

ARTICLE

Changing routine activities and the decline of youth crime: A repeated cross-sectional analysis of self-reported delinquency in Sweden, 1999–2017*

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*The authors would like to thank Co-Editor Charis E. Kubrin and the anonymous reviewers for their useful comments. The authors would also like to thank Frank Weerman for valuable feedback on an earlier version of this article and Malcolm Fairbrother for discussing modeling options. This article was initiated when Robert Svensson visited the Max-Planck-Institute for Foreign and International Criminal Law, Department of Criminology, Freiburg, in May 2019. A draft version was presented at the 2019 European Society of Criminology (ESC) Annual Conference held in Ghent, Belgium.

Abstract

This study examines the declining crime trend among Swedish adolescents between 1999 and 2017 using data from eight repeated cross-sectional waves of a nationally representative school survey ($N = \text{ca. } 49,000$). We examined to what extent changes in parental monitoring, school bonds, attitudes toward crime, routine activities, and binge drinking were related to the noticeable decline in youth crime. Multilevel modeling was employed for the analysis of temporal trends. We found strong empirical support for our hypotheses, that is, that changes in social bonds, attitudes toward crime, and routine activities were all associated with the decline in youth crime. Routine activities had the strongest explanatory power, and all predictors combined accounted for most of the variance attributed to the decline in youth crime. This study moves research on the crime drop closer to the analysis of social mechanisms by demonstrating that micro-level associations between theoretically relevant, proximal variables, and delinquency account for macro-level change.

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KEYWORDS

adolescents, attitudes toward crime, crime drop, routine activities, self-reported delinquency, social bonds

1 | INTRODUCTION

In many, particularly Western, countries, crime rates have been falling since the early 1990s (Baumer et al., 2018; Farrell et al., 2011; Tcherni-Buzzeo, 2019; Tonry, 2014; Tseloni et al., 2010; van Dijk & Tseloni, 2012; Zimring, 2006). The crime drop has rightly been recognized as a major international phenomenon, and it has stimulated manifold research (Baumer et al., 2018; Farrell et al., 2011; Tcherni-Buzzeo, 2019; Tseloni et al., 2010; van Dijk et al., 2012; Zimring, 2006). According to Farrell et al. (2014, p. 421), the crime drop is the “most important criminological phenomenon of modern times.”

More recently, research on the crime drop has extended to youth crime, which is the focus of this article. Declining trends in youth crime have been found in several countries, such as Spain (Fernández-Molina & Bartolomé Gutiérrez, 2020), Finland (Elonheimo, 2014; Salmi, 2009), Denmark (Balvig, 2011), Sweden (Estrada, 2019; Sivertsson et al., 2019; Svensson & Ring, 2007; Vasiljevic et al., 2020), the United States (Arnett, 2018; Baumer et al., 2018; Gruzca et al., 2018; Keyes et al., 2018; Moss et al., 2019), England and Wales (Griffiths & Norris, 2020), Scotland (Matthews & Minton, 2018), and the Netherlands (Berghuis & de Waard, 2017; van der Laan et al., 2019). The decline has been found in both self-report studies and police-recorded data, and it applies to different crime types, such as property crimes, violence, and vandalism (e.g., Arnett, 2018; Moss et al., 2019). Some studies, though, showed the decline to be more pronounced for property crimes than for violence (e.g., Fernández-Molina & Bartolomé Gutiérrez, 2020; Salmi, 2009; Sivertsson et al., 2019) and for boys than for girls (Estrada et al., 2016; Keyes et al., 2018).

When youth crime started to decline is not entirely clear: Self-report data from several countries such as the United States, Spain, and the Nordic countries hint at a decline since the mid-1990s (Arnett, 2018; Balvig, 2011; Elonheimo, 2014; Estrada, 2019; Fernández-Molina & Bartolomé Gutiérrez, 2020) or even earlier (Kivivuori & Bernburg, 2011), whereas in other countries such as Germany and the Netherlands where police-recorded data have been examined, the decline seems to have started around 2007 (Baier, 2018; Berghuis & de Waard, 2017; van der Laan et al., 2019). Despite some gaps in these data series, there is enough evidence to conclude that the decline in youth crime is a common experience in Western developed societies. Additionally, it is worth mentioning that other forms of problem or risk behavior such as marijuana use and binge drinking also showed a decline in many countries (Moss et al., 2019; Pape et al., 2018; Pennay et al., 2018).

How can we explain this decline in youth crime? For the general crime drop, various explanatory factors have been put forward, including socioeconomic development, cohort sizes, changing drug markets, improved security technologies, reductions in child maltreatment and lead poisoning, and the rise of the Internet (Farrell et al., 2014; Rennó Santos et al., 2019; Tcherni-Buzzeo, 2019; van Dijk et al., 2012; Vogel et al., 2020). Some of these attempts to explain the general crime drop were implicitly or explicitly targeted at criminal behavior in young age groups or at causal mechanisms that impact child and adolescent development, such as lead poisoning or cohort size. In addition, and specifically addressing the decline in youth crime, it has been argued that it may be a consequence of changes in parental monitoring (Arnett, 2018), changes in

young people's future orientation and attitudes toward school (Balvig, 2011), and more negative attitudes toward crime (Griffiths & Norris, 2020; Pape et al., 2018). Several scholars have discussed changes in daily routines as explanation for the decline in youth crime, in particular, an increase in time spent online and a corresponding decrease of offline activities (Arnett, 2018; Berghuis & De Waard, 2017; Moss et al., 2019; Twenge & Park, 2019; Twenge & Spitzberg, 2020; Weerman, 2017). And some have argued that the spread of more effective technologies preventing car thefts and burglaries has reduced opportunities for adolescents for initial crimes and to embark on criminal pathways beyond them (the "debut crime" hypothesis; see Farrell et al., 2014, 2015).

Few of these leads have received convincing empirical support. Many studies based on self-report survey data were of a descriptive nature and discussed but did not test possible explanations (e.g., Arnett, 2018; Elonheimo, 2014; Fernández-Molina & Bartolomé Gutiérrez, 2020; Svensson & Ring, 2007; Vasiljevic et al., 2020). Many attempts focused on single causes were loosely connected with the theoretical literature on crime causation or hard to test empirically, in particular, concerning the linkage of macro-level, societal developments to individual criminal behavior. In their recent review of research, Baumer et al. (2018) lamented the rudimentary and fragmented state of research into the causes of the international crime drop, and this can be extended to research into the causes of the decline in youth crime.

One major reason for this is that aggregate-level statistics of recorded crime or repeated victimization surveys may be important to measure national or regional crime trends and to identify associated macro-societal processes but do not allow for an analysis of proximate influences on criminal behavior commonly discussed in research on the etiology of crime, such as social control or routine activities (Baumer et al., 2018, p. 51). Research on the causes of the decline in youth crime, even if informed by macro-level theories of social or technological change, should encompass analyses of individual-level influences on delinquent behavior over time to provide a micro-foundation for the explanation of social change and to avoid "black boxes" (Hedström & Ylikoski, 2010).

To follow this route, repeated cross-sectional or longitudinal survey data focusing on the etiology of adolescent offending are needed but are rarely available over longer time periods. To our knowledge, three previous studies have used repeated cross-sectional survey data for analyses of individual-level influences on delinquency trends. First, using three cohorts (2005, 2010, and 2015) of the Dutch Youth Delinquency Survey, van der Laan et al. (2019) examined the effects of several individual-level risk and protective factors on youth crime over time. They found that the 2015 cohort was less exposed to risk factors (e.g., alcohol use and delinquent peers) and more exposed to protective factors (e.g., parental emotional support and monitoring) compared with previous cohorts, potentially accounting for the decrease in self-reported offending. Second, Keyes et al. (2018) used the extensive annual Monitoring the Future (MTF) data spanning the period of 1991 to 2015 and applied age-period-cohort modeling.¹ They reported strong period effects of declining problem behaviors mainly of boys and especially after 2008, and they found evidence for a parallel decline in unsupervised time with peers during evening hours, but they stopped short of testing the impact of this behavioral change on delinquency in individual-level models, nor did they consider other potential influences. Third, Baumer et al. (2021), using the same MTF data as Keyes et al. (2018), employed hierarchical modeling to examine whether declining prevalence rates of youth crime were a consequence of changes in adolescents' family and school relations and routine activities. They found no impact of changes in family and school relations, whereas changes in unstructured socializing and alcohol consumption showed a considerable explanatory

¹In may be relevant to note that they followed Yang et al.'s (2008) approach of age-period-cohort analysis that has not gone uncontested (Bell, 2020).

power for the declining trend. Baumer et al.'s (2021) study marks the first elaborated analysis of long-term adolescent crime trends in relation to shifts in social behaviors based on individual-level survey data and proves the value of this approach. Yet, as still little is known about the impact of various individual-level factors on the decline in youth crime, we agree with Baumer et al. (2018, p. 46) that more studies "evaluating the merits of a set of well-established causal processes shown to be important for understanding variation in criminal activity" are needed.

The current study extends previous research and examines whether changes in parental monitoring, school bonds, attitudes toward crime, as well as changes in daily routine activities and alcohol intoxication are associated with the decline in youth crime over a period of nearly two decades. We use self-report data from eight sweeps of a nationally representative school survey from Sweden conducted by the National Council for Crime Prevention between 1999 and 2017 and apply hierarchical linear and nonlinear modeling to capture temporal changes.

2 | THEORETICAL FRAMEWORK

In this study we will focus on *three* domains of theoretical explanations of the decline of youth crime geared at proximal influences on individual behavior. The first domain covers parenting and relations to school, the second domain attitudes toward crime, and the third routine activities including alcohol consumption. All three domains have been discussed as possible drivers of the decline in youth crime (e.g., Arnett, 2018; Elonheimo, 2014; Kivivuori & Bernburg, 2011; Keyes et al., 2018; Vasiljevic et al., 2020). Other important domains, such as strain or self-control, and specific aspects such as online activities have been omitted in the present study, all for a simple reason: They were not included in the instruments of the Swedish national survey program that originated in the early 1990s, or they have been adopted only in the most recent waves, a typical situation in the case of long-running surveys that must prioritize continuity over innovation. Despite these restrictions, the domains under investigation align well with the three basic dimensions of the etiology of criminal behavior listed by Baumer et al. (2018, p. 50): social controls, propensities and motivations for crime, and exposure to criminogenic settings. We will investigate whether and to what extent variables in these three domains have changed over time and thus help to explain the decline in youth crime. Therefore, we focus on the micro-foundation of individual-level correlates of delinquency to improve the understanding of macro-level changes in crime rates.

More specifically, we are interested in whether *level* differences in several predictors contribute to the explanation of changing likelihoods of delinquent behavior. We do not investigate potential *slope* differences over time, which would indicate that the effects of predictors on delinquency became weaker (or stronger) over time (cf. Firebaugh, 1997). The reason for this is that we focus on proximal influences on delinquency for which extant research does not offer strong clues that their relevance may have changed over time. For example, if social bonds to parents and schools contributed to the crime drop, we hypothesize that this was because adolescents developed stronger bonds, not because the effects of these bonds on crime became stronger (see "Sensitivity Analyses" section for some checks of this assumption).² The latter perspective seems more relevant for research on the changing roles of demographic (and, hence, more distal) factors such as gender and race/ethnicity in delinquent behavior or discriminatory treatment by the criminal justice system (e.g., Keyes et al., 2018; Weaver et al., 2019; cf. DiPetre & Grusky, 1990, for stratification research). In the following section, we will discuss the relation of these predictors to central theoretical perspectives in the etiology of youth crime.

²We thank an anonymous reviewer for raising this issue.

2.1 | Changes in parenting and relations to school

Adolescents' relations to parents and school as two major agents of socialization take a key position in criminological theories (e.g., Fagan & Bendini, 2019; Hirschi, 1969; Payne & Welch, 2013; Stattin & Kerr, 2000). Social control theories assume that social bonds to conventional institutions help to suppress deviant impulses, as does surveillance by parents. The association between family processes and involvement in crime is well established, indicating that poor relations with parents is related to more adolescent crime (e.g., Hoeve et al., 2009; Oleson & Costello, 2019; Stattin & Kerr, 2000).

One possible explanation of the crime drop is that parents as a central agent of socialization may have had a changed influence over their children, and that social control by parents and/or social bonds between parents and children have intensified over time. In the following discussion, we concentrate on the monitoring dimension. Some scholars have argued that children are more strongly monitored by their parents (and more closely bonded to them) than some years ago (Clark et al., 2013; Kristjansson et al., 2010, 2016). In Sweden as well as in neighboring Norway and Finland, the share of adolescents who state that their parents know where they spend their Friday and Saturday nights has increased considerably between 1999 and 2015 (Raitasalo et al., 2018, 2021). Swedish studies have shown that the majority of 15-year-old adolescents have had good communication with their parents since the mid-1980s, and that their communication with their fathers has improved in recent years (Public Health Agency of Education, 2018). In addition, previous research has shown that strong bonds to the parents is associated with an increased level of parental monitoring (Stattin & Kerr, 2000).

Time-use studies from industrialized nations showed an increase over the last decades of time that parents spend with their children, and "helicopter parenting" has become a widely discussed but empirically vague phenomenon (Doepke et al., 2019). On the other hand, Arnett (2018) disputed the empirical evidence for increased parental monitoring. Yet, there may have been changes in the modalities of parental monitoring resulting from technological change: Today it is possible for parents to have remote contact with their children via cell- or smartphones, which was not possible 20 years ago. Frequent contact via mobile phones and social media gives parents opportunities to be kept informed about their whereabouts and activities. Thus, Arnett (2018) argued that even though traditional parental monitoring has decreased, there has been a rise of *electronic monitoring*. Online communication is also a relevant feature of adolescents' routine activities, which we will discuss below.

Another possible explanation within social control theory is that the attitudes toward school may have changed over time. Schools function as an important agent of socialization as this is the place where children learn skills and attitudes that enable them to integrate into society (e.g., Wentzel & Looney, 2007). Many studies showed associations between various indicators of attachment to school and offending (e.g., Gottfredson, 2001; Hart & Mueller, 2013; Pepler, 2019), suggesting that the more strongly an individual is bonded to school, the lower the probability that the individual will engage in offending.

It has been claimed that children's and adolescents' attitudes toward school have changed over time, and that schools have become more important. For example, Curran and Hill (2019) reported a long-term increase of "socially prescribed perfectionism" among U.S. college students that they attributed to an increasing pressure on academic achievement in a meritocratic society. This may increase the number of young people who refrain from skipping school and committing crimes because they do not want to risk their future (Balvig, 2011; Clark et al., 2013; Kivivuori & Bernburg, 2011; Raitasalo et al., 2018). Swedish survey data showed that the proportion of

15-year-olds who like school has remained at a stable level since the mid-1980s, with a slight decline between 2013 and 2017. The data also indicate a stable level of trust to teachers, whereas school-related stress has increased in recent years (Public Health Agency of Education, 2018). Taken together, time trends in students' bonds to school or "school belonging" remain a neglected research topic despite abundant large-scale international survey programs, and the existing research does not seem to show clear trends (Allen et al., 2018; Wilhelmsen, 2017).

2.2 | Changes in attitudes toward crime

Another possible explanation that does not rank prominently in the discourse about the crime decline are changes in the moral climate and the attitudes toward crime in society. Seminal works on the topic such as Blumstein and Wallman (2006), Zimring (2006), and van Dijk et al. (2012) did not consider attitudinal changes as major drivers of falling crime rates, whereas Baumer et al. (2018) discussed specific facets of motivations for crime as self-control, frustration, and institutional legitimacy. Taking the long view since the middle of the twentieth century and before, Eisner (2014) found negative time series correlations between crime rates and indicators of cultural norms favoring morality, civility, and self-control in the Western world. Few empirical studies have examined whether youths' attitudes toward crime have changed over time. Using survey data from Finland, Salmi (2009) reported a trend toward more negative attitudes to crime during 1995 to 2001, as well as a more stable trend thereafter. Summarizing the research on adolescent delinquency in the Nordic countries, Kivivuori and Bernburg (2011, p. 419) claimed that "young people increasingly condemn criminal activity. It is no longer regarded as a normal part or manifestation of adolescence." In the Netherlands, it has been pointed out that a rise in disapproving attitudes toward crime has had an inhibiting effect on the propensity to commit crime (Berghuis & de Waard, 2017). Pape et al. (2018) reviewed the existing evidence for changing attitudes of adolescents toward alcohol consumption that is seen as an explanation of reductions in actual consumption patterns (see also below).

Attitudes toward social norms are often addressed as *morality*, a set of convictions about right or wrong behavior. Moral values have for a long time played a cardinal role in criminological theories. Both Sutherland (1947) and Hirschi (1969) regarded moral values and attitudes as key processes causing people to commit crime, or preventing them from doing so. More recently, situational action theory and rational choice-based theories assume that individuals vary in their levels of morality, and that strong conventional moral values override other potential influences on criminal behaviour, such as situational inducements or deterrence (Kroneberg et al., 2010; Wikström et al., 2012).

Many empirical studies have shown that attitudes toward crime—applying different definitions and measurements—were associated with actual offending (e.g., Antonaccio & Tittle, 2008; Chapple et al., 2005; Stams et al., 2006; Svensson et al., 2010, 2013; Wikström et al., 2012), in support of general concepts of human behavior that assume a causal cascade from attitudes and beliefs via intentions to behavior (Ajzen et al., 2019; Stets & Carter, 2012). These findings show that individuals who do not think it is wrong to commit crime are more likely to commit crime. Yet, the causal direction of this relation between attitudes and behavior is more difficult to ascertain. Panel studies found evidence for bidirectional influences between attitudes and behaviors on the individual level (Boers et al., 2010; Thornberry, 1987; Thornberry et al., 1994; Zhang et al., 1997).

Macro-level, societal change of attitudes occurs in relation to cultural, socio-political, and economic developments and events (Albarracin & Shavitt, 2018). Eisner (2014) discussed shifts in societal norms potentially guiding parents' child-rearing practices, which may contribute to changing adolescents' mindsets, and Kivivuori and Bernburg (2011) discussed potential economic, cultural, and media influences on the collective attitude change among adolescents concerning delinquent behavior in the Nordic countries. An example from Sweden of how legal changes subsequently induced or accelerated changes in collective moral attitudes is the ban on child maltreatment in 1979 (Gilbert et al., 2012).

2.3 | Changes in routine activities and alcohol consumption

A prominent explanation of the crime drop is the digital revolution and its impact on young people's routine activities and lifestyles (Berghuis & De Ward, 2017; Pape et al., 2018; Weerman, 2017). Since the digital revolution and the large-scale spread of broadband Internet that took off at the beginning of the 2000s, which then jumped to another level with the emergence of smartphones around 2007/2008 and affordable mobile Internet more recently, young people spend more and more time online using digital devices such as computers and smartphones. In Sweden already in 2012, 89 percent of 15-year-old adolescents used smartphones, and almost everybody (98 percent) used smartphones in 2018 (Swedish Media Council, 2019). A large-scale survey in Sweden showed that the share of 15-year-old adolescents who spent four or more hours during weekdays in front of a computer or using a smartphone rose from 11 percent in 2001/2002 to 42 percent in 2013/2014 (Public Health Agency of Education, 2015). In the United States, the average daily time spent online increased from around one hour in 2006 to 1.7 hours for eighth graders in 2016 and to 2.2 hours for twelfth graders in 2016. Although half of adolescents used social media on a daily basis in 2006, the share has risen to ca. 80 percent in 2016 (Twenge et al., 2019).

Importantly for adolescents' routine activities, more online time could mean less time away from home and in real-life interaction with peers (Arnett, 2018; Pape et al., 2018). Using data from the Monitoring the Future study, Twenge and Park (2019, cf. Kim & McCarthy, 2018) found a marked decrease of time adolescents have been going out without their parents since 1996 for eighth and tenth graders and since 2002 for twelfth graders in the United States. Other out-of-home activities as paid work, dating, and getting a drivers' license also decreased. An analysis of Swedish time use data between 1990 and 2010 revealed that for the age group 20 to 29 years, daily free time spent with digital devices increased from almost 0 to 50 minutes, whereas nondigital free time decreased by 37 minutes, with social activities such as out-of-home trips and social visits particularly affected (Susilo et al., 2019; Vilhelmson et al., 2018). Yet, the effects of online communication on routine activities may not be straightforward as studies also found a *positive* individual-level correlation between online and offline social interaction (Twenge et al., 2018). A study based on a small school survey conducted in 2008 found that "virtual" time with peers was associated with higher rates of delinquency, partly superseding the effect of traditional time with peers (with which it was positively correlated; Meldrum & Clark, 2015; but see Weerman et al., 2015). This may guard against the danger of ecological fallacies concerning the causal mechanisms of crime trends: Factors that seem to be positively correlated with the crime drop on the aggregate level of national time series may not necessarily be associated correspondingly with crime on the person level, and vice versa. A causal influence of the digital revolution on adolescent routine activities has yet to be shown convincingly. Also, if a decreasing trend of adolescents' real-world social activities exists, it seems to have started earlier than the advent of social media. Because

of data limitations, we cannot empirically test hypotheses about the effects of online time in this study.

These unsolved questions about the consequences of the digital revolution notwithstanding, the assumption that a decrease of free time spent away from home and with peers could result in fewer opportunities to commit crimes is less contentious. Routine activities have long been viewed as a causal influence on adolescent offending (e.g., Cohen & Felson, 1979; Osgood et al., 1996). Three aspects of young people's daily routines are important in relation to offending. First, routine activity theory stresses that spending time in *unstructured routine activities* in the absence of authority figures, that is, without social control, increases the risk of offending (Agnew & Petersen, 1989; Bernasco et al., 2013; Cohen & Felson, 1979; Felson, 1994; Hoeben et al., 2016; Osgood & Anderson, 2004; Osgood et al., 1996). Not being supervised by adults in the company of peers and not doing anything particular (as, e.g., hobbies or sports) exposes adolescents to different types of settings that in turn produce different types of situations that increase the risk of offending (e.g., Osgood et al., 1996; Wikström & Sampson, 2003). Second, it is also well known that young people who spend a lot of *time with their friends* commit more crimes than those who do not (Osgood et al., 1996; Warr, 2002; Weerman et al., 2015). In addition, unsupervised time spent with friends during evening hours is more criminogenic than during daytime hours (Wikström et al., 2012, p. 340). Thus, some psychologists judge the shift from “nondigital” to digital social interaction among adolescents as potentially detrimental for well-being (Twenge et al., 2018).

Finally, it is well known that *alcohol use* is significantly associated with offending, in particular violent offending, with strong hints at a causal influence (Brown & Leonard, 2017; Felson et al., 2008). In an analysis of situational influences, alcohol but not cannabis consumption increased the likelihood of adolescents' offending (Bernasco et al., 2013).

Adolescents' drinking habits have been closely monitored in many countries for many years, and the evidence for a long-term declining trend is unequivocal (Gruza et al., 2018; Inchley et al., 2018; Kraus et al., 2018; Moss et al., 2019; Pape et al., 2018; Pennay et al., 2018; Raitasalo et al., 2021). Thus, the declining trend in alcohol consumption clearly is a potential factor in the decline of delinquency if one accepts its causal role. One may argue whether alcohol consumption should be seen as an explanatory variable of delinquency or rather as a facet of delinquency as it is a status offense for adolescents in some countries (e.g., Boisvert et al., 2019; Franken et al., 2016). In Sweden, alcohol consumption is prohibited for adolescents but not sanctioned. Analyzing the declining trend of youth delinquency in the United States and applying item response theory, Gruza et al. (2018) found evidence for a “single-factor externalizing model” including both criminal offending and substance abuse or dependency according to DSM-IV. Although both theoretical angles may have some merits (and more sophisticated data would be needed to advance this issue), we will treat alcohol consumption as part of the situational influences and as an explanatory variable, in line with the reasoning by Apel and Horney (2017) and Baumer et al. (2021), but will test its relevance in a separate model step.

Recent research has increasingly acknowledged that routine activities as unstructured socializing do not have unconditional effects on adolescent offending. Many studies have examined whether there is an *interaction* between the individual propensity of adolescents (operationalized as morality and self-control) and their criminogenic exposure (operationalized as lifestyle risk or unstructured routine activities) in the explanation of adolescent offending. In line with situational action theory, it has been assumed that risky routines will have a differential impact on individuals' involvement in crime depending on their level of individual propensity to offend, that is, their attitudes toward crime. Several studies have found empirical evidence for this interaction, indicating that risky routine activities will have a stronger effect on offending for those individuals

with attitudes condoning crime, whereas for individuals with attitudes unfavorable to crime, risky routine activities will not, or only marginally, influence their involvement in offending (Gerstner & Oberwittler, 2018; Pauwels et al., 2018; Svensson & Pauwels, 2010; Wikström et al., 2012).

2.4 | Sweden as an example

Sweden, a Scandinavian country of approximately 10 million inhabitants, serves as an example of a highly developed and wealthy Western society. Sweden has a long tradition of egalitarian, social democratic policies and is characterized by a strong welfare state and low levels of social inequality, while enjoying one of the highest per-capita GDPs in the world (Schröder, 2013). In terms of social and technological trends, Sweden is one of the most advanced societies, indicated by high levels of gender equality and high self-expression values, as well as by an early adoption of Internet and mobile communication. During the 1990s, Sweden has gone through a period of economic slump, deregulations, and high unemployment, in particular youth unemployment, which rose to 25 percent in 2010 and has remained close to 20 percent thereafter (OECD, 2020). As a result of a liberal immigration policy, the share of foreign-born inhabitants, many of them from non-European backgrounds, has risen from 10 percent in 1995 to 16 percent in 2015, which puts Sweden 3 percentage points above the United States. Thus, despite being rooted in a strong welfare state tradition, Swedish society has experienced considerable socioeconomic challenges and has suffered blows to its generous social policies during recent decades. In sum, Sweden shares many characteristics and experiences of highly developed nations, and in some respects, social trends have occurred earlier or are more pronounced in Sweden than in many other Western countries.

Sweden's crime levels and trends, too, have been similar to those of other West European countries (e.g., Estrada, 2019; von Hofer & Lappi-Seppälä, 2014; von Hofer et al., 2012). The homicide rate was ~1.0 during the 2000s, which was similar to many other European countries (United Nations Office on Drugs & Crime, 2014). The levels of adolescent delinquency in Sweden have appeared comparable with other European countries in the International Self Report Studies (Junger-Tas, 2012; Kivivuori, 2007). Police statistics have shown a drop in property crimes, whereas recorded violence, particularly among young people, has been more stable (Estrada, 2019). Both hospital data on injuries and homicide statistics, however, indicate that serious violence reached its highest point in Sweden in the early 1990s (1993 in the vital statistics) and has declined since then, as in most Western countries (LaFree et al., 2015; von Hofer et al., 2012). These divergent trends of violence could hint at a rising proportion of minor cases of violence reported to and recorded by the police (von Hofer et al. 2012; cf. Baumer & Lauritsen, 2010; Weaver et al., 2019) and reflect increasing cultural sensitivities toward violence among the population (Kivivuori, 2014; Tonry, 2014). If true, increasing sensitivities and formal social control that lead to short-term increases in recorded violence could also be a potential explanatory factor in the long-term decline of adolescent violence that we see in in self-report and victimization surveys.

In sum, as crime trends in Sweden have closely mirrored those of many other developed countries, our findings about the possible drivers of the adolescent crime drop can also be deemed relevant beyond Sweden.

2.5 | Aim and hypotheses

The aim of this study is to explore explanations of the Swedish crime trend among young people between 1999 and 2017. We will extend previous research by using a unique data set of eight sweeps

of a nationally representative youth survey from Sweden and examine to what extent changes in predictors relating to the theoretical domains of 1) social bonds, 2) attitudes toward crime, and 3) routine activities can explain the decline in youth crime. We test the following three main hypotheses:

Hypothesis 1: *An increase of parental monitoring and school bonds is associated with a decline in crime.*

Hypothesis 2: *An increase of negative attitudes toward crime is associated with a decline in crime.*

Hypothesis 3: *A decrease of time spent in unstructured routine activities and with friends during evenings, as well as of alcohol intoxication, are associated with a decline in crime.*

3 | DATA AND METHOD

3.1 | Sample

This study is based on eight sweeps of a nationally representative school survey in Sweden of ninth-grade students who were on average 15 years old, conducted by the Swedish National Council for Crime Prevention between 1999 and 2017 (Brå, 2013, 2018). The survey was conducted every second year between 1999 and 2005, and thereafter every third or fourth year. All surveys are based on random samples (within Sweden's 21 regions) of schools with year-nine classes.³ The data have primarily been collected between November and January. Students completed the self-administered paper questionnaires during lesson time in the presence of the teacher. The sample sizes were between ca. 6,000 and 8,000 from 1999 to 2011 and ca. 4,500 in 2015 and 2017 (see the appendix, table A1, at the end of the article). The nonresponse rates within participating schools were between 13.1 percent and 18.6 percent from 1999 until 2015 and 31.4 percent in 2017 (see the appendix, table A1). In total, 50,657 adolescents participated in these eight survey sweeps. After the exclusion of ca. 4 percent missing values, the sample size in multivariate models is between 48,715 and 48,776 cases depending on the delinquency outcome. Survey weights, which compensate for uneven sampling and nonresponse in regions were available only for the two last sweeps in 2015 and 2017 (Brå, 2018). We decided not to use them as the first six sweeps did not have any weights, as well as because weights are less relevant in the analysis of associations compared with descriptive frequencies. We repeated our analysis without the last two waves, however (see "Sensitivity Analyses" section).

3.2 | Measures

All survey items were identical across the first six sweeps during the period 1999–2011. The wording of some items or answer categories were slightly changed for the last two sweeps (2015 and 2017). For a detailed description of the items included in the scales and changes in question wordings, see the appendix, table A2. To check the robustness of our findings also in the light of these changes, as just mentioned, we repeated all models without the last two waves (see "Sensitivity Analyses" section).

³ For the two surveys 2015 and 2017, there were also a systematic sample of one school class to participate within the study.

3.2.1 | Dependent variable

Self-reported delinquency is measured by three constructs. The self-reported delinquency scale consisted of 19 items on criminal offending during the past 12 months, covering vandalism, minor theft, serious theft, fraud, and violence. The four answer categories were as follows: “0 times”, “1 to 2 times”, “3 to 5 times”, “6 to 10 times”, and “more than 10 times”. These responses were coded between 0 and 4, respectively. We computed additive scales that reflect the frequency of offending. A respondent who did not report any offense would score 0, whereas respondents who either reported to have committed “1 to 2” offenses in four different offense categories as well somebody who reported “more than 10 times” in just one offense category would both score 4, and the theoretically possible maximum score would be 76 (19×4) for the *overall delinquency* scale. Yet, considering the ordinal categories are compressed at the upper end of the distribution, the scale does not represent true counts. Cronbach’s alpha for the *overall delinquency* scale varies between .86 and .90 in the eight sweeps. The scale *serious property offending* consists of six items about theft of or from motor vehicles, stealing of bags, burglary, and selling stolen goods (Cronbach’s alpha between .72 and .85). The scale *violent offending* consists of four items about robbery and assault that resulted in serious bodily harm (Cronbach’s alpha between .53 and .85). Only for descriptive purposes, we also constructed a scale *minor offending* that includes nine items about vandalism, fraud, and theft (Cronbach’s alpha between .81 and .84). The delinquency scales were log-transformed to reduce skewness.

3.2.2 | Independent variables

Social bonds

Parental monitoring is an additive index based on two items measuring parents’ knowledge about where and with whom their child spends time during evening hours. Spearman’s coefficient of the two items varies between .59 and .65 in the eight sweeps. High scores indicate that respondents are strongly supervised by their parents. Considering research by Stattin and Kerr (2000), we assume that this index is likely to reflect disclosure by children as much as parents’ active monitoring efforts. *School bonds* is an additive index based on two questions about whether respondents like school and value their teachers. Spearman’s coefficient of these two items varies between .34 and .40 in the eight sweeps, which is less than optimal. One may assume that many students like school yet are critical of their teachers, which is indicated by lower approval rates for this item. High scores indicate that the respondents are strongly bonded to school.

Attitudes toward crime

Attitudes toward crime is represented by an additive index based on four items measuring whether the respondents consider it to be acceptable if their friends committed different criminal acts (shoplifting, car theft, graffiti spraying, and cannabis use). Different question wordings have been used in self-report surveys to capture delinquent attitudes, referring to different hypothetical actors such as the respondents themselves (e.g., Antonuccio & Tittle, 2008) or more generally to “someone of your age” (Wikström et al., 2012, p. 134). Considering the role of peers in influencing norms and actual behavior among adolescents, attitudes about friends’ actions are highly relevant for respondents’ own behavioral preferences (Megens & Weerman, 2012). We assume that the moral evaluations of friends’ actions mirror shared norms among adolescents that may

contribute to their proneness to offend. Cronbach's alpha for this scale varies between .85 and .88 in the eight sweeps. High scores indicate more delinquent attitudes.

Routine activities

Unstructured activities are measured using an additive index of four items from a longer list of items about places or facilities that the respondents visit during their free time at least a few times in a month: a youth club, a skateboard ramp, a disco, and an amusement arcade/place with pinball machines or billiard tables. These four items loaded on a common dimension in exploratory factor analyses. We recoded the additive index to three ordinal categories "none", "some" (if one of the four items was ticked), and "intense" (if two or more items were ticked). The selection of places and activities connected with these places may not be perfectly suited for monitoring long-term trends in adolescents' leisure time preferences. For example, playing pinball and billiards probably went out of fashion and was replaced by technologically advanced alternatives such as computer gaming (which however was not included in the item list). An item about one important form of unstructured socializing that has been used in other studies, namely hanging out with peers in open spaces or in shopping malls without doing anything particular (e.g., Bernasco et al., 2013; Gerstner & Oberwittler, 2018), has been adopted to the Swedish survey only in the most recent sweeps, and it could not be used for our analysis.

Evenings with friends is measured by a single item asking how many evenings in a week the respondents usually spend with friends, with ordinal categories ranging from none to more than four evenings.

Alcohol intoxication is based on a single item asking for the number of times the respondents had drunk alcohol during the last year so that they felt intoxicated, with ordinal categories ranging from none to more than 10 times.

Demographic variables

We control for *sex* and *immigrant background*, which is based on the country of birth of the respondents and their parents. We do not use age since the survey samples were restricted to a single school grade. The survey data lacks information on parental socioeconomic status. The descriptive statistics of all variables are documented in the appendix (table A3).

3.3 | Analytical strategy

There are two basic approaches to model temporal trends in self-reported delinquency and associated behaviors and attitudes when using repeated cross-sectional survey data: fixed-effects and random-effects models. In both cases, a set of individual-level predictors is used to account for the part of variance in the dependent variable that is attributable to differences between survey waves. In a fixed-effects regression model, the survey waves are represented by a set of dummy variables or a (curve-)linear time trend, whereas in a random-effects model, they constitute groups in which the respondents are clustered, leading to more appropriate estimates of standard errors (Fairbrother, 2014). Random-effects models have become increasingly popular for this reason in the analyses of large survey programs as the European Social Survey or the General Social Survey (Pittau et al., 2016; Schmidt-Catran & Fairbrother, 2016), they have recently been used by Baumer et al. (2021) analyzing delinquency trends in the Monitoring the Future survey, and we employ this approach here as well (see the "Sensitivity Analyses" section for a comparison with fixed-effects models). If a trend of youth offending over time exists, it will show as a significant

group-level variance component. To put our strategy in a nontechnical way, the aim of our analysis is first to identify the time trend in youth offending and then to “explain it away” with the help of respondent-level variables representing social bonds, attitudes toward crime, and routine activities. Even repeated cross-sectional survey waves, however, do not allow for a causal interpretation of findings as a result of a lack of clear time order of variables and potential omitted variable bias.

It is also worth considering that repeated cross-sectional surveys of a narrow age range of adolescents (or in our case, even a single school grade) are ill suited to distinguish between cohort and period effects that refer to potentially different causal mechanisms of a crime decline. As hypothetical examples, the “iPhone effect,” which assumes that adolescents quickly changed their social behavior following the diffusion of a technological innovation, (Twenge et al., 2018) would constitute a pure period effect, whereas the toxicological consequences of lead poisoning in infancy for behavior later in life (Sampson & Winter, 2018) would mark a pure cohort effect. Although our models likely reflect a mixture of cohort and period effects and we cannot distinguish their relative importance, it is still worth considering their potential bearing on the crime decline in future research.

A formal description of our analytical approach is given in the following equation:

$$y_{it} = y_{00} + y_{10-k0} X_{ij} + U_{0t} + R_{it} \quad (1)$$

where the outcome y_{it} is self-reported offending of individual i in survey year t . The random intercept model partitions the variance of y_{ij} into a component that is shared by respondents in the same survey year (U_{0t}), and the residual variance R_{it} . The model includes a vector of individual-level predictors $y_{10-k0} X_{ij}$, which will be introduced block-wise. We do not model a time trend using a level-2 predictor but prefer to analyze the reduction of level-2 variance as described in the following paragraph. Yet, we successfully tested alternative models including a significant level-2 time trend (see the “Sensitivity Analyses” section). We can estimate the random intercepts that represent the model-based means of youth offending in each survey year by combining the grand mean y_{00} with the year-specific deviation of the group means expressed in U_{0t} . Using linear hierarchical modeling, these are best linear unbiased predictions of the random effects (Stata Corp., 2015, p. 425). In the null model without predictors, the predicted random effects equal the raw means of the dependent variable for each survey year. Introducing individual-level predictors will reduce the residual, unexplained variance R_{it} to the degree that they share variance with the outcome. In addition, to the extent that these predictors also share group-level variance with the outcome, the variance component U_{0t} will also be reduced. This reduction will be our main focus. It is crucial that respondent-level predictors are not group-mean-centered but remain uncentered or are grand-mean-centered for this variance reduction on the group level to happen (Raudenbush & Bryk, 2002, p. 142). Consequently, the predictions of delinquent behavior will be adjusted for all effects represented in a model. We can estimate the share of explained variance on both levels by computing the proportional reductions in the two variance components R_{it} and U_{0t} , comparing models before and after including specific predictors. Thus, in effect, the proportional reduction of the year-level variance reflects the explanatory power of the individual-level predictors on the declining trend of youth crime over eight survey sweeps. If most of the year-level variance is explained and U_{0t} is reduced accordingly, then the random intercepts will be close to the grand mean, and thus, the time trend will be successfully “explained away.” We illustrate these changing predictions over consecutive models by plotting the random intercepts from each model in figure 3a.

As computing variance components and reductions in variance is not straightforward in nonlinear hierarchical modeling, we decided to run linear hierarchical regression models with log-transformed dependent variables to reduce skewness. To check the robustness of results, all models were also run as negative binomial multilevel models, and those showed no substantial differences to the reported models (see the “Sensitivity Analyses” section and the results presented online as supporting information⁴). Just eight survey waves represent a small number of clusters for hierarchical modeling and call for a cautious interpretation of results, as the estimation of variance components may be less robust. To address this issue, we employed restricted maximum likelihood estimation. Elff et al. (2021) showed in a simulation study that this method leads to unbiased estimates even with a few groups (and that estimates of group-level variances were biased *downward* using standard maximum likelihood). We also compare the random intercept models with the fixed-effects models in the “Sensitivity Analyses” section. We used Stata 15 (mixed, menbreg) for all statistical analyses. Interval-scaled predictors were standardized.

4 | RESULTS

4.1 | Descriptive statistics

Initially we present descriptive evidence for a declining trend in youth crime in Sweden. All of the following mean differences are highly significant ($p < .001$).⁵ Figure 1a shows a drop in the frequency scales for overall offending as well as for minor delinquency, serious property, and violent offending. A value of around 4 for overall offending in 1999 represents the arithmetic mean of all respondents who either did not offend at all or offended in varying degrees of frequencies. As this trend is difficult to spot for the less frequent types of offending, figure 1b displays the same time series indexed to 100 for 1999. All types of offending have decreased in frequency by ca. 50 percent between 1999 and 2017. The decline seems to have been somewhat steeper between 1999 and 2011 for serious property and violence offenses, which remained stable after 2011, whereas overall offending (which is largely driven by the more frequent forms of minor offenses) continued to decline after 2011.⁶

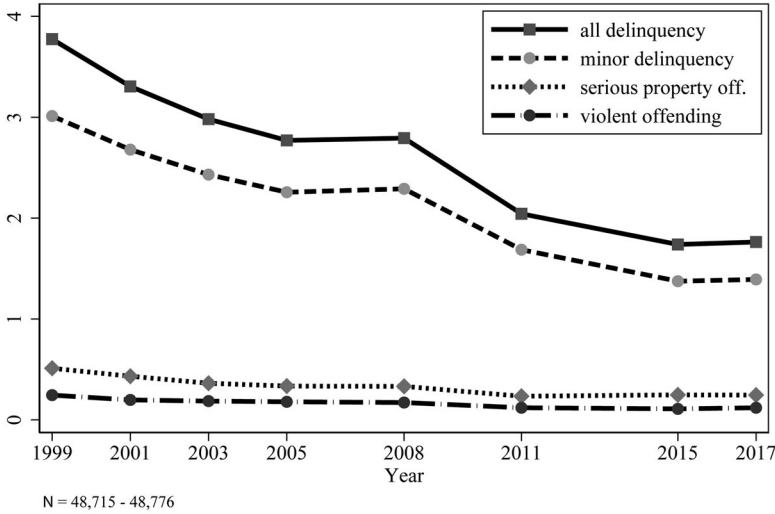
Next, we present a descriptive overview on the development over time of the explanatory variables. For the comparability of these predictors, all were standardized around the grand mean of the pooled sample of eight survey sweeps. Figure 2a shows that parental monitoring and bonds to schools became stronger over time and that attitudes toward crime became less approving. Yet, with a range of less than .4 standard deviations, these changes were not pronounced. For example, school bonds started at $-.2$ standard deviations below the grand mean of all survey sweeps in

⁴ Additional supporting information can be found in the full text tab for this article in the Wiley Online Library at <http://onlinelibrary.wiley.com/doi/10.1111/crim.2021.59.issue-2/issuetoc>.

⁵ These and the following significance tests reported in this section are based on analysis of variance with survey years as groups.

⁶ Although the issue of prevalence versus frequency of offending is not a focus of the present analysis, we compared the changes in offending frequencies with the changes in prevalence rates. The prevalence rates for overall and minor delinquency (which stood at ca. 60 percent in 1999) showed a proportional decrease by around 40 percent. The prevalence rate of violent offending dropped more strongly by 60 percent.

(a) Trends in adolescent delinquency (frequency)



(b) Trends in adolescent delinquency (frequency, 1999=100)

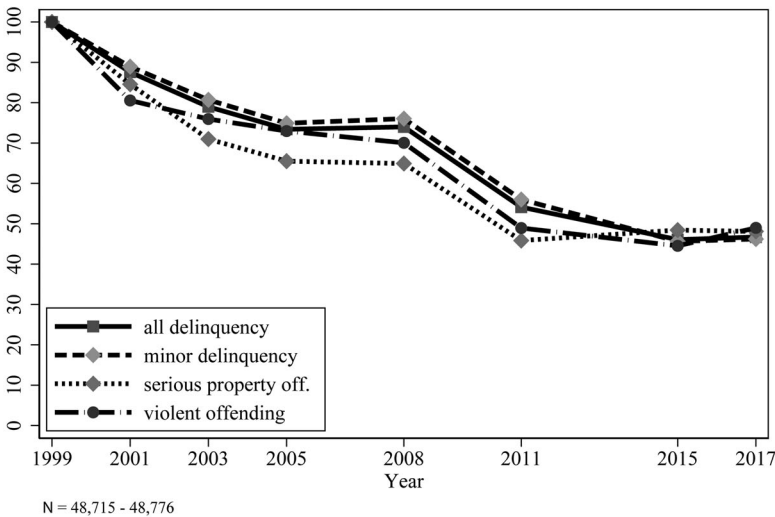
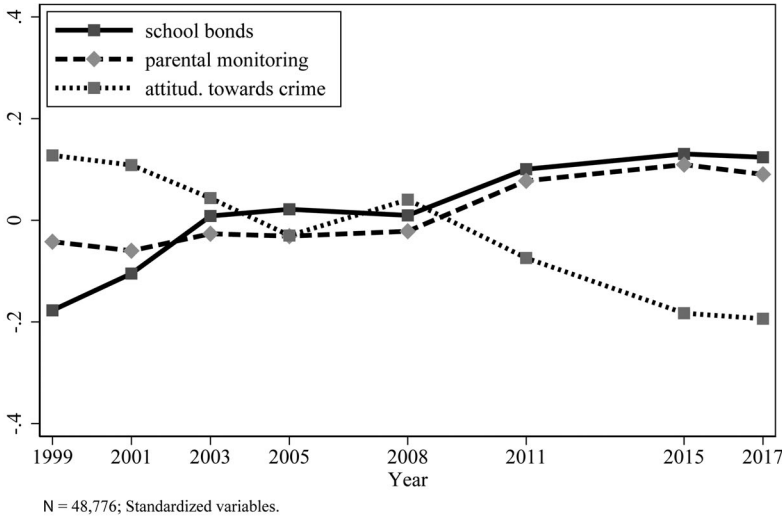


FIGURE 1 Trends in adolescent delinquency, 1999–2017

1999 and ended at less than +.2 standard deviations in 2017. Figure 2b displays the corresponding changes in the three predictors for routine activities. These show more pronounced declining trends in the range of .6 standard deviations from the grand mean, and they seem to have occurred slightly earlier for unstructured activities and slightly later for spending evening with friends and alcohol intoxication. Again, all of these changes over time are highly significant ($p < .001$).

In sum, the descriptive findings support both the declining trend of adolescents' offending as well as the corresponding and expected changes in all independent variables from the three theoretical domains.

(a) Trends in social bonds and attitudes towards crime



(b) Trends in routine activities

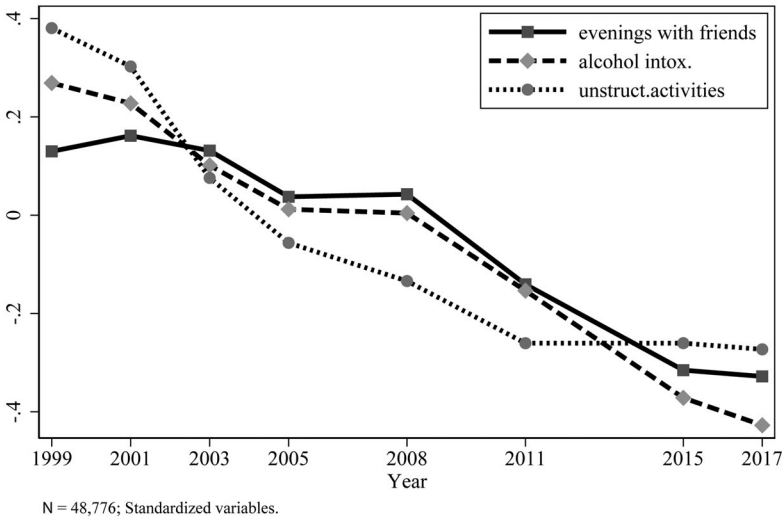


FIGURE 2 Trends in predictor variables, 1999–2017

4.2 | Multivariate analysis

We now turn to the results of multilevel regression analyses. The central research question is as follows: To what extent can the individual-level predictors of three theoretical domains account for the declining trend of youth crime that is modeled on the group level? These predictors are entered block-wise according to these domains into the regression. Because the effect of alcohol intoxication was particularly strong, we decided to keep this predictor in a separate block before the final model, which includes all predictors.

The model results for overall delinquency can be found in table 1. We support the interpretation of these models with figure 3a, which graphically displays the estimated random intercepts centered around a grand mean of 0 of the eight survey sweeps for each model, and with figure 3b,

TABLE 1 Multilevel linear regression models of overall delinquency

	(1)		(2)		(3)		(4)		(5)	
	BONDS		CRIME ATT.		ROUT. ACT.		ALC. INTOX.		FULL MOD.	
All offending (log freq.)	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Sex: boy	.275***	.007	.096***	.007	.272***	.008	.382***	.007	.172***	.006
Immigrant background (ref.: no)										
1st generation	.125***	.016	.101***	.015	.026	.016	.227***	.015	.155***	.013
2nd generation	.184***	.015	.150***	.014	.131***	.016	.277***	.014	.195***	.012
2nd generation mixed parents	.124***	.013	.079***	.012	.129***	.013	.128***	.012	.073***	.010
School bonds	-.205***	.004							-.099***	.003
Parental monitoring	-.291***	.004							-.095***	.003
Attitudes toward crime			.504***	.004					.143***	.009
Evening with friends (ref.: none)										
1-2					.150***	.011			.041***	.009
3-4					.374***	.011			.090***	.010
>4					.735***	.013			.203***	.012
Unstructured activities (ref.: none)										
Some					.305***	.009			.139***	.007
Intense					.822***	.023			.404***	.021
Alcohol intoxication (ref.: none)										
1-2							.390***	.010	.229***	.009
3-5							.616***	.012	.335***	.011
6-10							.843***	.013	.469***	.012
>10							1.349***	.010	.696***	.011

(Continues)

TABLE 1 (Continued)

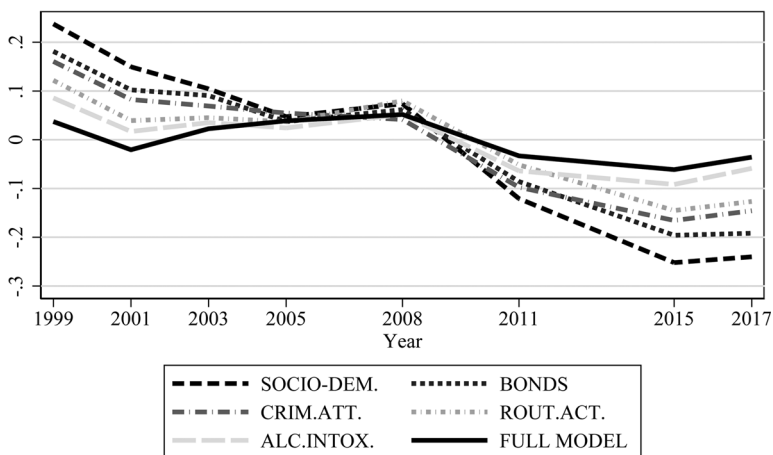
	(1)		(2)		(3)		(4)		(5)	
	BONDS	SE	CRIME ATT.	SE	ROUT. ACT.	SE	ALC. INTOX.	SE	FULL MOD.	SE
All offending (log freq.)	Coef.		Coef.		Coef.		Coef.		Coef.	
Interaction X Attitudes toward crime										
Evening with friends = 1–2									.027**	.010
Evening with friends = 3–4									.069***	.010
Evening with friends = > 4									.084***	.011
Unstructured activities = some									.046***	.007
Unstructured activities = intense									.066***	.015
Alcohol intoxication 1–2									.105***	.010
Alcohol intoxication 3–5									.113***	.011
Alcohol intoxication 6–10									.125***	.012
Alcohol intoxication > 10									.159***	.009
Constant	.575***	.050	.677***	.043	.175***	.036	.105***	.024	.255***	.018
Variance components										
L2 (year)	.020***	.005	.014***	.004	.009***	.003	.004***	.001	.002***	.001
L1 (respondent)	.649***	.002	.569***	.002	.693***	.002	.579***	.002	.437***	.001
L2 var. reduction vs. M cond. ^a (%)	40.2		56.9		71.7		87.7		94.5	
L1 var. reduction vs. M conc. ^a (%)	19.1		29.2		13.7		27.9		45.6	
AIC	117,303.700		110,848.503		120,494.684		111,761.504		98,219.831	

Notes. N = 48,715 in 8 waves; ICC in conditional model: 4.0 %; residual categories N/A included but not reported.

^aM cond: conditional model.

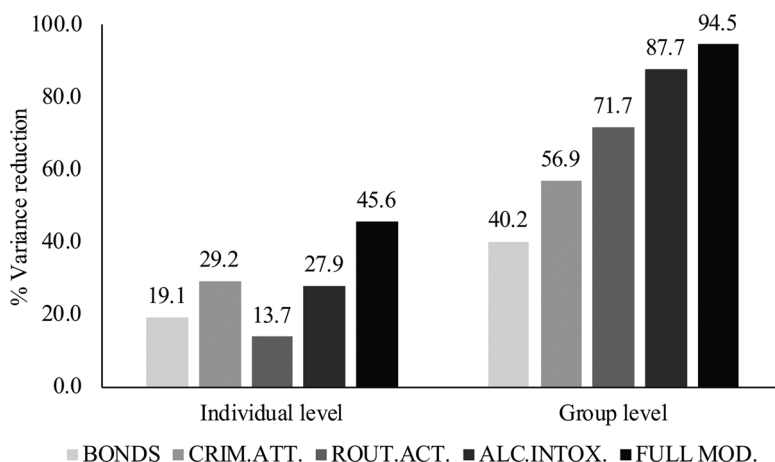
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

(a) Random effects estimated from blockwise linear multilevel models (overall delinquency)



N = 48,715

(b) Proportional reduction of variance in blockwise linear multilevel models (overall delinquency)



N = 48,715

FIGURE 3 Random effects and proportional reduction of variance in blockwise linear multilevel models (overall delinquency)

which graphically displays the proportional reduction in variance on level 1 (respondent level) and on level 2 (year level).

In the conditional model (not reported in table 1), which controls for sex and immigrant background, the intraclass correlation coefficient indicates that 4 percent of the total variance is between the survey sweeps. Although this proportion seems low, it is typical for behavioral outcomes where most of the variation lies between the individuals (Duncan & Raudenbush, 1999). In figure 3a, the line labeled “socio-dem.” displays the random intercepts of the conditional model, which clearly reflect the declining time trend familiar from the descriptive plot in figure 1a. Boys report significantly more offenses, as do adolescents with immigrant backgrounds (in particular second generation).

The first model reported in table 1 looks at the effects of parental monitoring and school bonds. The unstandardized coefficients show that both predictors are negatively associated with offending. As the dependent variable is log-transformed, their numeric values do not reveal much except the direction and relative strength of effects. The year-level variance—the main focus of our interest—is reduced by 40 percent, whereas the respondent-level variation is reduced by 19 percent (these and the following percentages are rounded; please refer to table 1 and figure 3b for exact results). It should be noted that the proportional reduction of variance in multilevel models is often higher at the group level, which however represents only a small portion of the total variance, than at the individual level, and considering the low number of groups, we prefer to interpret this and the following results cautiously.⁷

The reduction in year-level variance leads to a partial reduction in the random intercepts plotted in figure 3a (line labeled “bonds”). The next model 2 alternatively includes the predictor “attitudes toward crime” which is strongly associated with delinquency. The proportional reduction of variance is stronger compared with the previous model (57 percent of year-level, 29 percent of respondent-level variance), and the plotted line of random intercepts in figure 3a (labeled “crim.att.”) is slightly less steep than the line of the previous model. Model 3 estimates the effects of two predictors representing routine activities that both are significant and provide a stronger reduction of variance between the survey sweeps (72 percent) but a lesser reduction of variance on the respondent level (14 percent). Spending more than four evenings with friends ($B = .735$) and “intense” unstructured activities (two or more types of activities, $B = .822$) are more strongly associated with delinquency than having a 1 standard deviation higher score on the scale attitudes toward crime in the previous model ($B = .504$). More frequent incidences of alcohol intoxication are even more strongly associated with delinquency ($B = .843$ for “6 to 10 times”, $B = 1.349$ for “more than 10 times”) than the previous variables of routine activities indicating a close association between heavy alcohol consumption and delinquency. Note as these models look at the effects of predictors separately they do not consider possible interactions with delinquent attitudes yet. Model 4 looks at the effects of alcohol intoxication separately. Almost 90 percent of the year-level variance is explained by alcohol intoxication alone. Accordingly, the line of predicted random intercepts for this model (line “alc.intox.” in figure 3a) is now almost flat. Thus, whereas the previous models covering the effects of social bonds and attitudes reduced the declining trend in offending only partially (with up to 57 percent of the year differences explained), the two models using routine activity predictors provide stronger reductions in year-level variance (72 percent to 88 percent), whereas the variance reduction on the level of individual respondents is not stronger than in the first two models (14 percent to 28 percent). These results are in line with Baumer et al. (2021) who also found that changes in unstructured socializing and alcohol contributed more to the explanation of the crime decline than relations to parents and school.

The last model (table 1, model 5) includes all predictors from previous models plus the interactions between attitudes toward crime and all three predictors of routine activities including alcohol intoxication.⁸ Confirming our assumptions, these interactions are strongly significant,

⁷ The proportions of explained variance at the group level may often be larger because this variance component is stripped off the individual-level random variation. (See examples in Snijders & Boskers, 2012, p. 35; Raudenbush & Bryk, 2002, p. 74; cf. for geographic units at different levels of aggregation, Oberwittler & Wikström, 2009.)

⁸ We acknowledge that the use of multiplicative terms in linear regression models with log-transformed dependent variables may not be an adequate strategy in many cases because of the nonlinear properties of the function. In this case, the interaction is sufficiently robust to produce significant interaction terms. See Hannon and Knapp (2003) and Svensson and Oberwittler (2010).

and routine activities lose most of their influence on offending if adolescents disapprove of criminal behaviors, in support of situational action theory (Wikström et al., 2012). In this full model, the proportional reduction of respondent-level variance increases to 46 percent, whereas the reduction of year-level variance is now almost complete (95 percent). Looking again at the plotted random intercepts in figure 3a, the line of the full model (line “full model”) is almost flat, with only minor fluctuations around the grand mean left.

In sum, the multilevel models indicate that the variance component representing the declining trend in delinquency can be almost completely explained by changes in social bonds, attitudes toward crime, and routine activities. Routine activities and heavy alcohol consumption show a particularly strong association with the decline in crime when compared with social bonds and attitudes toward crime. It is intriguing that the same finding has been reported by Baumer et al. (2021) based on independent data from a different country. The three explanatory variables measuring routine activities and alcohol consumption together account for as much of the year-level variance as the all predictors in the full model (model not reported). It is particularly noteworthy that even though attitudes toward crime and alcohol intoxication both explain almost the same portion of respondent-level variance (29 percent vs. 28 percent); the former can only explain 57 percent and the latter 88 percent of the year-level variance. This difference corresponds with the weaker declining time trend for attitudes toward crime compared with a stronger declining trend of alcohol intoxication (see figure 2a, 2b).

We repeated the same series of multilevel models using violent and serious property offenses as dependent variables (see online tables 1a-b and online figures 1a-b in the supporting information). These analyses show identical patterns compared with the analysis of overall offending and confirm that changes in routine activities and alcohol consumption were decisive for the declining trend also in more serious forms of adolescent crime.

4.2.1 | Sensitivity analyses

We ran several alternative models to test the robustness of our findings. First, we repeated our series of models using nonlinear, negative binomial multilevel regression analysis that is suited to the highly skewed dependent variable. Although it is not straightforward to compute the proportional reduction of variance in nonlinear models, we can at least predict and plot the random intercepts of all models in the same way as we did in the main analyses using linear regression. The results confirm our central finding that the predictors representing routine activities and particularly alcohol intoxication account for most of the declining crime trend, whereas the predictors representing social bonds and attitudes for crime do so only partially. All predictors combined almost completely account for the decline of youth crime, as in the linear models (see online table 2 and figure 2 in the supporting information).

Second, we ran negative binomial regression models including a time trend as a group-level predictor (see online table 3 in the supporting information). Considering the inherent nonlinear nature of the log link function, the simple time predictor translates into a nonlinear declining trend that slightly abates over subsequent survey waves. Importantly, the trend coefficient was rendered smaller and smaller in subsequent regression models as more and more of the year-level variance was explained by respondent-level predictors (see online figure 3 in the supporting information). Comparing the final model with the conditional model, the time trend coefficient was reduced by 83 percent for overall offending.

Third, considering that eight survey waves are very few groups for a multilevel approach, we ran fixed-effects models with dummy variables representing the survey waves instead of hierarchical random-effects models (see online table 4 and figure 4 in the supporting information). If our multilevel model results were tainted by biased estimates of variance components, then fixed-effects models would offer a more robust alternative approach. Yet, comparing the coefficients of the wave dummies in the start model without substantial predictors with the full model with all substantial predictors, again these coefficients were reduced close to zero. In online table 4, the dummy predictor for year 2017, which represents the crime drop since 1999, is attenuated by 84 percent (from $-.480$ to $-.078$). This reduction is considerably stronger than the 35 percent reduction of the crime decline in the explanatory models reported by Baumer et al. (2021, p. 15), but it matches the estimated reduction of the time trend coefficient in the random intercept model reported above (online table 3 in the supporting information).

In addition to comparing alternative model approaches, we also looked for changes in the relevance of individual-level predictors but found little evidence for variability of coefficients over time, apart from a weakening of the effects of parental monitoring and attitudes toward crime (see online figures 5a–f in the supporting information).⁹ Although not a focus of our analysis, this suggests that the relevance of predictors for the explanation of individual criminal behavior did not substantially change during the two decades (cf. van der Laan et al., 2019).

Finally, we repeated all linear hierarchical models using only the first six survey sweeps covering the period 1999 to 2011 to avoid problems arising from both different wordings of the survey questions and differences in the sampling design and nonresponse in the last two sweeps (2015 and 2017; see online tables 6 and online figures 6a–b in the supporting information). These models show essentially the same picture and confirm our main findings.

5 | DISCUSSION AND CONCLUSION

This article contributes to understanding the causes of the decline in youth crime in recent decades. Looking at the micro-foundation of individual-level correlates of adolescent offending, we argued that changes in social bonds, attitudes toward crime, and daily routine activities all have contributed to the decline in youth crime. We investigated this using a series of eight sweeps of a nationally representative school survey from Sweden, covering a period of 18 years between 1999 and 2017. The self-report data from these sweeps confirm that youth crime declined considerably in Sweden over this time period for different crime types, which is in line with the trends in youth crime in many other societies across West Europe and North America.

5.1 | Summary of results

Using multilevel models with survey year as the group level, and entering explanatory variables on the individual respondent level, we found that 95 percent of the between-year variance of

⁹ In assessing these slope differences, the conditional nature of the effect of crime attitudes must be considered. As we found very substantial interaction effect between crime attitudes and routine activities, the slope of 'crime attitude' based on more simple regression model reported in these sensitivity tests does reflect the strength of the effect at an average value of the respective values of routine activity variables. More in-depth analyses including the interaction terms would be necessary to ascertain the character of these changes.

delinquency was accounted for by changes in adolescents' attitudes and behavior. We regard these and the following numeric results representing proportional reductions in variance as indicative for the substantive relevance of model results but apply caution because of the small number of survey waves. Alternative fixed effects models led to similar results—a reduction of the declining crime trend by 84 percent after controlling for all explanatory variables. Overall, our analyses show that the investigated factors—indicators of parental monitoring, school bonds, attitudes toward crime, and routine activities including alcohol intoxication—account for the largest portion of the decline of delinquency over two decades and eight waves of survey data.

Confirming our first hypothesis, we found that an increase in parental monitoring and school bonds partially accounts for the decline in delinquency, explaining 40 percent of its year-level variance. Relations to parents and school bonds tap into core elements of social control theory, and recent research from various countries supports the notion that both have grown stronger in recent decades (Clark et al., 2013; Curran & Hill, 2019; Kivivuori & Bernburg, 2011; Raitasalo et al., 2018).

In line with our second hypothesis we found that an increase of negative attitudes toward crime explained 57 percent of the decline in delinquency. Shifts in the moral climate have been discussed by some scholars in relation to the decline of delinquency (Berghuis & De Waard, 2017; Kivivuori & Bernburg, 2011) but seem to have been underrated in the main body of research on the crime drop (Tcherni-Buzzeo, 2019; Tonry, 2014).

Our third hypothesis dealt with the role of adolescent routine activities and alcohol consumption. Our analyses found that changes in daily routine activities accounted for a larger part of the crime decline than changes in social bonds and attitudes toward crime. Two indicators of routine activities (evenings with friends and unstructured activities) explained 72 percent of the decline in overall offending, whereas alcohol intoxication explained an even larger share of this decline (88 percent). Thus, unstructured routine activities which foster situational inducements and opportunities to commit crimes proved more relevant for the decline in crime than parental control, bonds to school, and attitudes toward crime, even though their explanatory power was much weaker on the individual level. Although all of the explanatory variables used in our models showed temporal trends in accordance with the declining crime trend, the changes in routine activities and alcohol consumption were stronger than the changes in social bonds and attitudes toward crime that correspond with their stronger effect on the changes in youth crime (cf. Baumer et al., 2021).

5.2 | Contribution to research on the crime drop

Taken together, our findings underline the relevance of long-term changes in adolescent social relations and daily routine activities for the explanation of the downward trend in delinquency. They support claims that the decline in peer-oriented “nondigital” activities in particular constitutes a major behavioral shift in adolescence with consequences for receding delinquency. This study is not the first to observe these connections. Yet, most previous research has looked at these aspects of adolescent social behaviors separately, was mainly descriptive or correlational, and did not analyze the interrelations between behavioral domains (e.g., Arnett, 2018; Balvig, 2011; Berghuis & De Waard, 2017; Keyes et al., 2018; Moss et al., 2019; Twenge & Park, 2019). The current study adds substantially to the understanding of the crime decline because it models long-term changes in criminal behavior as an outcome of long-term changes in relevant aspects of adolescents' lives that correspond to proximate influences on delinquency. Also, it does so not on a national, aggregate level of correlated time series but on the individual level, employing multilevel

modeling with time as a higher level. Compared with merely suggesting a correlation between two parallel trends of national aggregate time series, the proof that such associations exist on the micro-level of individual adolescents is important and marks a step toward exploring the causal mechanisms of long-term changes in criminal behavior. Based on repeated cross-sectional data, however, the study cannot claim causality. In addition, identifying potential mechanism of the crime decline on the micro-level does not make the search for macro-level factors that may have influenced the observed changes less important.

Our study joins a small, emerging field of research based on repeated cross-sectional survey data which help to move the analysis of adolescent crime trends closer to “the contours of existing etiological research on crime” (Baumer et al., 2018, p. 56). Some previous studies, however, were limited by a small number of time points and/or a narrow range of facets of adolescent lives (Keyes et al., 2018; van der Laan et al., 2019). The recent study by Baumer and colleagues (2021) expanded this research by exploiting 25 waves of Monitoring the Future data and considering a larger set of predictors simultaneously in multilevel models. Looking at delinquency *prevalence*, they found that unstructured socializing and alcohol use were the major factors associated with the crime decline, whereas relations to parents and school bonds remained stable and did not contribute to its explanation. The present study that analyzed delinquency *frequencies* using survey data from Sweden confirms these findings from the United States: Changes in unstructured activities and alcohol use were the most important factors connected with the crime decline. It is intriguing that this main finding is identical in two independent studies from different national contexts. Yet, other than Baumer et al. (2021), we did find some additional if minor effects of school and parental bonds as well as attitudes to crime that also showed long-term trends in the expected direction. Whether this reflects cross-national differences or is a result of survey methodology remains unclear. Also, there is no apparent explanation why we can account for most of the declining trend in Sweden, whereas Baumer et al. (2021) accounted for approximately a third of the trend. Future analyses should compare the temporal trends of crime *frequency* (our dependent variable) with those of crime *prevalence* (Baumer et al.’s dependent variable; Berg et al., 2016; Sivertsen et al., 2019). Also, more studies from other countries may help to shed light on these discrepancies.

Both the present study and the study by Baumer et al. (2021) underline the value of using repeated cross-sectional survey data and applying sophisticated statistical approaches such as multilevel modeling that partitions the variability into its individual and temporal components and elegantly helps to gauge the explanatory power of micro-level predictors on national crime trends.

The present study adds a specific perspective to a diverse and heterogenous research field. Much of the crime drop literature has focused on serious forms of crime such as homicide and on macro-level influences such as crime policies, security measures, or changing drug markets (Baumer et al., 2018; van Dijk et al., 2012). Using adolescents’ self-report data, the present study instead offers a micro-level, etiological analysis of criminal behavior at the lower, less serious end of the scale. This focus on proximate influences on delinquency has both advantages and disadvantages. The results lend empirical support to several hypotheses that have been prominent in the recent literature on the crime drop among adolescents (e.g., Arnett, 2018; Balvig, 2011; Baumer et al., 2021; Berghuis & De Waard, 2017; Moss et al., 2019; Pape et al., 2018; Twenge & Park, 2019). On the other hand, it inevitably leaves questions about the “causes of the causes” (Wikström, 2007) unanswered. Even if the micro-level analysis considerably contributes to the understanding of the long-term decline of youth crime, distal factors potentially situated at societal macro-levels can still be assumed to exert important effects in the background. Yet, these distal factors and

the mechanisms of translating them into individual behavior seem less accessible to empirical analysis. Although we can observe changes in parent–child relations or adolescents’ attitudes toward school or criminal behavior, it is more difficult, and beyond the scope of this study, to ascertain the drivers of these long-term societal trends and cultural shifts (e.g., Eisner, 2014), such as the assumption that changes in the labor market force adolescents to be more future oriented (Balvig, 2011), or that outlawing spanking by parents improves parent–child relations and reduces delinquency (Lansford et al., 2017). Both a long-term trend toward more careful and protective child-rearing practices and, more recently, toward online activities are two elements of societal changes that are plausibly being connected with the adolescent crime decline. To identify the effects of such macro-level changes on adolescents’ attitudes and behaviors, cross-cultural samples and societal-level variability in the relevant phenomena are needed (e.g., Deater-Deckard et al., 2018; Inglehart & Welzel, 2005).

Still, we would claim that the results of this study can contribute also to discussions about macro-level influences on the crime drop. Our findings question the validity of the security or “debut crime” hypothesis that sees technological innovations, essentially the target hardening of objects that could be stolen, as the prime cause of the adolescent crime drop (Farrell et al., 2015). In light of the strong association between the decline in unstructured out-of-home activities and the decline in various types of delinquency, we find it inconceivable that the improved security of cars or dwellings against property crimes induced adolescents to become less delinquent than previous cohorts (cf. Tonry, 2014, p. 5). Stronger security may have curtailed opportunities for crime and contributed to influenced adolescents’ normative beliefs about right and wrong behavior or intensified a cultural shift toward social control (Eisner, 2014, p. 123), but it is unlikely that it brought about the broader social change in adolescent social relations and daily routine activities that we observed in the current study, and that can plausibly be associated with the decline in youth crime. To put it more plainly, why should improved car security or technical surveillance induce a generation of adolescents to spend less time with their friends during evening hours?

Although our results also point at the strong effects of changing routine activities, they guard against a reductionist understanding of routine activities as merely the technical opportunity to commit property crimes. We prefer a more comprehensive understanding of adolescent routine activities that encompasses behavioral preferences, lifestyles, and youth cultures (Hoeben et al., 2016; Osgood et al., 1996) and does not neglect the conditionality of the criminogenic effects of routine activities on adolescents’ delinquent propensities (e.g., Gerstner & Oberwittler, 2018; Wikström et al., 2018). This conditionality has once more been confirmed by significant interaction effects between routine activities and delinquent attitudes in our models.

5.3 | Limitations

Apart from the general consequences of the micro-level approach and its focus on proximate influences on delinquency discussed in the previous section, this study has several limitations that need to be addressed.

First, several potentially relevant indicators are omitted from our analysis. Apart from psychological concepts such as self-control or sensation seeking, which has been discussed as a possible explanation of the decline in crime (Baumer et al., 2018, 2021), van der Laan et al. (2019) also included individual factors such as hyperactivity in their study.

Second, one particularly unfortunate omission from our analysis is the role of digital media and online activities in adolescents’ daily lives. These aspects were also not addressed in the

survey. That the decline in youth crime has been caused by the digital revolution is a widely discussed assumption (Arnett, 2018; Weerman, 2017). As time budget studies have revealed a shift from offline to online activities and a decline of time spent out-of-house with peers, our finding that a decline in unstructured socializing and alcohol consumption had the strongest effect on the decline of youth crime could be seen as an indirect support of this assumption. Twenge and Park (2019, p. 647) claimed, however, that the decline of some routine activities started before Internet use became more widespread among adolescents, and therefore, the Internet can only be a partial explanation of the changes in daily routines.

Third, we are also not able to contribute to the discussion about a possible shift from traditional crime to cybercrime (e.g., Weerman, 2017). Among adolescents specifically, cyberbullying has grown into a prevalent form of relational aggression that partly may replace physical violence (Brochado et al., 2017). Again, some scholars have argued that the decline in crime started before the spread of cybercrime (Farrell & Birks, 2018). This means that more research is needed to clarify whether or to what extent traditional “offline” crimes have been replaced by cybercrimes among adolescents.

Fourth, there are some methodological limitations. Although the repeated national-representative surveys are suitable for trend analyses, the data remains cross-sectional, which precludes causal claims. For example, the contemporaneous measurement of crime attitudes and delinquent behavior surely overestimates the “true” association of the two variables, and we cannot be certain whether a shift in attitudes influences behavior or vice versa.

Although we are covering a period of 18 years, we only have eight measuring points. For comparison, van der Laan et al. (2019) used three measurement points, whereas Keyes et al. (2018) and Baumer et al. (2021) were able to use more than twenty. Nevertheless, considering the stable long-term trends in the survey data, the use of REML estimators and the results of sensitivity analyses (i.e., fixed-effects models), we regard our findings as robust.

Despite these limitations, this study showed that a focus on the micro-level of individual explanatory factors of youth crime advances the understanding of the long-term decline in youth crime. The study adds to the literature by putting theoretically relevant factors to an empirical test using a unique multiwave data set. The results show that factors linked to routine activity theory are most strongly associated with the decline in youth crime during the last two decades.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

How to cite this article: Svensson R, Oberwittler D. Changing routine activities and the decline of youth crime: A repeated cross-sectional analysis of self-reported delinquency in Sweden, 1999–2017. *Criminology*. 2021;1–36. <https://doi.org/10.1111/1745-9125.12273>

APPENDIX

TABLE A1 Sample sizes and nonresponse rates by survey year

Year of study	Participants	Nonresponse rate (%)*
1999	6,003	13.5
2001	8,203	13.1
2003	6,692	14.0
2005	7,449	13.7
2008	6,893	18.6
2011	6,490	14.5
2015	4,659	16.2
2017	4,268	31.4

*Within participating classes.

TABLE A2 Detailed description of the items included in the study

Scales	1999–2011	2015–2017
Self-reported delinquency	Intentionally destroyed a call box, street lamp, window, somebody's bicycle or something else that did not belong to you	Intentionally destroyed things that did not belong to you (e.g., bus shelter, street lamp, window, someone's bicycle or similar)
	Scribbled so-called tags or other words with ink or spray paint somewhere	Scribbled tags or similar with ink of spray paint
	Did a large graffiti painting with several different spray colors on, for example, a concrete wall without permission	Did a large graffiti painting without permission
	Stolen something from a shop or department store	Stolen something from a shop
	Used a forged ID card	Used somebody else's or a forged ID card
	Cheated someone into giving you money	<i>Unchanged</i>
	Stolen something from school	<i>Unchanged</i>
	Stolen a bicycle	<i>Unchanged</i>
	Bought something you knew was stolen	<i>Unchanged</i>
	Stolen a moped or motorcycle	<i>Unchanged</i>
	Stolen a car	<i>Unchanged</i>
	Stolen something out of a car	<i>Unchanged</i>
	Snatched a bag, purse, or similar from somebody you did not know	<i>Unchanged</i>
	Broken into someone's home or some other building	<i>Unchanged</i>
	Sold something you knew was stolen	<i>Unchanged</i>
	Threatened somebody with violence or with a weapon in order to obtain money or other valuables	Threatened somebody with violence or with a weapon in order to obtain money or other valuables (e.g., mobile phone)
	Intentionally beaten somebody up (other than a member of your family) so you think or know he/she needed medical treatment	<i>Unchanged</i>
	Intentionally beaten somebody up that belongs to your family so you think or know he/she needed medical treatment	<i>Unchanged</i>
	Intentionally injured somebody with a knife or other weapon	Intentionally injured somebody with a weapon (e.g., knife)
		(none / 1–2 times / 3–5 times / 6–10 times / 11 times or more)
Parental monitoring	Do your parents know where you are if you are out in the evening?	How often do one of your parents know where you are if you are out in the evening?
	Do your parents know whom you meet if you are out in the evening?	How often do some of your parents whom you meet if you are out in the evening?
	(1 No never / 2 seldom / 3 sometimes / 4 often / 5 yes, always)	(Never, almost never / Sometimes / often / always, almost always / Never go out in the evening) <i>((almost) always & never go out combined)</i>

(Continues)

TABLE A2 (Continued)

Scales	1999–2011	2015–2017
School bonds	Do you like school? (Never / mostly not / as good as bad / most of the time / always) Do you like your teachers? (None of them is good / most of them are bad / as many good as bad / most are good / all of them are good)	How do you like your school? (very bad / rather bad / neither good nor bad / rather good / very good) Do you think your teachers are good? (All of them are bad / most of them are bad / as many good as bad / most of them are good / all of them are good)
Attitudes toward crime	Would you think it to be ok if your friends... - stole something from a shop - smoked hash - stole a car - did a large graffiti painting (yes that's ok / pretty ok / hesitant / hardly ok / not ok)	<i>Unchanged</i>
Alcohol intoxication	Did you drink beer, wine, hard liquor, or other alcohol so that you felt drunken? (none / 1–2 times / 3–5 times / 6–10 times / more than 10 times)	<i>Unchanged</i>
Unstructured activities	Do you usually visit the following places at least a few times a month at your leisure time? - youth club - skateboard ramp - amusement arcade/place with pinball machines or billiard tables - disco (yes / no)	<i>Unchanged</i>
Evenings with friends	How often do you usually meet friends in the evenings? (less than once a week / 1–2 evenings / 3–4 evenings / 5–6 evenings ore more)	How many evenings in a week do you usually meet friends, for example at a youth club, outside or at someone's home? (5 evenings or more / 3–4 evenings / 1–2 evenings / less than once a week / never) (<i>less than once a week & never combined</i>)

TABLE A3 Descriptive statistics

	Mean	Std.dev.	Min.	Max.
Scales				
Overall delinquency (log freq.)	.77	.93	.00	4.33
Violent offending (log freq.)	.08	.31	.00	2.83
Serious property off. (log freq.)	.14	.42	.00	3.22
School bonding ^a	2.73	.75	.00	4.00
Parental monitoring ^a	3.03	.91	.00	4.00
Attitudes towards crime ^a	.98	1.10	.00	4.00
Percent				
Sex				
Girl	49.6			
Boy	50.1			
N/A	.3			
Immigrant background				
Native Swedish	75.9			
1st generation	5.9			
2nd generation	6.5			
2nd generation mixed parents	9.3			
N/A	2.3			
Evening with friends				
0 times	18.9			
1–2	31.3			
3–4	30.7			
>4 times	16.7			
N/A	2.4			
Unstructured activities				
No	64.0			
Some	32.1			
Intense	2.9			
N/A	1.0			
Alcohol intoxication (last 12 months)				
0 times	48.1			
1–2	15.7			
3–5	11.2			
5–10	9.0			
> 10 times	15.3			
N/A	.7			

N = 48,715 respondents in eight waves. N/A = no answer.

^aStandardized in regression models.