \text{Expansion school social workers}_{c\nu} + \varphi_c + \tau_t + \varepsilon_{\text{ct}}, \tag{2}$$

where the expansion in the number of school social workers per 1,000 students in each c in year t is defined as follows:

$$\text{Expansion school social workers}_{c\nu} = \begin{cases} \text{School social workers}_{ct} - \text{School social workers}_{ct(0)} & \text{if } \nu = -3, \\ \Delta \text{ School social workers}_{ct} & \text{if } -3 < \nu < 3, \\ \text{School social workers}_{cT} - \text{School social workers}_{ct} & \text{if } \nu = 3, \end{cases}$$

where the initial period, $t(0)$, is 2006 and the last period, T, is 2018. The first lead is omitted and used for normalization.

Figure 5: The impact of school social workers on youth crime: leads and lags



Notes: This figure shows the coefficients of the effect of the number of school social workers on crime rates when estimating the main regression in equation (1), excluding control variables but including the year-to-year change in school social workers as well three leads and lags of the change in the number of school social workers per 1,000 students. The first lead is omitted the last lead and lag are binned. Horizontal lines give the 95-percent confidence intervals.

ratio of crimes in which suspects are identified to the total number of crimes committed annually per county. Changes in police activity are likely to affect the detection rate, as the numerator (number of crimes in which a suspect can be identified) is likely to alter, while the denominator (number of reported crimes) is expected to remain constant, considering that the majority of crimes are reported by victims rather than by the police themselves (Blanes i Vidal & Kirchmaier, 2018). The findings in Table 6 indicate small and statistically insignificant effects of school social workers on detection rates. This suggests that the decrease in youth crime is attributed to the increased presence of school social workers and not to any changes in policing.

To further show that the effects are not simply due to changes in policing activity, I conduct a placebo estimation, in which I use crime rates of perpetrators aged 20-30 as outcome variable in my main specification in equation (1). Individuals in this age category are too old to have directly experienced school social work themselves, and likely too young to be affected by school social work of their children.[21] Significant placebo test effects would indicate that the observed effects of school social workers are due to varying time trends (e.g. increase

[21] Additionally, spillover effects of adolescents affected by school social workers on individuals aged 20-30 are less likely, as not more than seven percent of my sample consists of cases where at least one suspect is 20 or older and at least one suspect is under 19.

Table 6: The impact of school social workers on detection rates

	(1)	(2)	(3)	(4)
	All	Property Crime	Violent Crime	Drug Crime
Social Worker	0.001	−0.002	−0.005	0.005
	(0.007)	(0.005)	(0.006)	(0.004)
Mean	0.58	0.32	0.81	0.96
Num.Obs.	572	572	572	572
Std.Errors	County	County	County	County
County	X	X	X	X
Year	X	X	X	X

Notes: This table shows the results of the generalized difference-in-differences regression in equation (1). The outcome variable is the ratio of cases in which a suspect could be identified to the total number of recorded crimes per year per county. Control variables include the county's unemployment rate, GDP per capita, disposable household income, population density, the interpolated vote share at the local level, the share of migrant students, and the share of school dropouts. Standard errors in parenthesis are clustered at the county level. *p<0.1; **p<0.05; ***p<0.01.

in policing) rather than the actual policy program impacts. Table 7 shows that across all types of crimes, I find no statistically significant effect of school social workers on crime rates for perpetrators aged 20-30. This finding gives hint to the validity of my empirical approach. Additionally, I employ a triple-difference approach, incorporating age group as the third differing factor. The outcomes of the triple-difference regression (see Table B.6 in Appendix) closely resemble the main results in Table 3. They reveal insignificant effects for individuals aged 20-30, while showing negative and statistically significant effects for adolescents, which further confirms the validity of my approach.[22]

As my difference-in-differences specification has a continuous treatment, the "average treatment effect function" must not vary with the dose of treatment. This assumption is likely satisfied if the treatment dose is uncorrelated with other observed variables (Callaway et al., 2024; Cook et al., 2023). As shown in Table B.2, the treatment dose is unrelated to observed variables, such as a county's unemployment rate, GDP per capita or voting for the conservative party. The finding that county characteristics do not predict whether a county increased the number of school social workers more strongly further alleviates potential concerns of self-selection.

Additionally, I conduct robustness checks by estimating different specifications of the main

[22]I only conduct the placebo estimation and triple-difference regression for crime rates, and not for victimization rates or education outcomes. Victimization rates of people aged 19 and above can also be affected by school social workers via the reduction of youth criminal behavior. For education outcomes, suitable data is lacking.

Table 7: The impact of school social workers on crime - placebo age group (perpetrators aged 20-30)

	(1)	(2)	(3)	(4)
	All	Property Crime	Violent Crime	Drug Crime
Social Worker	0.519	−0.892	−0.102	0.716
	(2.678)	(1.041)	(0.215)	(0.500)
Mean	50.09	11.99	3.56	7.12
Num.Obs.	572	572	572	572
Std.Errors	County	County	County	County
County	X	X	X	X
Year	X	X	X	X

Notes: This table shows the results of the placebo estimation. I estimate the regression in equation (1), but with crimes committed by people aged 20-30 years as outcome variables. Control variables include the county's unemployment rate, GDP per capita, disposable household income, population density, the interpolated vote share at the local level, and the share of migrant students. Standard errors in parentheses are clustered at the county level. *p<0.1; **p<0.05; ***p<0.01.

regression equation (1), with the results shown in Table B.7.[23] In Column (1), I include administrative district-by-year fixed effects to flexibly account for time-varying shocks that may differ across broader regions. The estimated effects remain unchanged. In Column (2), I re-estimate the impact of school social workers on crime using the main regression, but with additional controls for revenues and debts. Because data on these financial variables is not available until the end of the observation period, I incorporate their baseline values and interact them with year indicators accordingly. In column (3), I estimate the effects of school social workers on crime using the main regression but including the number of teachers per 1,000 students as an additional control variable. The number of teachers is a potentially important control variable as it affects educational outcomes and crime rates and may be correlated with the number of school social workers. Since data on teachers are only available since 2009, I can estimate the main regression in equation (1) from 2009 onwards. The results do not differ depending on the inclusion of the number of teachers per 1,000 students.[24] Thus, I can rule out any omitted variable bias that might arise from omitting the number of teachers in my main regression in equation (1). In column (4), I estimate equation (1), but weight by the county population in that age range. The results are statistically significant and similar in magnitude to the main findings. In column (5), I use the log of the number of crimes per 1,000 people in that age range, instead of the level specification. The coefficient from this specification now represents a percentage effect,

[23]Robustness checks in which I estimate different specifications for victimisation and education outcomes are shown in Table B.8 and B.9, respectively.

[24]The results are also consistent with those of the main regression (equation (1)), which uses only the observation period from 2009 onwards (not shown).

enabling a direct assessment of the relative impact rather than calculating it by dividing the estimated absolute effect by the sample mean. The result is consistent with the baseline model, confirming a significant negative impact of school social workers on youth crime rates, though with a somewhat smaller magnitude.

In another robustness check, I account for potential bias that arises from students attending school in a different county than where they reside and commit crimes. Only around 5% of students in Baden-Wuerttemberg attend school outside their home county, with many commuting from rural to urban counties. To mitigate this bias I restrict the sample to only rural counties.[25] This test also assesses whether the effects are driven by differences between rural and urban areas. To further examine if the effects are driven by any specific county, I run regressions, omitting one county at a time. The results remain robust (see Figure A.6).

5.3 Heterogeneity

Intensive vs. Extensive Margin - Next, I investigate whether the overall decline in crime is due to fewer adolescents engaging in criminal activity (extensive margin), or whether it reflects a reduction in repeat offenses by a smaller number of individuals (intensive margin). To assess this, I use the number of perpetrators per 1,000 individuals in the relevant age group, rather than the number of crimes, as the outcome variable. Table B.10 shows that an additional school social worker per 1,000 students reduces crime participation by around 3.85, which constitutes a reduction of around 10% relative to the mean. As the average annual increase in school social workers was 0.13 due to the program, this translates to a reduction of crime participation of 1.4% per year. Remember, that the funded school social workers reduce the number of crimes by around 2% annually. Taking together, the results suggest that school social workers reduce both the number of perpetrators, and also the number of crimes committed per perpetrator.

Offender Characteristics - In a further step, I explore how the effectiveness of school social workers may vary based on offender characteristics. The analysis based on demographic characteristics, specifically gender, migrant status, and age group is motivated by the possibility that school social workers reach different groups differently and thus may have distinct effects. For instance, a slightly higher percentage of male students avail themselves of the counseling services provided by school social workers, and counseling appointments with

[25] In Baden-Wuerttemberg, there are 9 urban counties and 35 rural counties

teachers predominantly involve male students (KVJS, 2020), potentially resulting in greater benefits for male students. In addition, pupils with a migration background in particular could benefit from school social workers if their focus is on promoting integration. Also, school social workers may interact with adolescents distinctively during different phases of puberty. Table B.11 in the Appendix shows that the outcomes for boys closely resemble the main findings in Table 3, and this similarity can be attributed to the fact that 80% of the adolescents involved in criminal activities are male. I also find a significant decline in the number of crimes committed by girls. With regard to migrant status, school social workers significantly reduce the number of offenses committed by both German and migrant youths, with the relative effect sizes being somewhat greater for migrants. Looking at different age groups, the results suggest that school social workers significantly reduce youth crimes for all age groups. For property crimes and violent crimes a significant decrease can be observed for adolescents in the peak phase of puberty (aged 13-15) and in late puberty (aged 16-18). For adolescents aged 13-15, the program-induced expansion of school social workers also significantly reduces drug-related crime by almost 6.5% over the baseline.

County Characteristics - I also investigate differences by economic conditions of county of residence, namely disposable household income and unemployment rate of counties. Table B.12 shows that the reductions in youth crime due to school social workers are more pronounced for youth in counties with lower disposable household income, and higher unemployment rates, suggesting that their influence is more substantial for students living in relatively more disadvantaged areas.

Additionally, I analyze whether school social workers are more effective in counties with a lower ratio of teachers to 1,000 students to indirectly assess the potential substitution between teachers and school social workers. The results, shown in Table B.12, indicate that school social workers reduce youth crime in both counties with higher and lower teacher-to-student ratios, suggesting indirectly that teachers do not substitute the role of school social workers. A more compelling analysis would be comparing the impact of adding one school social worker versus one teacher, but this is not feasible in my study, and there is limited empirical research on teacher's effects on youth crime. While Rose et al. (2022) find that also teachers can significantly reduce future arrests (a one standard deviation in teacher effects reduces student's future arrests by 11% relative to the mean), they find that these effects are orthogonal to the effects of teachers on academic achievement. This suggests that the teachers who improve test scores are not the same as those who reduce criminal behavior through non-cognitive skills, and vice versa.

Location and Time of Crime - Next, I investigate whether school social workers reduce crime only within school or also outside of school environment. I leverage the fact that 92% of police records also include the exact crime locations. I categorize crime occurrences based on whether they happen at or near schools—specifically, at school or on the way to school—versus outside of school environments. Around 10% of crimes occur at school, with violent crimes representing the largest share. While I find no significant effect of school social workers on overall crime happening within the school environment, one additional school social worker per 1,000 students leads to a substantial reduction in violent crimes at school. For crimes outside of school, I observe significant decreases in total offenses, property crimes, and violent crimes, although the reduction in violent crimes is smaller compared to those occurring within the school setting (see Table B.13). This finding shows that school social workers are also effective outside school environment, and also disproves the possibility that the decline in juvenile crime is driven by school social workers resolving school-related incidents internally instead of involving the police.

In similar line, I explore whether school social workers impact youth crime rates only during the academic year, or also during the six-week-summer holidays. While school social workers are employed over the whole year, they mostly work less or not at all during summer holidays. They are expected to work overtime during the academic year to compensate for the summer holidays. Also, research shows that juvenile crime rates vary seasonally, and that particularly violent crimes and drug crimes are higher during the school year than during the summer holidays[26](Jacob & Lefgren, 2003; Luallen, 2006; Jones & Karger, 2023). Since school is in session most time of the year, the effects of school social workers on crime during the academic year are similar in magnitude and significance to those of the entire year. School social workers significantly reduce property and violent crimes committed by adolescents aged 10-18. Although school social workers usually work less or not at all during summer time, and crime rates are generally lower, they seem to still have an impact during summer holidays (see Table B.13).

5.4 Cost-Benefit-Analysis

In this section, I provide approximate estimates of the benefit-cost-ratio and the Marginal

[26]Figure A.3 in the Appendix shows that this seasonality of youth crimes can also be observed in my data. For most types of crime, there is a drop in the number of offenses after week 30, which usually marks the beginning of the 6-week summer holidays.

Value of Public Funds, a cost-benefit framework which evaluates the societal willingness to pay for a policy against the net costs to the government of introducing it.[27] These estimates are based on the example of adding one additional school social worker to a school with 1,000 students, including 200 in grades 10–13.

First of all, I assess the savings resulting from the reduction in juvenile crime. Here, I refer to Heeks et al. (2018), who outline the various costs for victims that are associated with crime prevention, property damage, physical and emotional harm, healthcare services, lost productivity, and victim support for each offense type.[28] For my cost-benefit analyses, I focus only on the offense types where I find significant reductions among adolescents, specifically property crimes (theft, property damage[29]) and violent crimes (serious bodily injury). Heeks et al. (2018) calculate that a theft costs on average 1,100€. With one additional school social worker reducing approximately 4.2 thefts per 1,000 adolescents, this results in savings of 4,600€ (1,100 * 4.2) per 1,000 adolescents. Property damage is valued at roughly 1,000€ per incident. Since an extra social worker can prevent about 1.1 property damage offenses, this translates to savings of 1,100€ (1,000 * 1.1) per 1,000 adolescents. The cost of serious bodily injury is estimated at 13,000€ per case. With one additional social worker preventing around 1.3 such offenses, this leads to savings of 16,900€ (13,000 * 1.3) per 1,000 adolescents. Beyond the reported crimes, school social workers likely contribute to additional reductions in offenses that go unreported. Surveys show that the number of unreported crimes is considerable (Dosdall et al., 2024). For example, the reporting rate for thefts is approximately 53%, suggesting that the true cost savings in thefts could be 1.9 times (100/53) greater than reported. Similarly, property damage has a reporting rate of 37%, indicating that the cost savings in property damage could be 2.7 times (100/37) higher. This translates to a total savings for property crime of approximately 11,700€. For bodily injuries, with a reporting rate of 33%, the implied cost savings is three times (100/33) higher, amounting to an estimated 50,700€. Besides the costs borne by victims, criminal activity imposes substantial public expenses on the criminal justice system, including costs for policing, courts, offender management, and juvenile custody. On average, these costs amount to around 9,000€ per offender (National Audit Office, 2011). Among all adolescents aged 10-18, one additional school social workers prevents around 3.9 offenders per 1,000

[27] Here, I follow Villa (2024) who evaluates the cost-effectiveness of youth club closures in terms of crime and education in the UK.

[28] These estimates pertain to the United Kingdom. In the absence of similar sources from Germany (Entorf, 2014), I used the UK estimates and adjusted them for conversion accordingly.

[29] I also find significant reductions in document forgery, however, I exclude it from my cost-benefit analysis due to the absence of cost estimates in the existing literature.

adolescents per year, generating approximately 35,100€ savings per 1,000 adolescents.

Second, I assess the cost savings from reduced grade retention in grade 10-13. As research suggests that grade retention, especially for older students, does not lead to long-term benefits, such as higher graduation rates or increased college degree attainment (Schwerdt et al., 2017; ter Meulen, 2023), I only take costs into account without weighting them against potential benefits. Grade retention costs the government on average around 5,000€ per repeater due to their extended time in school and the proportional expenses for teachers, teaching materials, and other resources (Klemm, 2009). Adding an additional school social worker reduces grade retention by 0.2%-points in grades 10–13, leading to a cost reduction of 2000€ per school (5,000 * 0.002 * 200). Moreover, students who repeat a grade face delayed entry into the labor market. Reducing grade retention leads to both public savings through higher tax revenues and private savings from earlier workforce entry and increased earnings. Assuming that a student who repeats a grade foregoes earnings at least equal to the current German minimum wage[30], then the forgone tax revenues amount to approximately 7,000€ annually. An additional school social worker, by reducing grade retention by 0.2%-points, generates public savings of 2,800€ per school (7,000 * 0.002 * 200). Furthermore, the earlier entry into the labor market due to reduced grade retention increases net income by an average of 19,000€. With a reduction in grade retention of 0.2%-points in grades 10–13, this results in private savings of 7,600€ per school (19,000 * 0.002 * 200).

In total, the introduction of an additional school social worker in a school with 1,000 students, including 200 in grade 10-13, yields a benefit of 96,500€ in crime prevention (accounting also for unreported cases) for the entire student body and an additional 12,400€ related to grade retention specifically for the subset of 200 students in grades 10-13. On the other hand, the introduction of an additional school social worker incurs an expenditure of approximately 50,000€[31] (see Table 8 for calculation). Thus, for every 1€ spent, the benefits to the government and society in terms of reduced crime and grade retention amount to 2.2€ under a social cost-benefit analysis, which compares total benefits (both private and public) to the costs.

I also compute the Marginal Value of Public Funds (MVPF), which compares the policy's benefits to recipients (i.e. societal willingness to pay) to the policy's net cost to the govern-

[30]The current minimum wage is 12.8€ per hour, or working full-time around 26,000€ annualy

[31]The state-level funding of 16,700€ was intended to cover a third of the total costs of one school social worker.

ment. In the numerator, which gives the societal willingness to pay, I include the private savings of reduced property and violent crimes, as well as private savings resulting from additional earnings due to earlier labor market entry. In the denominator, which shows net costs, I include costs of one school social worker per 1,000 students, incurred savings in the criminal justice system as well as government savings from reduced grade retentions, including savings from reduced school resources and increased tax revenues. For every 1€ spent by the government, there are associated savings of up to 6.9€ when adding one more school social worker to a school with 1,000 students (see Table 8). The size of the MVPF is comparable to investments in education and health of low-income children, that have historically the highest MVPFs, on average above 5 (Hendren & Sprung-Keyser, 2020).

It is important to note that the cost-benefit analyses come with limitations and should be regarded as approximate. For instance, the analyses account only for savings from reductions in adolescent crime, excluding the potential long-term benefits school social workers might have on reducing adult crime. Additionally, savings related to reductions in drug offenses are omitted from the cost-benefit analysis due to data limitations, and the analyses do not incorporate the benefits of identifying victims of sexual offenses. Effects of school social workers on other outcomes, such as mental health, or other services, like youth welfare, are also excluded. Positive spillover effects on parents and teachers are similarly neglected. Furthermore, while research shows that grade retention has no beneficial impact on older students' educational achievement—and may even have negative effects, such as increasing adult crime or dropout rates (Eren et al., 2022; Jacob & Lefgren, 2009)—these potential effects are not included in the analyses. Moreover, the estimates of increased income and tax revenue represent only a lower bound, as I assume foregone earnings from delayed labor market entry are equivalent to the German minimum wage.

Table 8: Cost-benefit analysis of school social workers

Adding one School Social Worker to a School with 1,000 Students (among them 200 in Grades 10-13)		
	Only reported crimes	**Reported + unreported crimes**
Savings from Crime Reduction		
Public Savings from Criminal Justice System	35,100 (9,000 * 3.9)	35,100 (9,000 * 3.9)
Private Savings from Property Crime (Thefts + Property Damage)	5,700 (1,100 * 4.2 + 1,000 * 1.1)	11,700 (1,100 * 4.2 * 1.9 + 1,000 * 1.1 * 2.7)
Private Savings from Violent Crime (Serious Bodily Injury)	16,900 (13,000 * 1.3)	50,700 (13,000 * 1.3 * 3)
Savings from Grade Retention Reduction		
Public Savings from Reductions in School Resources	2,000 (5,000 * 0.002 * 200)	2,000 (5,000 * 0.002 * 200)
Public Savings from Additional Tax Revenue from Earlier Labor Market Entry	2,800 (7,000 * 0.002 * 200)	2,800 (7,000 * 0.002 * 200)
Private Savings from Additional Income from Earlier Labor Market Entry	7,600 (19,000 * 0.002 * 200)	7,600 (19,000 * 0.002 * 200)
Costs for School Social Worker	50,000 Euro	50,000 Euro
Benefit-Cost-Ratio	**1.4**	**2.2**
Total Savings	70,100 Euro	109,900 Euro
Total Costs	50,000 Euro	50,000 Euro
MVPF	**3.0**	**6.9**
Willingness to Pay (Private Savings)	30,200 Euro	70,000 Euro
Net Costs (Costs and Public Savings)	10,100 Euro	10,100 Euro

6 Conclusion

This paper examines the impact of school social workers on youth crime, victimization, and education by exploiting the regional variation in the increase of school social workers induced by a policy reform in Baden-Wuerttemberg, a large state in Germany. I find that adding one school social worker per 1,000 students reduces youth crime by approximately 16%. Given that the policy increased the number of school social workers by 0.13 per 1,000 students annually, this corresponds to an annual 2% reduction in youth crime attributable to the policy program. Heterogeneity analysis reveals that school social workers affect adolescents across all demographic groups, though the effects are somewhat larger for boys, adolescents with a migration background and those aged 13-18 years. In addition, the impact on crime reduction is more pronounced in economically more disadvantaged areas. While school social workers help reduce victimization from violent crimes, they also play a role in uncovering previously unreported cases of sexual offenses. The program-induced expansion of school social workers also contributes to improvements in educational outcomes by decreasing grade retention by around 1.3%. Back-of-the-envelope calculations suggest that the estimated benefits of school social work in terms of crime prevention and education outweigh their costs. The beneficial short-term effects are likely to have long-term consequences. First, grade retention results in higher dropouts, lower lifetime earnings and higher adult crime rates (Jacob & Lefgren, 2009; Eren et al., 2022). Second, incarceration as well as victimization have detrimental costs for future health and labor market outcomes (Aizer & Doyle, 2015; Hjalmarsson, 2008; Mueller-Smith, 2015; Bindler et al., 2020). These findings emphasize the crucial role of school

personnel, beyond teachers, in shaping the outcomes of young individuals.

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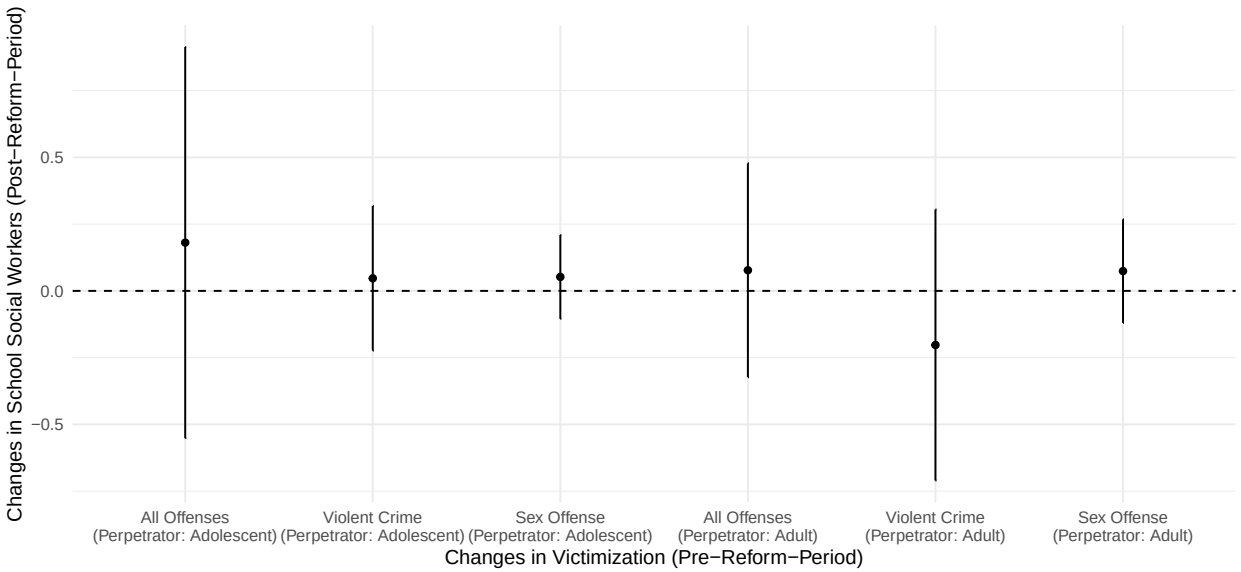
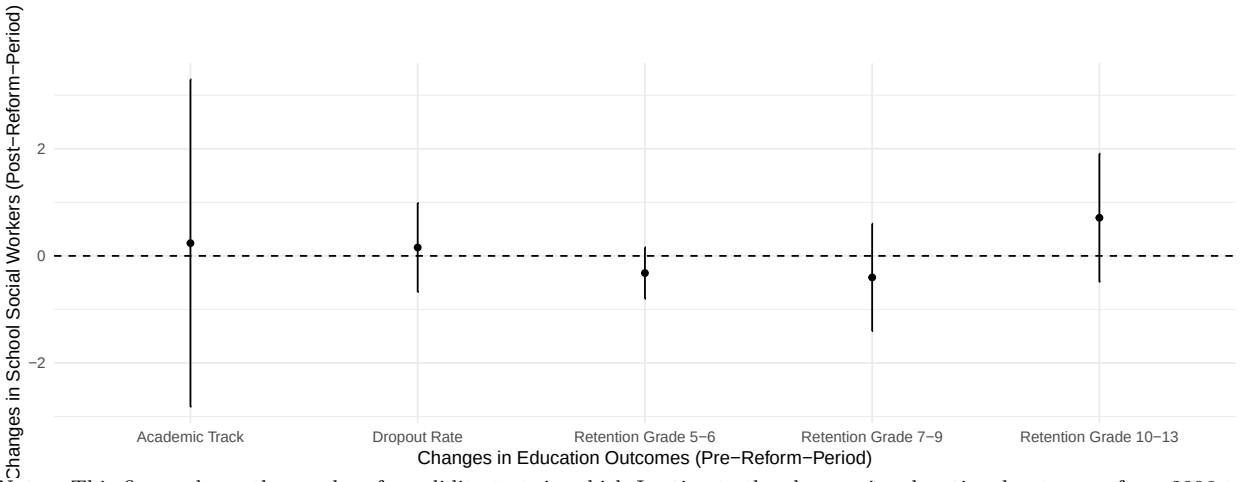
A Additional Figures

Figure A.1: The impact of changes in victimization rates prior the reform on school social workers



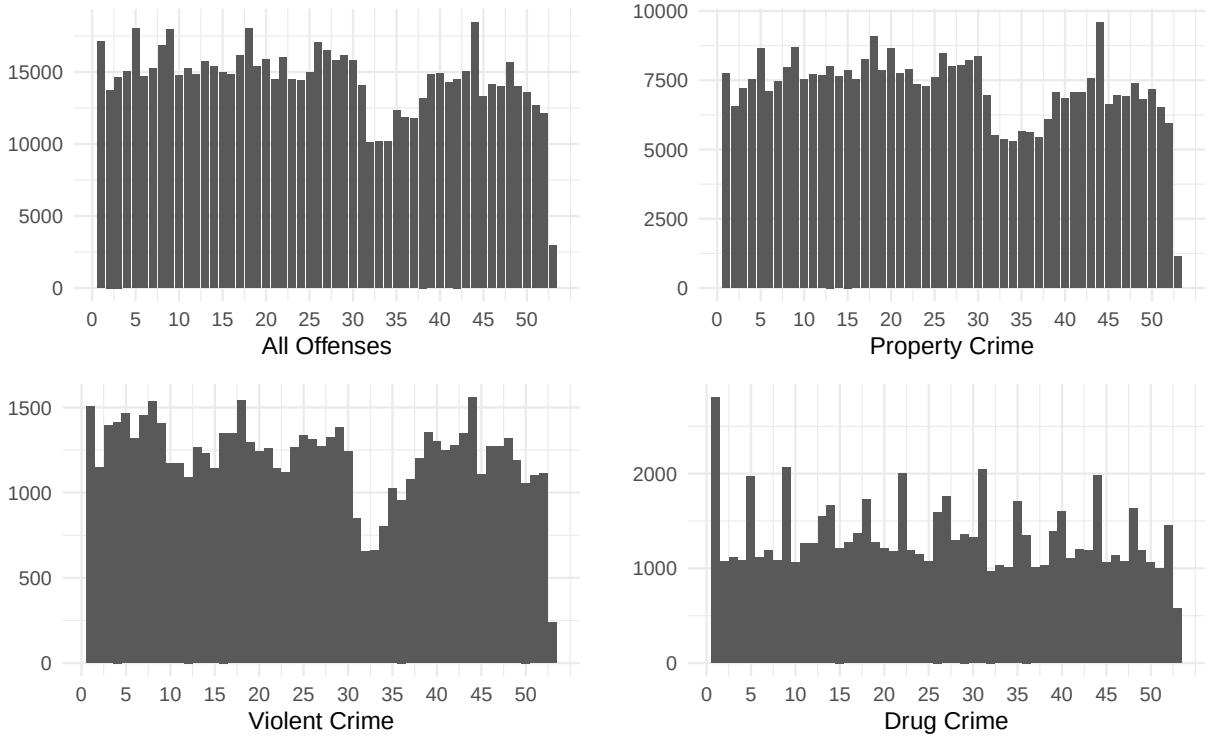
Notes: This figure shows the results of a validity test, in which I estimate the changes in victimization rates from 2006 to 2011 on the changes in school social workers from 2012 to 2018. Horizontal lines give the 95-percent confidence intervals.

Figure A.2: The impact of changes in education outcomes prior the reform on school social workers



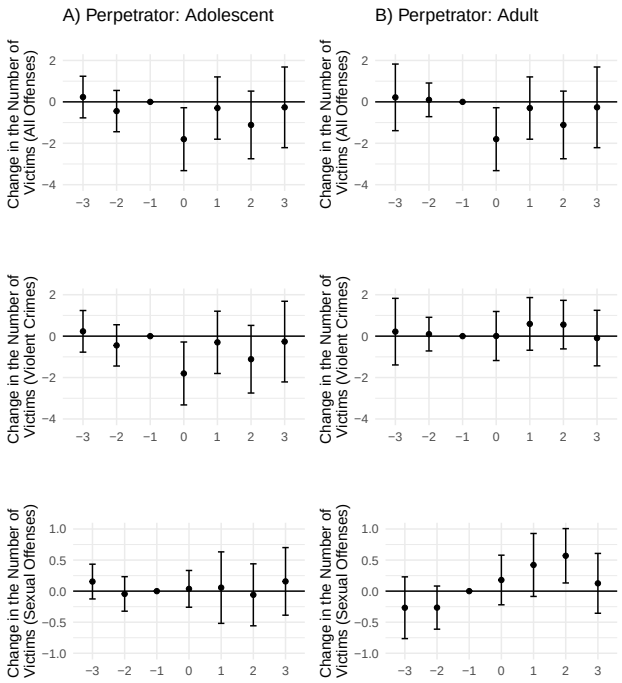
Notes: This figure shows the results of a validity test, in which I estimate the changes in educational outcomes from 2006 to 2011 on the changes in school social workers from 2012 to 2018. Horizontal lines give the 95-percent confidence intervals.

Figure A.3: Seasonality of crimes



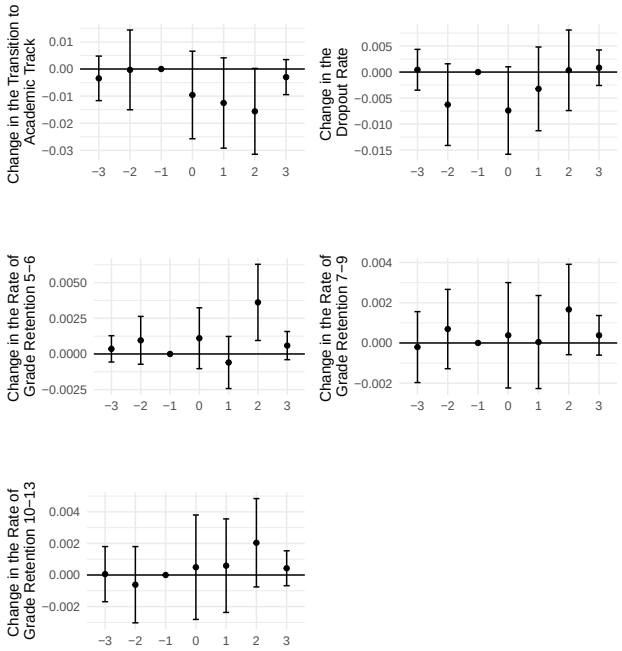
Notes: This figure illustrates the number of crimes per week of the year during the whole observation period 2006-2018.

Figure A.4: The impact of school social workers on victimization: leads and lags



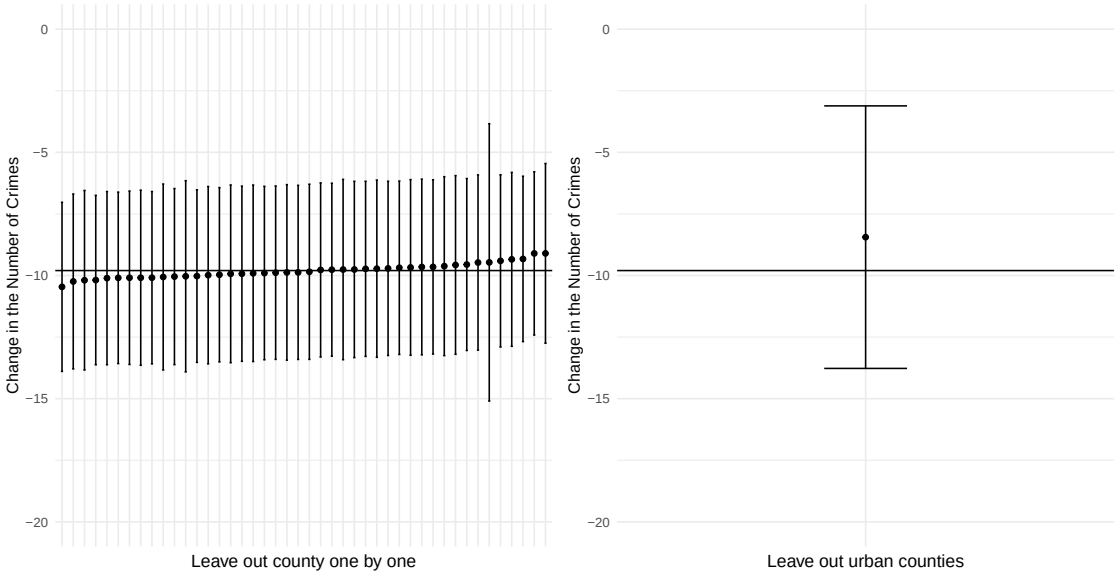
Notes: This figure shows the coefficients of the effect of the number of school social workers on victimization when estimating the main regression in equation (1), excluding control variables, but including the year-to-year change in school social workers as well three leads and lags of the change in the number of school social workers per 1,000 students. The first lead is omitted the last lead and lag are binned. Horizontal lines give the 95-percent confidence intervals.

Figure A.5: The impact of school social workers on education: leads and lags



Notes: This figure shows the coefficients of the effect of the number of school social workers on educational outcomes when estimating the main regression in equation (1), excluding control variables, but including the year-to-year change in school social workers as well three leads and lags of the change in the number of school social workers per 1,000 students. The first lead is omitted the last lead and lag are binned. Horizontal lines give the 95-percent confidence intervals.

Figure A.6: Robustness to specific counties



B Additional Tables

Table B.1: Types of crimes

• Property crime: thefts, trespassing, property damage, arson, forgery of documents
• Violent crime: murder, rape and sexual assault, robbery, serious bodily injury
• Drug crime: use, possession, and trafficking of drugs
• Sex offense: rape, sexual assault, sexual abuse, sexual harassment, exhipitionist acts and public nuisance, dissemination of child and youth pornography

Table B.2: County-level characteristics and the change of school social workers

	(1)	(2)	(3)	(4)	(5)
Unemployment Rate	-0.21	-0.21	0.06	0.06	0.015
	(0.15)		(0.13)		(0.051)
Youth Unemployment Rate	-0.18	-0.18	0.11	0.11	0.083
	(0.15)		(0.09)		(0.064)
Conservative Party Voting	0.12	0.12	0.01	0.01	-0.002
	(0.15)		(0.24)		(0.063)
Social Party Voting	0.08	0.08	-0.03	-0.03	-0.035
	(0.15)		(0.10)		(0.046)
Share Migrant Students	-0.28*	-0.28	0.20	0.20	0.081
	(0.15)		(0.17)		(0.093)
Pop Density	-0.17	-0.17	1.54	1.54	0.009
	(0.15)		(1.28)		(0.007)
GDP per Capita	-0.21	-0.21	-0.28	-0.28	-0.037
	(0.15)		(0.19)		(0.027)
Disposable Income	-0.34**	-0.34	0.03	0.03	0.02
	(0.15)		(0.10)		(0.035)
Revenues per Capita	-0.22	-0.22	x	x	x
	(0.15)		(x)		(x)
Debts per Capita	0.14	0.14	x	x	x
	(0.15)		(x)		(x)
Share of School Dropouts	0.17	0.17	x	x	x
	(0.15)		(x)		(x)
Crime Rate	-0.11	-0.11	x	x	x
	(0.15)		(x)		(x)
Youth Crime Rate	-0.18	-0.18	x	x	x
	(0.15)		(x)		(x)
Teachers per 1,000 Students	0.04	0.04	-0.02	-0.02	0.033
	(0.15)		(0.10)		(0.051)
School Social Workers per 1,000 Students	-0.55***	-0.55***	x	x	x
	(0.13)		(x)		(x)

Notes: Column (1) shows the regressions of the post-policy change in school social workers on each pre-policy control variable separately (using 2011 data for all variables, except for debt, where 2009 is used as it represents the last year of available observations). Column (2) shows the coefficients with p-values adjusted for multiple hypotheses. Column (3) shows the regressions of the levels of school social workers on the county-level characteristics separately including county and year fixed effects. Column (4) shows the coefficients with p-values adjusted for multiple hypotheses. Column (5) reports regressions of each county-level characteristic separately on the levels of school social workers and other county-level control variables (excluding the dependent variable), with county and year fixed effects. In column (3)-(5), a regression using revenues or debts as independent variables is not feasible because the data is only available up to 2014 and 2009, respectively. Also, I do not run a regression with the share of dropouts, and (youth) crime rates, as they might be an outcome themselves. In all columns, the dependent and independent variables are standardized to have mean value of 0 and a variance of 1. *p<0.1; **p<0.05; ***p<0.01.

Table B.3: The impact of school social workers on crime - sub categories

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Property crime					Violent crime			
	Thefts	Property damage	Trespassing	Forgery	Arson	Murder	Rape and sexual assault	Robbery	Serious bodily injury
Social Worker	−4.166***	−1.111**	−0.241	−0.501***	−0.055	−0.031	0.043	−0.014	−1.277***
	(1.224)	(0.497)	(0.192)	(0.171)	(0.077)	(0.019)	(0.030)	(0.232)	(0.451)
Mean	20.34	6.69	1.13	0.65	0.27	0.03	0.17	0.82	3.91
Num.Obs.	572	572	572	572	572	572	572	572	572
Std.Errors	County	County	County	County	County	County	County	County	County
County	X	X	X	X	X	X	X	X	X
Year	X	X	X	X	X	X	X	X	X

Notes: This table shows the results of the generalized difference-in-differences regression in equation (1). The outcome variables are defined as the number of crimes per 1,000 people in the respective age category per county. Control variables include the county's unemployment rate, GDP per capita, disposable household income, population density, the interpolated vote share at the local level, and the share of migrant students. Standard errors in parentheses are clustered at the county level. *p<0.1; **p<0.05; ***p<0.01.

Table B.4: The impact of social workers on victimization by victim-perpetrator relationship

	(1)	(2)	(3)	(4)	(5)	(6)
	Perpetrator: Adolescent			Perpetrator: Adult		
	All	Violent Crime	Sex Offense	All	Violent Crime	Sex Offense
Family						
Social Worker	−0.016	−0.005*	0.002	−0.031*	−0.009*	0.006**
	(0.010)	(0.003)	(0.002)	(0.017)	(0.005)	(0.003)
Mean	0.049798	0.0097639	0.0048525	0.1757525	0.0215285	0.016965
Friends/Acquaintances						
Social Worker	−0.188	−0.073	0.034	−0.010	−0.005	0.000
	(0.229)	(0.100)	(0.026)	(0.037)	(0.007)	(0.011)
Mean	1.559338	0.3974858	0.1336946	0.2852591	0.0427264	0.0782908
Unknown						
Social Worker	−0.157	−0.178***	0.010	−0.114	−0.071**	0.043
	(0.120)	(0.061)	(0.015)	(0.102)	(0.035)	(0.043)
Mean	1.32421	0.5104249	0.0529806	0.6149616	0.1127684	0.1094909
Num.Obs.	572	572	572	572	572	572
Std.Errors	County	County	County	County	County	County
County	X	X	X	X	X	X
Year	X	X	X	X	X	X

Notes: This table shows the results of the generalized difference-in-differences regression in equation (1) by accounting for the victim-perpetrator relationship. The outcome variables are defined as the number of victims per 1,000 people in the respective age category per county. Control variables include the county's unemployment rate, GDP per capita, disposable household income, population density, the interpolated vote share at the local level, and the share of migrant students. Standard errors in parentheses are clustered at the county level. *p<0.1; **p<0.05; ***p<0.01.

Table B.5: The impact of school social workers on education (transition from primary school)

	(1)
	Academic Track
Social Worker	−0.006
	(0.007)
Mean	0.41
Num.Obs.	572
Std.Errors	County
County	X
Year	X

Notes: This table shows the results of the generalized difference-in-differences regression in equation (1) using educational outcomes as dependent variables. Control variables include the county's unemployment rate, GDP per capita, disposable household income, population density, the interpolated vote share at the local level, and the share of migrant students. Standard errors in parentheses are clustered at the county level. *p<0.1; **p<0.05; ***p<0.01.

Table B.6: The impact of school social workers on crime - DDD

	(1)	(2)	(3)	(4)
	All	Property Crime	Violent Crime	Drug Crime
Social Worker	0.149	−1.115	−0.135	0.672
	(2.374)	(0.930)	(0.210)	(0.490)
Social Worker*Age Group	−9.593***	−4.776***	−1.124**	−1.054**
	(2.296)	(1.251)	(0.478)	(0.456)
Num.Obs.	572	572	572	572
Std.Errors	County	County	County	County
County	X	X	X	X
Year	X	X	X	X
Age Group	X	X	X	X
Age Group x County	X	X	X	X
Age Group x Year	X	X	X	X

Notes: This table shows the results of the triple-difference regression. The outcome variable is defined as the number of crimes per 1,000 people. Standard errors in parentheses are clustered at the county level. *p<0.1; **p<0.05; ***p<0.01.

Table B.7: The impact of school social workers on crime - robustness checks

	(1)	(2)	(3)	(4)	(5)
Social Worker	−9.681***	−9.201***	−9.470***	−9.619***	−0.082***
	(1.875)	(1.857)	(2.135)	(1.815)	(0.027)
Mean	58.63	58.63	55.12	58.63	58.63
Num.Obs.	572	572	440	572	572
Std.Errors	County	County	County	County	County
County	X	X	X	X	X
Year	X	X	X	X	X
Model	Time trend	Local finances control	Teacher control	Weighting	Log

Notes: This table shows the results of different specifications of the generalized difference-in-differences regression in equation (1). Column (1) shows the results of the generalized difference-in-differences regression in equation (1) but with time trends that are allowed to vary across broader administrative regions. Column (2) shows the results of the generalized difference-in-differences regression in equation (1) but with additional controls for revenues and debts, more specifically their baseline values interacted with year indicators. Column (3) shows the results of the generalized difference-in-differences regression in equation (1) but with the number of teachers per 1,000 students as additional control variable. Column (4) shows the results of the generalized difference-in-differences regression in equation (1) but weighted by the county population of of that age range. Column (5) shows the results of the generalized difference-in-differences regression in equation (1) but with the logarithm of the outcome variable. The outcome variables are defined as the number of crimes per 1,000 people in the respective age category per county. Standard errors in parentheses are clustered at the county level. *p<0.1; **p<0.05; ***p<0.01.

Table B.8: The impact of school social workers on victimisation - robustness checks

	(1)	(2)	(3)	(4)	(5)	(6)
			A) Perpetrator: Adolescent			
Social Worker	−1.251*	−1.513***	−1.216***	−0.692	−1.200***	−0.063
	(0.628)	(0.363)	(0.354)	(0.461)	(0.421)	(0.039)
Mean	7.44	7.44	7.44	6.93	7.44	7.44
			B) Perpetrator: Adult			
Social Worker	−0.315	−0.351*	−0.375	−0.041	−0.275	−0.056
	(0.219)	(0.192)	(0.231)	(0.204)	(0.244)	(0.042)
Mean	4.55	4.55	4.55	4.51	4.55	4.55
Num.Obs.	572	572	572	440	572	572
Std.Errors	County	County	County	County	County	County
County	X	X	X	X	X	X
Year	X	X	X	X	X	X
Model	No controls	Time trend	Local finances control	Teacher control	Weighting	Log

Notes: This table shows the results of different specifications of the generalized difference-in-differences regression in equation (1). Column (1) shows the results of the generalized difference-in-differences regression in equation (1) but without any control variables. Column (2) shows the results of the generalized difference-in-differences regression in equation (1) but with time trends that are allowed to vary across broader administrative regions. Column (3) shows the results of the generalized difference-in-differences regression in equation (1) but with additional controls for revenues and debts, more specifically their baseline values interacted with year indicators. Column (4) shows the results of the generalized difference-in-differences regression in equation (1) but with the number of teachers per 1,000 students as additional control variable. Column (5) shows the results of the generalized difference-in-differences regression in equation (1) but weighted by the county population of of that age range. Column (6) shows the results of the generalized difference-in-differences regression in equation (1) but with the logarithm of the outcome variable. The outcome variables are defined as the number of victims per 1,000 people in the respective age category per county. Standard errors in parentheses are clustered at the county level. *p<0.1; **p<0.05; ***p<0.01.

Table B.9: The impact of school social workers on education - robustness checks

	(1)	(2)	(3)	(4)	(5)	(6)
Social Worker	−0.002*	−0.002	−0.002**	−0.001	−0.001	−0.135**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.053)
Mean	0.02	0.02	0.02	0.02	0.02	0.02
Num.Obs.	572	572	572	440	572	572
Std.Errors	County	County	County	County	County	County
County	X	X	X	X	X	X
Year	X	X	X	X	X	X
Model	No controls	Time trend	Local finances control	Teacher control	Weighting	Log

Notes: This table shows the results of different specifications of the generalized difference-in-differences regression in equation (1). Column (1) shows the results of the generalized difference-in-differences regression in equation (1) but without any control variables. Column (2) shows the results of the generalized difference-in-differences regression in equation (1) but with time trends that are allowed to vary across broader administrative regions. Column (3) shows the results of the generalized difference-in-differences regression in equation (1) but with additional controls for revenues and debts, more specifically their baseline values interacted with year indicators. Column (4) shows the results of the generalized difference-in-differences regression in equation (1) but with the number of teachers per 1,000 students as additional control variable. Column (5) shows the results of the generalized difference-in-differences regression in equation (1) but weighted by the county population of of that age range. Column (6) shows the results of the generalized difference-in-differences regression in equation (1) but with the logarithm of the outcome variable. The outcome variable is defined as the grade retention in grade 10-13. Standard errors in parentheses are clustered at the county level. *p<0.1; **p<0.05; ***p<0.01.

Table B.10: The impact of school social workers on crime participation

	(1)	(2)
	All	All
Social Worker	−3.412***	−3.855***
	(1.059)	(0.808)
Mean	36.98	36.98
Num.Obs.	572	572
Std.Errors	County	County
County	X	X
Year	X	X
Control Variables		X

Notes: This table shows the results of the generalized difference-in-differences regression in equation (1). The outcome variables are defined as the number of perpetrators per 1,000 people in the respective age category per county. Control variables include the county's unemployment rate, GDP per capita, disposable household income, population density, the interpolated vote share at the local level, and the share of migrant students. Standard errors in parentheses are clustered at the county level. *p<0.1; **p<0.05; ***p<0.01.

Table B.11: The impact of school social workers on crime by demographics

	(1)	(2)	(3)	(4)
	All	Property Crime	Violent Crime	Drug Crime
		A) Boys		
Social Worker	−16.745***	−10.601***	−2.476***	−0.683
	(2.995)	(2.298)	(0.569)	(0.952)
Mean	89.42	43.52	8.33	9.47
		B) Girls		
Social Worker	−1.900*	−1.102	0.044	−0.140
	(1.128)	(0.790)	(0.252)	(0.188)
Mean	25.99	13.79	1.20	1.48
		C) Germans		
Social Worker	−8.486***	−5.053***	−0.732**	−0.564
	(1.827)	(1.293)	(0.277)	(0.616)
Mean	51.13	26.02	3.63	5.33
		D) Migrants		
Social Worker	−21.146***	−12.174**	−5.286***	−0.228
	(6.720)	(4.665)	(1.313)	(1.065)
Mean	122.44	55.99	14.97	7.99
		E) Aged 10-12 Years		
Social Worker	−3.505*	−2.812	−0.525	−0.032
	(1.923)	(1.690)	(0.346)	(0.027)
Mean	17.72	12.58	1.01	0.08
		F) Aged 13-15 Years		
Social Worker	−14.772***	−7.821***	−1.791***	−1.816**
	(2.865)	(1.737)	(0.460)	(0.716)
Mean	67.32	38.87	4.75	3.78
		G) Aged 16-18 Years		
Social Worker	−12.215***	−7.739***	−1.661***	0.238
	(3.607)	(2.604)	(0.544)	(1.157)
Mean	86.97	34.66	8.44	12.13
Num.Obs.	572	572	572	572
Std.Errors	County	County	County	County
County	X	X	X	X
Year	X	X	X	X

Notes: This table shows the results of the generalized difference-in-differences regression in equation (1) separately by demographics. The outcome variable is defined as the number of crimes per 1,000 people in the respective age category per county. Control variables include the county's unemployment rate, GDP per capita, disposable household income, population density, the interpolated vote share at the local level, and the share of migrant students. Standard errors in parentheses are clustered at the county level. *p<0.1; **p<0.05; ***p<0.01.

Table B.12: The impact of school social workers on crime by county characteristics

	(1)	(2)	(3)	(4)
	All	Property Crime	Violent Crime	Drug Crime
		A) Disposable Income: Low		
Social Worker	−12.234***	−7.911***	−1.873***	−0.924*
	(2.447)	(1.689)	(0.367)	(0.508)
Mean	59.31	29.34	4.98	5.53
		B) Disposable Income: High		
Social Worker	−5.405*	−2.361	−0.544	0.547
	(2.905)	(2.259)	(0.628)	(1.026)
Mean	57.94	28.82	4.75	5.66
		C) Unemployment Rate: Low		
Social Worker	−8.178*	−4.491	0.448	−1.599*
	(4.377)	(2.639)	(0.564)	(0.911)
Mean	48.63	24.73	3.52	4.92
		D) Unemployment Rate: High		
Social Worker	−11.982***	−7.233***	−1.749***	−0.371
	(2.085)	(1.255)	(0.322)	(0.696)
Mean	68.62	33.43	6.22	6.27
		E) Teacher-to-Student Ratio: Low		
Social Worker	−8.571**	−4.592**	−0.934	−0.700
	(3.311)	(2.104)	(0.628)	(0.887)
Mean	58.05	29.39	4.77	5.72
		F) Teacher-to-Student Ratio: High		
Social Worker	−10.089***	−6.464***	−1.806***	−0.084
	(2.397)	(1.408)	(0.500)	(0.871)
Mean	59.21	28.77	4.97	5.47
Num.Obs.	572	572	572	572
Std.Errors	County	County	County	County
County	X	X	X	X
Year	X	X	X	X

Notes: This table shows the results of the generalized difference-in-differences regression in equation (1) separately by county characteristics. The outcome variable is defined as the number of the crimes per 1,000 people in the respective age category per county. Standard errors in parentheses are clustered at the county level. *p<0.1; **p<0.05; ***p<0.01.

Table B.13: The impact of school social workers on crime by location and time

	(1)	(2)	(3)	(4)
	All	Property Crime	Violent Crime	Drug Crime
		A) School Environment		
Social Worker	−0.343	0.152	−0.363***	−0.087
	(0.352)	(0.233)	(0.129)	(0.069)
Mean	5.50	2.44	0.59	0.40
		B) Outside School Environment		
Social Worker	−10.080***	−6.564***	−0.777**	−0.268
	(2.432)	(1.551)	(0.300)	(0.548)
Mean	48.94	25.71	4.13	4.71
		C) Academic Year		
Social Worker	−8.870***	−5.473***	−1.119***	−0.546
	(1.621)	(1.222)	(0.330)	(0.511)
Mean	53.11	26.33	4.47	4.93
		D) Summer Holidays		
Social Worker	−1.069***	−0.702**	−0.184***	0.051
	(0.359)	(0.344)	(0.057)	(0.096)
Mean	5.33	2.67	0.39	0.64
Num.Obs.	572	572	572	572
Std.Errors	County	County	County	County
County	X	X	X	X
Year	X	X	X	X

Notes: This table shows the results of the generalized difference-in-differences regression in equation (1) separately by location and time. The outcome variable is defined as the number of crimes per 1,000 people in the respective age category per county. Control variables include the county's unemployment rate, GDP per capita, disposable household income, population density, the interpolated vote share at the local level, and the share of migrant students. Standard errors in parentheses are clustered at the county level. *p<0.1; **p<0.05; ***p<0.01.