



Do Morality and Self-Control Protect from Criminogenic Peer Influence? Testing Multidimensional Person–Environment Interactions

Helmut Hirtenlehner, Johann Bacher, Heinz Leitgöb & Doris Schartmueller

To cite this article: Helmut Hirtenlehner, Johann Bacher, Heinz Leitgöb & Doris Schartmueller (2022) Do Morality and Self-Control Protect from Criminogenic Peer Influence? Testing Multidimensional Person–Environment Interactions, *Justice Quarterly*, 39:1, 78-112, DOI: [10.1080/07418825.2021.1903069](https://doi.org/10.1080/07418825.2021.1903069)

To link to this article: <https://doi.org/10.1080/07418825.2021.1903069>



© 2021 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group on behalf of Academy of Criminal Justice Sciences



Published online: 25 Mar 2021.



[Submit your article to this journal](#)



Article views: 6706



[View related articles](#)



[View Crossmark data](#)



Citing articles: 20 [View citing articles](#)

Do Morality and Self-Control Protect from Criminogenic Peer Influence? Testing Multidimensional Person–Environment Interactions

Helmut Hirtenlehner^a, Johann Bacher^b, Heinz Leitgöb^c and Doris Schartmueller^d

^aCentre for Criminology, Johannes Kepler University, Linz, Austria; ^bInstitute of Sociology, Johannes Kepler University, Linz, Austria; ^cInstitute of Sociology, University of Eichstätt–Ingolstadt, Eichstätt, Germany; ^dDepartment of Political Science and Criminal Justice, California State University, Chico, CA, USA

ABSTRACT

The present study examines whether the effect of involvement with delinquent friends on young people's criminal activity is contingent on adolescents' personal morality and their capacity for self-control and how these enduring properties work together in determining youths' vulnerability to peer influence. The corresponding person–environment interactions are tested based on a longitudinal student survey from Austria. Findings reveal conditional peer effects. The significance of crime-prone friends decreases as morality gets stronger and self-control gets higher. Thereby, self-control seems to modify criminogenic peer effects particularly among youths of weak morality. We find evidence of a three-way interaction according to which high trait self-control protects against detrimental peer influence primarily among individuals who have poorly internalized law-consistent moral rules. Such an interplay is consistent with theoretical reflections regarding a moral filtering of action alternatives and a subsidiary relevance of self-control.

ARTICLE HISTORY

Received 21 July 2020
Accepted 8 March 2021

KEYWORDS

Peer delinquency; self-control; morality; person–environment interaction; Situational Action Theory

Introduction

Analytically, criminological theorizing can be divided into person-oriented and environment-oriented approaches (Hardie, 2020; Nagin & Paternoster, 1993; Wikström et al., 2012, 2018). Theories often tend to highlight either the individual (personal propensities) or his or her surroundings (environmental conditions) as criminogenic forces. The interaction of disposition and exposure in the causation of acts of crime – at least in the form of statistical moderation relationships¹ – represents a neglected issue. Acknowledging that the

CONTACT Helmut Hirtenlehner  helmut.hirtenlehner@jku.at

 Supplemental data for this article can be accessed at <https://doi.org/10.1080/07418825.2021.1903069>.

This article has been corrected with minor changes. These changes do not impact the academic content of the article.

¹We talk about interaction “when the effect of one variable on an outcome is contingent on the level of another variable” (Barnes et al., 2020, p. 2). In essence, we refer to differential susceptibility to environmental influences.

© 2021 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group on behalf of Academy of Criminal Justice Sciences. This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way.

specific interplay of characteristics of a person and properties of a setting in governing criminal activity deserves more attention, several scholars (e.g. Fishbein, 2001; Hay & Meldrum, 2016; Wikström et al., 2012; Wright et al., 2001) argue that enduring individual differences in the sensitivity to influences of the current immediate environment shape the impact of setting features or criminogenic exposure. Crime is most likely to occur when individuals with a tendency to offend are faced with outer contextual circumstances favorable to the commission of crime. Thereby, personal predisposition moderates the impact of the environment. Crime-conducive settings are assumed to exercise their greatest effect among individuals with a high propensity to offend.

Not all aspects of criminogenic surroundings and criminal disposition have received the same extent of scholarly attention. Studies that stress the significance of setting characteristics, outer exposure and situational influences often draw on association with delinquent peers as a measure of a crime-facilitating environment (Haynie & Osgood, 2005; Hoebe et al., 2016; Osgood et al., 1996; Warr, 2002). Theorizing on the role of criminal propensity in crime causation frequently focuses on personal morality or an individual's capacity for self-control (Gottfredson & Hirschi, 1990; LeBlanc, 2006; Wikström, 2004). Accordingly, a large body of research has established peer delinquency (Gallupe et al., 2019; Hoebe et al., 2016; Pratt et al., 2010), moral beliefs (Pauwels et al., 2018; Stams et al., 2006) and self-control (Pratt & Cullen, 2000; Vazsonyi et al., 2017) as powerful predictors of criminal behavior. However, although there is ample evidence of independent or additive effects of these concepts on offending, too little is known about the concrete interplay of exposure to crime-prone peers with morality *and* self-control as indicators of an individual's propensity for crime. The question whether morality or self-control individually or both together shape the criminogenic effect of association with delinquent peers has been left open to debate. The few works that take up the corresponding interaction issue produce inconsistent results and fail to consider a potentially moderating role of morals and self-control simultaneously (Beier, 2018; Gerstner & Oberwittler, 2018; Hirtenlehner et al., 2015; McGloin & Shermer, 2009; Meldrum et al., 2009; Piquero et al., 2005). The latter is astonishing in view of accumulating evidence suggesting that the crime-dampening impact of an individual's capacity for self-control depends on his or her level of morality (Kroneberg & Schulz, 2018; Svensson et al., 2010; Wikström & Svensson, 2010). Given the group nature of much juvenile delinquency – young offenders tend to commit their crimes in the company of others (Reiss & Farrington, 1991; Warr, 2002) –, a study on whether and how personal morality and self-control ability *jointly* condition the size of the criminogenic peer effect is long overdue.

Along these lines, the present inquiry addresses the interaction between personal morality and trait self-control as components of an individual's criminal propensity with the extent of association with delinquent peers. Guided by the life-course model of interdependence (Wright et al., 2001) and Situational Action Theory (SAT; Wikström, 2004, 2010), we examine the interplay of both morality and self-control ability with exposure to delinquent friends in governing adolescent offending. Wright et al.'s (2001) "social amplification hypothesis" holds that antisocial ties exert their greatest effect among individuals marked by a strong internal disposition for crime. Drawing on a longitudinal student survey conducted in Austria, we predict a significant

interaction between affiliation with delinquent peers and measures of criminal propensity, with exposure to crime-prone friends increasing unlawful behavior most strongly among adolescents of weak morality and low self-control. From SAT (Wikström et al., 2012), we additionally infer the presence of a three-way interaction between the concepts: trait self-control is assumed to mitigate the detrimental impact of involvement with delinquent peers primarily among individuals of weak morality. The underlying rationale is that people with strong law-consistent morals do not regard acts of crime as a personally selectable action alternative – a fact that constitutes a first line of defense against environment-induced criminogenic temptations and in case of success renders further self-control dispensable.

At the heart of this work is the assumption that an individual's morality and capacity for self-control jointly moderate the impact of delinquent friends on self-reported offending and that the protective self-control effect is greatest among adolescents who have weak moral inhibitions against crime. To our knowledge, the present study represents the first test of the three-way interaction between delinquent peer association, trait self-control, and personal morality with panel data. Since the underlying survey is restricted to two waves of data collection, we cannot analyze the causal order among the three predictors of unlawful behavior: our focus is limited to the interdependent “between effects” of these concepts on young people's level of criminal activity.

Theory and state of knowledge

Individual characteristics and criminal activity

Types-of-person theories accentuate “individual differences in criminal disposition that are established early in life, remain stable throughout the life course, and are related to a wide range of criminal (...) behaviors” (Nagin & Paternoster, 1993, pp. 488–489). Recent works emphasize morality and self-control as key ingredients of an individual's propensity to offend (Hay & Meldrum, 2016; Kroneberg et al., 2010; Pratt, 2016; Trasler, 1993; Wikström et al. 2012; Wilson & Herrnstein, 1985). Other conceptions of criminal propensity focus on negative emotionality, psychopathy, aggressiveness, or neuropsychological deficits, among other things (Caspi et al., 1994; DeLisi, 2017; Jensen Arnett, 1996; Moffitt, 1993).

The term “morality” is frequently employed to describe an individual's sense of what is right or wrong, good or bad, acceptable or unacceptable to do in a given situation (Stets & Carter, 2012; Wikström, 2010). In criminology, morality is usually measured against the yardstick of the internalization of the social and legal norms prevailing in a society. It contains a cognitive and an affective dimension (Marshall & Marshall, 2018). The cognitive dimension refers to an individual's moral beliefs and attitudes, to his or her judgments concerning the wrongfulness of various breaches of established rules of conduct. The affective dimension captures unpleasant emotions resulting from the violation of moral rules, in particular the feelings of shame and guilt.

Both dimensions of morality function as powerful regulators of behavior by affecting either the set of the perceived action alternatives or the process of choice between the considered behavioral options (Etzioni, 1988; Kroneberg et al., 2010). Moral norms may either have a filtering impact (they can exclude response options that violate internalized rules of conduct from the catalog of the perceived

alternatives) or exercise a replenishing effect (they can load contemplated norm-incongruent action alternatives with internal costs, such as sentiments of embarrassment or a bad conscience, and thus render them less attractive).

Trait self-control refers to the enduring capacity to withstand spontaneous hedonistic wishes, urges, and impulses, whose fulfillment would run counter to an individual's long-term goals, values, interests and wellbeing (Burt, 2020; Hay & Meldrum, 2016). The concept rests upon "the idea that people (...) differ in the extent to which they are vulnerable to the temptations of the moment" (Gottfredson & Hirschi, 1990, p. 87). Low self-control is attributed to individuals marked by an inability to defer gratification, plan for the future, and consider the long-term consequences of behavior. Individuals of low self-control are described as "impulsive, insensitive, physical (...), risk-taking, short-sighted, and nonverbal" (Gottfredson & Hirschi, 1990, p. 90). These people tend to respond primarily to the incentives of the here-and-now and discount or neglect the delayed implications of their behavior. Because of their excessive present-orientation, people who lack self-control are incapable of resisting the seductions of on-the-spot pleasures that may be associated with subsequent negative consequences. Their focus on instant benefits without regard for the temporally remote repercussions of their actions renders them susceptible to momentary temptations and provocations (Burt, 2020).

In processual terms, self-control describes the practice of overriding or suppressing a natural spontaneous response to a tempting impulse or urge and replacing it with a response that is more in line with higher-ranking standards, such as abstract ideals, moral values, legal norms, long-range interests, or future well-being (Hay & Meldrum, 2016). Burt (2020, p. 44) defines self-control as "the effortful inhibition of an impulse for immediate gratification in the service of long-term, higher-order goals." The common denominator of diverse models of self-control is their focus on resolving conflicts between competing goals (Inzlicht et al., 2021). Exerting self-control refers to managing conflicts between abstract, distal, higher-order goals on the one hand and concrete, proximal, lower-order goals on the other hand. Thereby, self-control steers behavior toward the former group of goals.

The origins of a heightened disposition for crime can be traced to an interplay of biopsychological and environmental influences (Fishbein, 2001; Hay & Meldrum, 2016). According to various theoretical perspectives (Akers, 1998; Gottfredson & Hirschi, 2020; Wikström, 2020), personal morality and self-control ability are largely acquired in exchange with the socio-cultural environment via processes of socialization. Thereby, peer association may play an important role. Irrespective of the fact that an adolescent's criminal propensity affects with whom he or she makes friends (Warr, 2002), involvement with delinquent peers has been found to undermine prosocial morals (Megens & Weerman, 2012; Seddig, 2014; Warr & Stafford, 1991) and reduce self-control ability (Burt et al., 2006; Meldrum & Hay, 2012; Meldrum et al., 2012). In line with these observations, Gottfredson and Hirschi (2020) explicitly argue that morality and self-control have the same developmental causes.²

²In their most recent monography, Gottfredson and Hirschi (2020) conceptualize personal morality as an integral part of the self-control trait. This self-control trait is assumed to remain relatively stable after an age of 8–10 years (Gottfredson & Hirschi, 1990, 2020). Relative stability means that individual differences in self-control established early in life tend to persist over long periods of time. In absolute terms, the capacity for self-control has been shown to increase up to an age of approximately 60 years, interrupted solely by a temporary stagnation in adolescence (Hay & Meldrum, 2016).

Conjectures that weak morality (Braithwaite, 1989; Messner, 2012; Wikström, 2010) and low self-control (Gottfredson & Hirschi, 1990; Hay & Meldrum, 2016; Pratt, 2016) represent key determinants of criminal behavior are corroborated by empirical evidence. Plenty of studies found that various measures of morality (Antonaccio & Tittle, 2008; Svensson et al., 2013; Seddig, 2014; Tyler, 2006; Wikström & Butterworth, 2006) and self-control (Evans et al., 1997; Grasmick et al., 1993; Marshall & Enzmann, 2012; Rebellon et al., 2008; Vazsonyi et al., 2001) relate significantly to criminal activity. Statistical meta-analyses confirm this picture (Pratt & Cullen, 2000; Stams et al., 2006; Vazsonyi et al., 2017).

Recent theorizing – especially in the framework of SAT (Wikström, 2004, 2010) – suggests that personal morality and self-control ability have interdependent effects on criminal activity. The theory's reflections on the moral filtering of action alternatives are particularly instructive in this regard. SAT posits that an individual's own moral rules and the moral norms of the setting govern whether or not crime is perceived as a selectable tool to respond to a given motivation (temptation or provocation). Personal morality and setting morality jointly determine whether crime is seen as a viable action alternative. The more an individual's own moral attitudes correspond to penal law, the less likely he or she is to regard crime as a justifiable option and seriously consider it for action. Conversely, the more an individual's own moral beliefs deviate from the rules of law, the more likely he or she is to view crime as a defensible option and contemplate offending.

While morality governs which action alternatives are being perceived, self-control affects the choice among the perceived alternatives (Wikström et al., 2012). According to SAT, controls become relevant solely when engaging in criminal behavior is being seriously pondered, which happens primarily under conditions of a permeable moral filter. Therefore, self-control can be assumed to come into play as a protective force particularly when a weak moral shield permits crime to be taken into consideration (Brauer & Tittle, 2017). It follows that the ability to exercise self-control will affect an individual's level of crime involvement predominantly among those who have poorly internalized a society's legal rules – simply because they are more prone to see crime as a “real” alternative. The presumed interplay of morality and self-control has found firm empirical support. Several studies show that the magnitude of the self-control effect is contingent on personal morals, with self-control ability being more predictive of offending among individuals of weak law-consistent morality (Craig, 2019; Hirtenlehner & Kunz, 2016; Kroneberg & Schulz, 2018; Svensson et al., 2010; Wikström & Svensson, 2010).

Peer influence

Types-of-setting theories attribute criminal behavior to characteristics of the immediate environment or the social context surrounding an actor (Anderson, 1999; Cohen & Felson, 1979; Hindelang et al. 1978; Sampson, 2012; Sampson & Laub, 1993; Wilcox et al., 2003). Outer controls, opportunities, culture and situational inducements play a prominent role in this strand of explanatory models. Here, the degree of exposure to deviant role models or delinquent peers has received particular attention (Akers, 1998;

Sutherland, 1956; Warr, 2002). The fact that adolescents who have delinquent friends are more likely to offend, is one of the most replicated findings in our discipline (for reviews of the voluminous literature see Akers & Jensen, 2006; Hoebe et al., 2016; Pratt et al., 2010). Thereby peer influence may ground on socialization or opportunity effects (Hirtenlehner et al., 2015; Hoebe et al., 2016; Haynie & Osgood, 2005). Delinquent peers may foster criminal activity both through the transfer of crime-conducive attitudes and beliefs and through the provision of favorable circumstances for crime.³

Socialization focuses on the social transmission of values, attitudes as well as behaviors and describes the process by which individuals come to learn the moral rules and behavioral expectations of the group. According to Social Learning Theory (Akers, 1998), delinquent friends shape behavior through supplying definitions, models and reinforcement contingencies, which may all be supportive of criminal conduct. Crime-prone peers convey definitions or attitudes favorable to the violation of the law, model the commission of acts of crime, and reward criminal conduct. All this raises the likelihood that an adolescent will adopt crime-conducive beliefs and imitate the age mates' unlawful behavior.

In addition, as stated in opportunity theory (Osgood et al., 1996), hanging out with crime-prone peers outside the home – in particular when time is jointly spent in unstructured and unsupervised leisure activities – produces a wide range of situational inducements (temptations and provocations) as well as chances for criminal behavior. These are the situations where the motivation to offend typically evolves, often spontaneously as a by-product of group-dynamic processes. Delinquent others may provide ideas for crime, point out opportunities for crime or actively encourage committing acts of crime. They may even exert concrete pressure to participate in criminal activities. Being with friends who advocate delinquent behavior makes delinquency easier and more rewarding. Especially among crime-prone associates, offending may entail a broad array of pleasant consequences. The benefits of elevated status, reputation and respect, for instance, may be acquired through criminal behavior particularly when the audience approves of this course of action (Hirtenlehner et al., 2015).

The association between peer delinquency and criminal behavior is among the most consistent findings of criminological research. Numerous studies show that a larger number of friends who approve of or commit acts of crime is accompanied by higher levels of self-reported offending (Baerveldt et al., 2008; Gerstner & Oberwittler, 2018; Matsueda & Anderson, 1998; Megens & Weerman, 2012; Seddig, 2014; Warr & Stafford, 1991). Meta-analytic reviews take the same line (Gallupe et al., 2019; Pratt & Cullen, 2000; Pratt et al., 2010).

Certainly, the similarity of crime involvement among friends may reflect different causal mechanisms (Hirtenlehner et al., 2015; Matsueda & Anderson, 1998).

Some scholars argue that the correlation between peer delinquency and personal delinquency is spurious; reflecting merely a joint dependency of both concepts on the same influencing factors (Gottfredson & Hirschi, 1990). Low self-control, weak internal moral standards, and poor parental supervision, for example, may increase both

³Conversely, offending may facilitate the formation of bonds to delinquent peers. This so-called selection effect has been repeatedly documented in the empirical literature (Gallupe et al., 2019).

personal criminal activity and association with crime-prone others, thus generating spurious covariation between individual and peer delinquency. However, empirical evidence demonstrates that delinquent peer association retains significant explanatory power in multivariate regression models controlling for morality, self-control, and other third variables (Bruinsma et al., 2015; Steketee, 2012; Weerman et al., 2015; Weerman & Hoeve, 2012; Yarbrough et al., 2012). In these analyses, both peer delinquency and the mentioned indicators of an individual's crime propensity exert independent effects on self-reported offending.

Aside from this, the strong correlation between exposure to crime-prone peers and individual offending may also represent a methodological artifact that is due to projection and false consensus effects (Boman et al., 2012; Young et al., 2014). When asked to assess their friends' delinquency, respondents tend to impute their own behavioral inclinations to their peers. Crime-prone adolescents may also be more likely to identify delinquent others as their friends. False consensus effects describe a general tendency of individuals to overestimate the prevalence of their own behaviors and attitudes in the population. Together, the various distortions imply that the respondents' perceptions of their friends' criminal involvement are biased in the direction of their own attitudes and behaviors. This is why indirect or perceptual measures of peer delinquency may produce inflated estimates of peer effects. Direct or peer-reported measures of friends' crime involvement represent a less contaminated alternative. Network-based direct operationalizations of peer offending also yield significant, albeit considerably weaker correlations with individual criminal activity – a fact that partially discredits the artifact hypothesis (Meldrum et al., 2009; Rebellon & Modecki, 2014; Weerman & Smeenk, 2005).

Peer selection refers to people's tendency to choose friends who are similar to themselves. In accordance with the old saying "birds of a feather flock together," personal delinquency may foster the formation of friendships with other individuals who engage in criminal behavior (Warr, 2009). To express this in the words of Gottfredson and Hirschi (1990, p. 158), persons of high crime propensity tend "to end up in the company of one another." Empirical investigations have repeatedly found indication of selection effects in the sense that previous offending promotes subsequent involvement with delinquent peers (Baerveldt et al., 2008; Boers et al., 2010; Gallupe et al., 2019; Matsueda & Anderson, 1998; Seddig, 2014).

Of course, the relationship between friends who engage in illegal activities and the criminal behavior of the respondents themselves can also depict peer influence. It has already been noted that peer influence can take the form of socialization or opportunity formation. Delinquent peers contribute to the learning of values, attitudes and definitions favorable to breaches of the law, and they foster the genesis of situations in which motivations, incentives and opportunities for criminal conduct evolve. Unsurprisingly, the empirical research landscape supports both forms of peer influence (Gerstner & Oberwittler, 2018; Haynie & Osgood, 2005; Hoebe et al., 2016; Megens & Weerman, 2012; Osgood et al., 1996; Seddig, 2014; Steketee, 2012; Svensson & Oberwittler, 2010; Thomas & McGloin, 2013; Warr & Stafford, 1991).⁴

⁴In fact, existing evidence supports a reciprocal relationship between peer delinquency and criminal behavior (Gallupe et al., 2019). Prior offending leads to the acquisition of delinquent friends, and association with delinquent friends increases subsequent offending.

Person–environment interaction

While types-of-person theories and types-of-setting theories certainly contribute to our understanding of criminal behavior, linking the two may lead to a more complete picture of crime causation. In this context, several scholars have acknowledged that integrating person-oriented and environment-oriented approaches means more than just introducing predictors derived from the various perspectives simultaneously into regression models and then determining their unconditional (additive) effects (Barnes et al., 2020; Hardie, 2020; Hay & Meldrum, 2016; Wikström et al., 2012; Wright et al., 2001). Instead, emphasis should be placed on the interactive interplay of constructs representing the different approaches. Thereby, interaction (or moderation) means that the size of the impact of one (group of) predictor(s) depends on the values of another (group of) predictor(s) (Aiken & West, 1991).

A theoretical perspective that focuses on person–environment interactions is Wright et al.'s (2001) life-course model of interdependence. Its basic proposition is that “[t]he effects of social ties on crime vary as a function of an individual’s propensity for crime” (2001, p. 321). Their reflections can be condensed into three hypotheses. The “cumulative disadvantage hypothesis” holds that antisocial personality traits facilitate the formation of antisocial relationships over time. The “social protection hypothesis” maintains that prosocial ties (bonds to family, education or employment) exercise a crime-reducing effect particularly among individuals of high criminal propensity (i.e. those characterized by low levels of inner containment). The “social amplification hypothesis” posits that antisocial ties or bonds to delinquent peers exert a crime-heightening effect especially among individuals with a strong disposition for crime (again those marked by weak internal restraints). The logic underlying the latter is that exposure to crime-prone others provides motivation, opportunities, and knowledge for criminal behavior, which creates a need for high levels of internal control to curb the resulting criminal inducements, temptations and provocations. People with an elevated propensity to offend – that is, individuals with insufficient crime-inhibiting forces inside the self – are less capable of resisting the allure of criminal activity brought about by ample involvement with peers who approve of and commit delinquency. Put differently: strong internal constraints – such as a well-developed sense of morality or an elaborated ability to exercise self-control – may act as a buffer against criminogenic peer influences.

Similar hypotheses may be deduced from SAT (Wikström, 2004, 2010), which, as described above, has more to offer in terms of the interplay of the various components of criminal propensity. The theory’s core idea is that a person–environment interaction initiates a perception–choice process that immediately governs action. Crime is most likely to occur when an individual with a heightened propensity to offend takes part in a criminogenic setting. Thereby, SAT identifies two enduring properties as key elements of an individual’s propensity for crime: personal morality (internalized moral beliefs and associated moral emotions) and the ability to exercise self-control (the capacity to withstand external incentives and pressures to breach rules of conduct). The criminogeneity of a setting is determined by the moral norms that apply to it (often referred to as the moral context) and its deterrent quality. The theory’s principal argument focuses on the interaction of individual and environmental characteristics. Setting criminogeneity is hypothesized to be most consequential for

people of high crime propensity – a proposition that has received non-negligible empirical support (Gerstner & Oberwittler, 2018; Hirtenlehner & Treiber, 2017; Kokkalera et al., 2020; Pauwels et al., 2018; Wikström et al., 2012, 2018; see also Wright et al., 2001). That the two components of criminal propensity are assumed to have interdependent effects on crime involvement has been detailed above.

Moderation of peer influences

Ample scholarship suggests that adolescents commit most of their crimes while in the company of their peers (Beier, 2018; Bernasco et al., 2013; Osgood et al., 1996; Warr, 2002; Wikström et al., 2012). Offending is more likely in settings where peers are present. Nevertheless, that is not meant to say that every youth reacts to the presence of peer-related opportunities for crime with unlawful behavior. Despite the significance of friends in adolescence, young people may differ widely in the degree to which they are susceptible to situational peer effects. Trait-like personal qualities can shape an individual's sensitivity to group dynamics. The two intra-individual characteristics we will attend to as moderating forces in the remainder of this work are morality and self-control. Accordingly, the hypothesized significance of individual differences in morality and self-control warrants efforts to unpack the mechanisms underlying the immunizing impact of these properties.

How strong peer influence processes need to be in order for an adolescent to perceive offending as a “real” action alternative may vary according to the strength of his or her personal moral rules. Wikström et al. (2012) argue that the presence of peers with a positive stance toward crime can weaken the moral context. If delinquent peer groups affect adolescents by creating the impression that crime perpetration might be an acceptable or “good” idea, an individual's personal sense of morality may fill in as a safeguard against the seductions of crime. Where present adolescents of the same age encourage engaging in delinquent behavior, internalized law-consistent moral beliefs can prevent the individual from seriously envisaging this type of conduct. Individuals whose own moral standards oppose offending are less likely to actually consider committing acts of crime even in situations where the views or expectations of crime-prone friends suggest breaking the law. This sort of interworking between the moral norms of the setting and an individual's own moral rules can easily be derived from SAT (Wikström, 2004, 2010), which argues that whether crime is perceived as an action alternative in a given situation depends on the interaction between people's personal morality and their immediate moral context (the so-called moral filter). If high internal moral standards preclude crime from being seen as a viable option to respond to a particular motivation, crime cannot occur. Only when weak personal morals permit crime to be regarded as a selectable alternative, involvement with delinquent peers may drive adolescent offending.

Other authors have also emphasized that internal moral inhibitions prevent crime from entering the range of the contemplated action alternatives, consequently removing it from the set of the considered response options in a given situation (Kroneberg et al., 2010; Parsons, 1937; Trasler, 1993). Individuals who feel bound by internalized social norms (often called conscience) are less likely to engage in a crime-relevant instrumental calculus, simply because they do not see behaviors that are inconsistent

with the law as a genuine option for them. In this case, the crime-related benefits and rewards provided by antisocial peers cannot affect decision-making – since the set of the perceived action alternatives from which the concrete response to a particular motivation is chosen does not include crime.

The crime-promoting role of delinquent peers may also be defused by an individual's ability to exercise self-control. How a person responds to a given input from the environment depends not the least on his or her capacity to resist current temptations and provocations for the benefit of long-term goals or higher-order standards (Burt, 2020; Hay & Meldrum, 2016). Exposure to delinquent peers leads to criminal opportunities, and people of low self-control may be more likely to seize them, plainly because they are less capable of keeping a low profile in the face of immediate gratifications (Gottfredson & Hirschi, 1990, 2020). In other words, situational inducements to break rules of conduct may collide with people's long-term interests, their future well-being as well as their social commitments and moral values (Hay & Meldrum, 2016). If criminal activity arises from the incentives and pressures to offend emerging in the course of socializing with crime-prone others, then individuals with a well-developed ability to exercise self-restraint may be more successful in resisting the lures of the moment. In situations where crime-affine peers actively encourage breaching the law, an adolescent's capability to override spontaneous impulses and to keep an eye on his or her long-range goals, interests, and commitments may render him or her immune to the criminogenic instigations of a delinquent peer group (at least to a certain extent). Conversely, involvement with delinquent friends may foster offending particularly when the absence of self-control frees the individual to give in to crime-conducive peer pressure or group-dynamic processes (Hirtenlehner et al., 2015).

As regards the moderation of criminogenic peer influences, the interplay of people's morality and self-control ability outlined in SAT (Hirtenlehner & Kunz, 2016; Pauwels et al., 2018; Wikström & Svensson, 2010) suggests an even more complex impact dynamic. High self-control may mitigate detrimental peer effects primarily when weak personal morals add to the perception of crime as an acceptable action alternative. An individual's capacity for self-control may become increasingly important as a buffer against the temptations and provocations resulting from exposure to crime-prone peers when weak personal morals back the perception of crime as a "true" option. Such a dynamic is tantamount to a three-way interaction between the concepts under study. Concisely, the value of one individual characteristic (morality) determines the effectiveness of another individual trait (self-control) in moderating the impact of environmental conditions (delinquent peer association). Insofar as internalized moral norms work as a moral filter that removes norm-incongruent responses from the set of the subjectively considered action alternatives, they also determine the relevance of an individual's ability to exercise self-control for the neutralization of criminogenic peer effects. The impact of the capacity for self-control may reach its maximum when adolescents of weak personal morality socialize with crime-encouraging friends. From this perspective, self-control plays a solely subsidiary role that is contingent on the strength of an individual's moral shield (Kroneberg & Schulz, 2018).

The complexity of the relationship between delinquent peer association and personal restraints is increased by the fact that exposure to crime-prone friends

undermines both morality (Megens & Weerman, 2012; Seddig, 2014; Warr & Stafford, 1991) and self-control (Burt et al., 2006; Meldrum & Hay, 2012; Meldrum et al., 2012). At the same time, personal qualities affect the level of involvement with crime-prone others (Evans et al., 1997; Hill et al., 1999; Thornberry et al., 2003; Wright et al., 2001). Individuals suffering from weak morality or poor self-control tend to end up together and become friends (Glueck & Glueck, 1950; Warr, 2002). The principle of homophily states that “people make friends with people who are similar to themselves” (Warr, 2009, p. 388). This implies that adolescents of weak morality or poor self-control will more frequently find themselves in the company of delinquent peers. Repeatedly observed selection effects according to which criminal activity raises the probability of acquiring crime-prone friends (Baerveldt et al., 2008; Matsueda & Anderson, 1998; Seddig, 2014) also suggest that delinquent peer association is a function of personal morality and self-control ability. Correspondingly, a difficult or antisocial personality has been shown to facilitate the formation of bonds to delinquent others (Hay & Meldrum, 2016; Krohn & Thornberry, 2008; Wright et al., 2001). The undeniable inter-connectedness of peer delinquency and individual propensity to offend renders purely isolated effects of both concepts on criminal behavior very unlikely.

In the remainder of this subsection, we will develop in more detail how personal morality and self-control ability interact in shaping the effect of affiliation with crime-prone others on adolescent offending.

SAT (Wikström, 2004, 2010) holds that strong law-consistent personal morals increase the probability that criminal activity is not viewed as a defensible option in a situation loaded with incentives to offend. Whether and how personal morality affects the level of criminogenic exposure is a question of selection (Wikström et al., 2012). Although there is indication that strong morals decrease the chances that adolescents associate with delinquent peers (Hill et al., 1999; Seddig, 2014; Thornberry et al., 2003), even those whose internalized moral rules support adherence to the law will sometimes be faced with crime-encouraging age-mates (e.g. in school or when going out at night). In these crime-conducive situations, law-consistent personal morals can prevent the perception of crime as a genuine option.

If crime is not considered for action, self-control lacks any relevance. Only when an individual ponders committing an act of crime, his or her capacity for self-control comes into play. When the moral filter fails to rule out crime as a defensible way to satisfy a given motivation, self-control becomes a necessary restraining force. Just like strong morality, high trait self-control has been shown to reduce the level of affiliation with delinquent peers (Evans et al., 1997; McGloin & Shermer, 2009; Wright et al., 2001). Nevertheless, even adolescents of high self-control will sometimes be confronted with crime-encouraging age-mates. In these situations, the interplay of personal morality and self-control ability determines the consequences of such potentially criminogenic exposure. When an adolescent associates with crime-prone peers and his or her internalized moral rules do not inhibit the perception of crime as a justifiable option, his or her ability to withstand current temptations and provocations to breach rules of conduct will substantially influence whether crime is chosen for action. The protective self-control effect can be assumed to culminate when individuals of weak morality hang out with delinquent others.

Previous research on the conditioning role of personal morality and trait self-control

Despite the solid support for the explanatory power of involvement with delinquent peers, personal morality and trait self-control, knowledge about their interaction in crime causation is insufficient.

Only a small number of studies has addressed the issue whether strong moral inhibitions function as a barrier to the influence of crime-prone peers. Some of these inquiries found that the relationship between perceived peer delinquency and self-reported offending is weaker for adolescents with higher levels of law-consistent morality (Beier, 2018; Hannon et al., 2001; Mears et al., 1998). Such an observation is compatible with the notion that crime-prone others have their greatest effect when personal morality is low. However, there are also a few studies which report results that point in the opposite direction (Higgins, 2004; Piquero et al., 2005; Schoepfer & Piquero, 2006). Their findings suggest that criminogenic peer influences are greater for adolescents holding strong moral beliefs against crime. A possible explanation for this counterintuitive observation is that crime-encouraging friends may help to overcome elevated internal constraints.

The interplay of peer delinquency and trait self-control has been examined more frequently. Here, the findings turn out to be heterogeneous, too. Some studies found that the effect of delinquent peer association on offending was stronger among individuals suffering from low self-control (Desmond et al., 2012; Hirtenlehner & Baier, 2019; Hirtenlehner & Hardie, 2016; Hirtenlehner et al., 2015; Kuhn & Laird, 2013; Mobarake et al., 2014; Morselli & Tremblay, 2004; Ousey & Wilcox, 2007; Wright et al., 2001). Other inquiries were unable to replicate this relationship (Franken et al., 2016; McGloin & Shermer, 2009; Meldrum et al., 2009; Yarbrough et al., 2012). The results of Ford and Blumenstein (2013) as well as Longshore and Turner (1998) are inconclusive, substantiating the interaction hypothesis for some sorts of rule-breaking, but not for others. Analyses that fail to establish a protective impact of high self-control tend to draw on direct (network-based) measures of peer offending and rely on multiplicative terms estimated in a negative binomial regression framework to determine the existence and direction of the moderation relationship between self-control and peer delinquency (Franken et al., 2016; McGloin & Shermer, 2009; Meldrum et al., 2009). This analytic strategy has limited power to detect interaction effects and is flawed by the risk of producing product term coefficients that give misleading information about the direction of the interaction (see the methods section of this article).

The work of Gerstner and Oberwittler (2018) differs from most of the aforementioned studies in several ways. It rests upon network-based measures of peer delinquency, utilizes a composite measure of criminal propensity (morality and self-control were added up), and employs comparisons of marginal effects obtained from negative binomial regression models to examine the peer-propensity interaction. The results indicate that the effect of exposure to delinquent peers on individual offending is more pronounced for adolescents of high crime propensity. Whether this interplay is due to personal morality or self-control or both cannot be inferred from the analyses.

In a cross-sectional investigation not directly related to peer offending, Barton-Crosby and Hirtenlehner (2020) demonstrated that self-control ability conditions the impact of

provocation experiences particularly among adolescents exhibiting high levels of legal cynicism. In this study, the extent of provocation was measured in terms of trait anger and exposure to interpersonal conflict in various areas of life. The interaction analyses relied on comparisons of marginal effects obtained from negative binomial models. Whether the observed interplay of morality and self-control also determines the implications of involvement with delinquent friends remains an open question.

Prior research on criminogenic peer effects has generally neglected to address the moderating role of morality and self-control simultaneously. Aside from the work of Gerstner and Oberwittler (2018), who combined morality and self-control to a single measure of an individual's disposition for crime, previous inquiry has concentrated on either personal morals or self-control ability as a conditioning factor. To our knowledge, no empirical study has tested a three-way interaction of individual morality, trait self-control, and association with delinquent peers up to now.

Hypotheses

The argumentation developed above leads to a catalog of six hypotheses that will guide the ensuing analyses:

Hypothesis 1: Association with delinquent friends increases offending.

Hypothesis 2: Low trait self-control increases offending.

Hypothesis 3: Weak personal morality increases offending.

Hypothesis 4: The criminogenic peer effect is greater for individuals of lower trait self-control.

Hypothesis 5: The criminogenic peer effect is greater for individuals of weaker personal morality.

Hypothesis 6: High trait self-control decreases criminogenic peer effects especially among individuals of weaker personal morality.

While the first three hypotheses refer to unconditional or main effects of diverse determinants of criminal activity, and therewith to additive explanatory contributions of these factors, the last three hypotheses assume a moderating role of dispositional characteristics, which, in a statistical sense, requires an examination of interactive effects. Departing from the presumption that acts of crime are an outcome of "who is in what setting" (Gerstner & Oberwittler, 2018, p. 123), Hypotheses 4 and 5 depict two-way interaction relationships between individual characteristics and delinquent peer association. Hypothesis 6 increases the complexity by positing a three-way interaction according to which the magnitude of the crime-enhancing peer effect depends on the interplay of the investigated propensity variables.

Methods

Data

The data underlying the present study stems from a longitudinal student self-report survey conducted in the city of Linz (Austria). Linz is the capital of the province

“Upper Austria.” It has approximately 200,000 inhabitants and is characterized by extensive industry and economic prosperity. Although Linz was once a classical steel city, it has successfully dealt with economic structural change, resulting in a flourishing labor market and low levels of socio-economic inequality. In terms of the sociodemographic structure of its population, Linz is quite typical for medium-sized cities in Austria.⁵

The school-administered online survey was based on a multistage sampling plan. At first, all lower secondary schools located in the city of Linz were asked to take part in the survey.⁶ Thirty one out of contacted 35 schools agreed to participate. In each of them, one third and one fourth grade class were randomly selected. All 1294 students attending the chosen classes were then invited to repeatedly fill out the questionnaire.⁷

The inquiry comprised two waves of data collection, separated by a lag period of 4 months. The first wave of data gathering took place in November and December 2017, the second wave followed in March and April 2018. In contrast to the bulk of criminological panel studies which collect data at annual intervals (Gallupe et al., 2019), our longitudinal research relies on a much shorter time lag between the surveys. For several reasons, we consider a shorter lag period as advantageous. In terms of age, our respondents are in a stage of life characterized by dynamic personal and moral development. Friendship relationships may change. The participants are also rapidly approaching the typical age peak of criminal activity. All of this suggests measuring “cause” and “effect” as close as possible in time. The chances to detect causal relationships are greater when time-ordered data are gathered at shorter intervals.

One thousand, one hundred and ninety four students participated in the first, 1198 in the second survey round. Therewith, the response rates for the two waves of data collection were 92% and 93%, respectively.⁸ The analyses conducted in the course of this work rest on the 809 students who took part in both survey waves and provided valid panel codes.⁹ Participants were mainly 13- or 14-year old when they entered the study, with boys and girls represented on equal terms.¹⁰ The composition of the employed net sample is apparent from Table 1.

⁵As of January 1st, 2020, 18% of the population were under the age of 20 and 24% were over the age of 60. Men and women are represented in equal parts. A quarter of the population does not possess Austrian citizenship (https://www.linz.at/zahlen/040_Bevoelkerung/040_Bevoelkerungsstruktur/).

⁶At the lower secondary level, the Austrian school system offers two types of schools: the “new middle school” (general lower secondary school) and the “gymnasium” (grammar school). The “new middle school” is intended to prepare for a later occupational career, while the “gymnasium” is designed to prepare for an academic education.

⁷Class sizes range between 4 and 27 students.

⁸The dropouts were mostly due to absences on the day of the data collection.

⁹To link the two anonymous surveys, we relied on a combination of a small number of items whose values could not change within the investigation period (e.g., class identification code, sex, month of birth, first letter of the forename of the mother). Only cases of a perfect match in this panel code were integrated into the longitudinal data set. When drawing on an exact match of such identification codes, “losses up to 50% of the cases are not unusual” (Schnell et al., 2010, p. 393). Here, the losses amount to one third of the respondents (385 out of 1194 cases). They are largely attributable to absence on the day of a survey or item nonresponse in variables included into the panel code.

¹⁰In terms of their sociodemographic profile (sex, age, ethnicity, school type, grade, place of residence) and their level of criminal involvement, the students who participated in both waves do not differ systematically from all respondents of the first wave. Detailed comparisons of these populations can be found in the Supporting Information to this article.

Table 1. Sample composition ($n = 809$).

Characteristic	Percent
Sex	
Male	48%
Female	52%
Age	
12 years	18%
13 years	47%
14 years	30%
15 or more years	5%
Grade	
Third class	46%
Forth class	54%
Ethnicity	
Austrian	66%
Non-Austrian	34%
Place of residence	
Linz	93%
Outside of Linz	7%
Type of school	
Grammar school	40%
General lower secondary school	60%

The surveys were conducted online during class time in the school's computer labs. Participants completed the surveys under the instruction of trained interviewers. Teachers were present to ensure discipline, but the interviewers made certain that the teachers could not see the answers provided by the students.

Measurement

Criminal activity

Self-reported offending was measured in terms of a crime variety scale that counts the number of different types of crime an individual has committed in the 4 months preceding the survey. Variety scales have been shown to outperform frequency scales in several ways (Bendixen et al., 2003; Sweeten, 2012). Variety scores exhibit a higher reliability than frequency scores, are less skewed and show higher correlations with other measures of criminal behavior. Moreover, they are not biased by a "guessing" of the number of one's acts of crime and less dominated by minor offenses. Information was gathered on nine types of crime (graffiti spraying, vandalism, shoplifting, theft from a person, receiving stolen goods, extortion, robbery, physical assault, burglary). This offense catalog includes the most common forms of juvenile delinquency in urban Austria (Stummvoll et al., 2010).¹¹ About one third of the respondents (32%) reported having committed at least one of these crimes in the past 4 months.

Peer delinquency

To quantify the extent of exposure to delinquent friends, we draw on a perceptual measure of peer offending. Respondents were asked to indicate how many of their friends were involved in five different types of crime (graffiti spraying, vandalism,

¹¹Drug use and dealing were not part of the survey.

shoplifting, burglary, physical assault) during the last 12 months before the survey. Response categories were “all,” “most of them,” “a few,” and “none.” Answers were summed to form a composite score (Cronbach’s $\alpha = .70$), in which higher values reflect increased (perceived) association with delinquent peers.

Self-control

Respondents’ capacity for self-control was measured with an abridged version of the self-control scale utilized by Wikström et al. (2012), which itself builds on the inventory developed by Grasmick et al. (1993). The 11 items presented to participants tap primarily into the risk-taking, impulsivity and temper components of the self-control trait.¹² Responses on a four-category answering format ranging from “strongly agree” to “strongly disagree” were added up to form a total score. High values on this score denote low trait self-control (Cronbach’s $\alpha = .74$).

Personal morality

Our measure of an individual’s law-relevant morality highlights the cognitive dimension of the concept. Inspired by Wikström et al. (2012), respondents’ moral beliefs were captured via their assessment of the wrongfulness of nine different types of rule-breaking (e.g. skipping school, shoplifting, damaging a streetlight, physical assault). Response categories were “very wrong,” “fairly wrong,” “a little wrong,” and “not wrong at all.” The resulting sum score (Cronbach’s $\alpha = .83$) was coded so that high values are indicative of weak morality.

Perceived sanction risk

Participants’ generalized sensitivity to sanction risk was measured in terms of the perceived likelihood of getting caught when committing five different types of crime (e.g. smashing a streetlight, stealing a CD in a shop, beating up a stranger). Four response options between “very great risk” and “no risk at all” were provided. Answers were summed up (Cronbach’s $\alpha = .78$) and coded in a way that higher values indicate a lower risk appraisal.

Excursus: confirmatory factor models

Confirmatory factor analyses (Brown, 2006) for the diverse concepts used in this study yield acceptable goodness-of-fit indices (CFI > .91; RMSEA < .07). All employed indicators load significantly on the respective latent construct. Furthermore, a joint model reveals that personal morality and self-control ability represent different concepts. A χ^2 -difference-test ($\Delta\chi^2 = 948.84$; $\Delta df = 1$; $p < .001$) indicates significant losses in overall fit when morality and self-control are combined into a single propensity construct. In a confirmatory two-factor model, the concepts of personal morality and trait self-control are correlated with .43 ($p < .001$).

¹²Item examples are “I often take a risk just for the fun of it,” “I often act on the spur of the moment without stopping to think,” and “I lose my temper pretty easily.”

Table 2. Descriptive statistics and product-moment correlations.

	1.	2.	3.	4.	5.
1. Crime variety	1				
2. Peer delinquency	.32***	1			
3. Self-control	.30***	.34***	1		
4. Morality	.32***	.38***	.34***	1	
5. Sanction risk perception	.13***	.08*	.18***	.25***	1
Mean/StdDev	0.64/1.25	1.37/1.68	13.51/5.38	6.17/4.68	4.41/3.13
Range	0 – 9	0 – 15	0 – 33	0 – 27	0 – 15

*** $p \leq .001$. ** $p \leq .01$. * $p \leq .05$.

Sociodemographic characteristics

Additional control variables included type of school (grammar school vs. general lower secondary school) as well as participants' domicile (Linz vs. non-Linz), age, sex and ethnicity. Whether the respondent is of Austrian or other ethnicity was inferred from his or her parents' country of birth. If one parent was born abroad, the respondent was classified as having foreign ethnicity.

Table 2 provides descriptive statistics and bivariate correlations for the concepts under study.

Analytic strategy

In technical terms, the employed response variable represents a count variable. Negative binomial regression has been established as an appropriate statistical model for skewed count variables with overdispersion (Hilbe, 2011). A Lagrange multiplier test indicates significant overdispersion of the crime variety measure ($p \leq .01$). Consequently, the statistical analyses were conducted on the basis of negative binomial models.

In accordance with the hypotheses formulated above, the ensuing analyses will proceed in three steps. First, we examine the unconditional effects of delinquent peer association, trait self-control and personal morality. Then, we investigate the two-way interplay of peer offending and particular individual characteristics. Lastly, we turn to the three-way interaction of the concepts mentioned above.

The identification of interaction effects is more intricate in a nonlinear than in a linear framework (Ai & Norton, 2003; Berry et al., 2010; Karaca-Mandic et al., 2012). Interaction is inevitably introduced into nonlinear models by the link function between the linear predictor and the stochastic component (the log-link in the case of the negative binomial model). Even when the regression equation includes only main effects of predictor variables, the marginal effect of a given predictor depends on the levels of all independent variables introduced into the equation. To capture the complete interplay of two explanatory variables involved in an interaction relationship, it is necessary to additionally incorporate their product term into the linear predictor (Mize, 2019). The presence of both model inherent and product term induced interaction complicates the interpretation of interaction effects in nonlinear models. Both interaction components sum up to the total interaction effect. Thus, the total interaction effect may be deviating from zero even if the product term's slope parameter equals zero (or show a different sign than

the product term coefficient). This invalidates the strategy of focusing solely on the sign, size, and significance of the slope parameter of the product term. To make a long story short: in a nonlinear framework the product term coefficient represents only one component of the overall interplay of two predictors and may therefore be a misleading estimate of the interaction effect (Ai & Norton, 2003; Berry et al., 2010; Bowen, 2012; Karaca-Mandic et al., 2012; Mize, 2019; Tsai & Gill, 2013).

For this reason, we relied on comparisons of marginal effects (Karaca-Mandic et al., 2012; Mood, 2010; Williams, 2012) obtained from negative binomial models to examine the interplay of the investigated concepts. A marginal effect relates a continuous independent variable to the predicted change of a dependent variable, given specific values of other explanatory variables (Mize, 2019). In the case of a negative binomial regression, it expresses how the expected value of the count response changes with a one-unit increase in the predictor variable, with other independent variables held at fixed values (Hilbe, 2011). Marginal effects are largely invariant to the omission of third variables unrelated to the predictors included in the model and can thus be compared across groups (Mood, 2010).

Based on the logic that variability in conditional marginal effects indicates the presence of interaction, conditional peer effects on self-reported offending were calculated for selected values of an individual's morality and self-control ability. These conditional marginal effects were tested for equality using the Z-test proposed by Paternoster et al. (1998). According to Hardie (2020, p. 62), this "approach seems most fruitful for the further study of (...) interaction within a non-linear framework."

To examine the presence of two-way interactions between peer delinquency and propensity variables, negative binomial models including the corresponding multiplicative terms (peer offending $\times$ self-control or peer offending $\times$ morality) were estimated. From these models, in which crime variety was regressed on the continuous predictors, their product and a few control variables, marginal effects for peer delinquency were computed at representative values of personal morality or self-control ability. For the calculation of the marginal effects, morality or self-control were set at their mean, one standard deviation below the mean and one standard deviation above the mean. Although the underlying regression models employ the full information (the total scores) of the concepts involved in the investigated interaction relationships for the prediction of the response variable, the conditional marginal peer effects – which represent local slopes of the regression surface – were reported and compared only for the selected levels of the hypothesized moderator variables.

In order to assess the existence of a three-way interaction, separate negative binomial models (including the product of peer offending and trait self-control) were fitted for subsamples of individuals with lower and higher morality. To this end, the sample was split into two subgroups at the median value of the morality measure. This strategy was driven by the goal to allow for a more flexible adjustment of the underlying regression models to the data, which should result in more accurate estimates of the local peer effects (as compared to a single model for the overall sample enriched with several product terms). Furthermore, this approach avoids model overspecification stemming from the introduction of three two-way and one three-way interaction terms into the linear predictor. The risk of producing statistical artifacts is greater in highly parameterized models (characterized by the inclusion of many product terms)

than in simpler group-specific models (whose effect estimates are compared subsequently) (Crump et al., 2008).

The negative binomial models in the two subsamples serve as point of departure for the calculation of marginal peer effects at representative self-control values. To enable an accessible interpretation of the complex interaction dynamics, the conditional peer effects were identified here solely at two levels of the self-control trait: one standard deviation below the mean and one standard deviation above the mean.¹³ Following a “difference-in-differences” approach, the subgroup-specific peer effect differentials (that are due to respondents’ capacity for self-control) were then compared across groups. A greater difference between the conditional marginal peer effects at fixed self-control values in the “lower morality” group was taken as evidence in favor of the hypothesized three-way interaction.

Sensitivity analyses were performed within a linear framework. In detail, evaluations of the robustness of the findings were based on linear robust regression analyses (Andersen, 2008). Robust regression techniques aim at providing parameter estimates and standard errors that are unaffected by outliers or skewed response distributions. Since crime variety measures represent skewed-to-the-right target variables that do not meet the distributional assumptions of ordinary least squares regression, Huber’s (2004) M-estimator was employed to obtain results that are robust against heavy-tailed error distributions. Robust regression has the power to weigh down the influence of extreme values (outliers) on the regression slope and to correct for contamination through a second data-generating process. Thus, it may help to ensure that the effect of a multiplicative term observed in a linear model is not spurious (i.e. solely the result of the special distribution of the dependent variable) even when the normality assumption is not fulfilled.

All regression models were fit using Stata 15. Predictor variables were z-standardized before computing the corresponding interaction terms (Aiken & West, 1991). Due to the hierarchical organization of the underlying data (students are nested in school classes), the conducted negative binomial regression analyses were based on clustered robust standard errors.¹⁴

Results

The relevance of peer delinquency, trait self-control, and personal morality

The analysis starts with an assessment of the significance of exposure and propensity variables for the etiology of adolescent offending. To determine the unconditional

¹³To avoid any misunderstanding: the computation of the marginal effects is based on the full information processed in the underlying group-specific negative binomial regression. However, as the values of these effects vary across individuals in nonlinear models, they can be reported only for selected levels of the other variables in the model.

¹⁴The intra-class correlation coefficient (obtained from a linear model) amounts to .007. This means that less than 1% of the variance of the crime variety measure is accounted for by the school class level. In this context, it must be noted that in Austrian lower secondary schools, students cannot choose subjects and do not switch classrooms. Students are nested in school classes in the sense that they are assigned to one particular classroom where they have all their courses in exactly the same composition of students, and this composition normally ‘sticks’ for the entire lower secondary school period (4 years). Hence, the school class represents the most important level of clustering. Nonetheless, we can add that replacing school class with school as cluster variable does not lead to different conclusions.

Table 3. Results of the lagged negative binomial regression predicting crime variety.

	<i>B</i>	<i>SE</i>	<i>Z</i>	<i>p</i>
Perceived peer delinquency	+0.29	0.07	4.08	.000
Low self-control	+0.31	0.07	4.41	.000
Weak morality	+0.28	0.09	3.28	.001
Perceived sanction risk	+0.07	0.07	1.01	.312
Type of school: grammar school	+0.26	0.14	1.82	.069
Age	+0.03	0.09	0.37	.710
Sex: male	+0.21	0.16	1.33	.183
Ethnicity: non-Austrian	+0.08	0.16	0.54	.592
Domicile: Linz	-0.08	0.21	0.39	.694
Model fit	$n = 681$; $\chi^2 = 106.79$; $df = 9$; $p = .000$			

B: unstandardized regression coefficient; *SE*: standard error; *Z*: Z-statistic; *p*: *p*-value.

effects of the concepts under study, we estimated a lagged negative binomial regression model that includes several control variables. The correct temporal ordering was established by taking the explanatory variables from the first and the response variable from the second survey wave. Table 3 reports the findings. The results indicate that (perceived) affiliation with delinquent friends as well as the individual respondent's morality and self-control ability relate significantly to his or her level of criminal activity. The independent effects of these predictors support Hypotheses 1 to 3, according to which increased peer delinquency, lower self-control and weaker morality are associated with heightened crime involvement.

The interplay of peer delinquency, trait self-control, and personal morality

At the heart of the present study is the interworking of the concepts introduced above. To investigate whether the criminogenic peer effect varies as a function of self-control or morality, the just described negative binomial model was re-estimated two times: once enriched with a product term capturing the interplay of delinquent peer association and self-control ability, and once expanded with a product term depicting the interplay of delinquent peer involvement and personal morality (see Appendix 1). Then, conditional marginal peer effects at representative values of the moderator variables were calculated from these models, which were compared (across levels of a moderator) in a next step. These marginal effects express the change in the crime variety measure resulting from a one-unit increase in peer offending, given a fixed level (one standard deviation below the mean, the arithmetic mean, one standard deviation above the mean) of self-control or morality. Table 4 presents the results.

From the first two columns of Table 4, it can be seen that the criminogenic peer effect increases as trait self-control decreases. Exposure to crime-prone friends has its strongest impact on self-reported offending among adolescents of low self-control and its weakest impact among youths of high self-control. The peer effect in the "low self-control" condition is approximately two times as large as in the "high self-control" condition. According to the conducted Z-tests (Paternoster et al., 1998), all pairwise effect differences are significant. Taken together, these findings suggest that an individual's capacity for self-control may indeed buffer deleterious peer effects – an observation that is highly consistent with Hypothesis 4.

Table 4. Conditional effects of perceived peer delinquency at representative values of trait self-control or personal morality (marginal effects from lagged negative binomial models).

Conditional peer effects at	ME (p)	Conditional peer effects at	ME (p)
Lower self-control ($\mu + 1$ SD)	+0.31 (.000)	Weaker morality ($\mu + 1$ SD)	+0.28 (.001)
Medium self-control (μ)	+0.22 (.000)	Medium morality (μ)	+0.20 (.000)
Higher self-control ($\mu - 1$ SD)	+0.16 (.000)	Stronger morality ($\mu - 1$ SD)	+0.15 (.000)
Equality tests	Z (p)	Equality tests	Z (p)
Lower/higher	3.80 (.000)	Weaker/stronger	2.28 (.023)
Lower/medium	3.54 (.000)	Weaker/medium	2.12 (.034)
Medium/higher	4.17 (.000)	Medium/stronger	2.53 (.001)

ME: marginal effect; Z: Z-statistic; p: p-value.

From the last two columns of [Table 4](#), it is apparent that the impact of having delinquent friends increases when personal morals become more conducive to crime. Exposure to crime-prone peers is most influential among adolescents of weak morality and least consequential for youths of strong morality. The peer effect in the “weak morality” condition is nearly twice as large as in the “strong morality” condition. All pairwise effect differentials prove to be significant. In sum, these results suggest that the extent of delinquent peer association makes a difference especially when individuals have internalized the legal rules poorly – an observation that squares with Hypothesis 5.

So far, we have presented evidence of a person–environment interaction in the sense that individual characteristics possess the potential to protect against detrimental peer influence.¹⁵ The concrete interplay of personal morality and trait self-control in shaping the significance of affiliation with crime-prone friends certainly deserves closer attention.

To examine the joint working of involvement with delinquent peers, personal morality and self-control ability, we divide the sample at the median value of the morality measure into two subgroups. Subsequently, the negative binomial regression model depicted in [Table 3](#) – complemented with the product of peer offending and trait self-control – was fitted for the “weaker morality” and the “stronger morality” subsample separately (see [Appendix 1](#)). The conditional (with self-control set at fixed values) marginal peer effects obtained from these models serve as basis for the “difference-in-differences” approach underlying our attempt to disclose the precise interplay of the three concepts. At first, we study the differences between the conditional peer effects at representative values of the self-control trait (one standard deviation below the mean and one standard deviation above the mean) *within* groups characterized by a given level of morality. Then, we compare these effect differentials *across* the two morality groups. [Table 5](#) shows the calculated marginal effects and their divide.

The key finding of this analysis is a significant three-way interaction according to which high trait self-control attenuates the criminogenic peer effect particularly when an individual’s law-relevant morality is weak. Although involvement with delinquent friends fosters offending at all levels of self-control and morality, there is considerable variation in the magnitude of the conditional peer effects. By far the largest peer

¹⁵Calculating the conditional marginal peer effects from negative binomial models that contain only the model-inherent interaction and do not include product terms leads to the same conclusion. All effect differentials achieve significance ($p \leq .007$) and point in the expected direction.

Table 5. Conditional effects of perceived peer delinquency at selected combinations of trait self-control and personal morality (marginal effects from lagged negative binomial models).

Self-control	Morality	ME (p)	Δ (p)	$\Delta\Delta$ (p)
Lower	Weaker	+0.51 (.000)		
Higher	Weaker	+0.21 (.000)	0.30 (.000)	
Lower	Stronger	+0.23 (.002)		
Higher	Stronger	+0.13 (.002)	0.10 (.072)	0.20 (.042)

ME: marginal effect; Δ : effect difference; $\Delta\Delta$: difference of differences; *p*: *p*-value.

effect emerges for adolescents who have both low self-control and weak morality. Here, for each additional standard deviation of peer delinquency the predicted crime variety score increases by 0.5 offenses. Conversely, those who have a well-developed ability to exercise self-control and strong law-consistent morals are least vulnerable to detrimental peer influence, although a significant peer effect can be found even under these conditions. In this case, the predicted crime variety score increases by 0.1 offenses when delinquent peer association rises by one standard deviation.

The protective impact of an individual's capacity for self-control culminates for young people with weak law-consistent morals. Comparing the disparities between the conditional peer effects at representative self-control values across the dichotomized morality groups reveals significantly larger effect differences among adolescents who have internalized the legal rules to a lesser extent. Among those of weaker morality, the distance between the peer effects at fixed values of trait self-control is three times as large as it is among those of stronger morality. While this effect differential is significant in the "weaker morality" group, it fails to achieve significance in the "stronger morality" group.

From these comparisons, it is apparent that an individual's ability to exercise self-control conditions the impact of affiliation with crime-prone friends especially when his or her own morality is below-average. Among adolescents characterized by strong law-consistent morals, the size of the peer effect on self-reported criminal activity is hardly modified by the capacity for self-control. Such an interaction pattern is definitely congruent with Hypothesis 6.¹⁶

Sensitivity analyses

To examine the robustness of the obtained results, we switched to a linear framework.¹⁷ It has been argued that unadjusted linear regression models face the risk of producing spurious interaction effects when the dependent variable is highly skewed (Osgood et al., 2002). Here, the skewness of the employed crime variety measure amounts to 2.96, which represents a significant ($p = .000$) but not extreme deviation from the normality assumption. Therefore, to take account of the non-normal nature

¹⁶Similar findings are obtained when the conditional marginal peer effects are calculated from one negative binomial model estimated for the overall sample without product terms. Association with delinquent friends is most consequential for adolescents who combine low self-control with weak morality and least influential for youths who amalgamate high self-control with strong morality. Trait self-control modifies the criminogenic peer effect at all levels of morality, but more strongly among individuals with deviant moral beliefs ($Z = 2.35$; $p = .019$).

¹⁷Since 16% of the respondents committed more than one of the investigated offenses in the reference period, we preferred a linear model to a logit model for the sensitivity analyses.

of the response variable, sensitivity analyses were conducted by means of robust regression modeling (Andersen, 2008).

Table 6 presents the results of a series of lagged robust regression analyses. The findings can be summarized as follows: The unconditional regression slopes of involvement with crime-prone friends, the individual's morality and his or her capacity for self-control turn out to be significant again, indicating once more that elevated peer delinquency, weak morality and low self-control facilitate criminal activity (Model 1). A significant product term reveals that the impact of delinquent peer association on an individual's self-reported offending is stronger for respondents with a poor ability to exercise self-control (Model 2). The product term capturing the interplay of peer delinquency and personal morality shows the expected sign, but remains insignificant (Model 3). A significant positive three-way interaction term suggests once more that trait self-control works as a protective shield against criminogenic peer influence chiefly when weak personal morals enable the perception of crime as a selectable action alternative (Model 4).¹⁸

Conclusions

The present study dealt with the question whether enduring individual characteristics condition the impact of a criminogenic environment, namely of exposure to delinquent peers, on adolescent offending. We examined whether having crime-prone friends increases an individual's crime involvement and whether the effect of delinquent peer association is contingent on young people's personal morality and their capacity for self-control. Particular attention was paid to the interplay of morality and self-control ability in determining adolescents' vulnerability to peer influence. The causal order among the three explanatory factors was not subject of the analysis.

The findings of lagged models reveal that peer offending predicts an individual's own criminal activity – adolescents who have crime-prone friends are more likely to engage in criminal behavior themselves – and that both personal morality and trait self-control are effective in combating criminogenic peer influence. There is evidence of moderation relationships between the concepts. Involvement with delinquent friends affects personal offending especially when an individual's law-relevant morality is weak and his or her capacity for self-control is low. The effect of delinquent peer association is smaller for those of strong morality and high self-control, indicating that law-consistent moral beliefs and an elevated ability to resist situational temptations and provocations have the potential to attenuate criminogenic peer influence. In short, well-developed self-regulatory capacities act as a buffer against detrimental peer effects (Baumeister et al., 1994).

The dependency of the magnitude of the peer effect on enduring individual characteristics lends credence to the significance of the propensity–exposure interaction in governing criminal involvement (Wikström et al., 2012). People vary in their responsiveness to crime-conducive surroundings based on their level of criminal propensity.

¹⁸Since Hypothesis 6 assumes a specific direction of the interplay of the three concepts, one-tailed significance testing would also be appropriate. In this case, the *p*-value of the three-way interaction term drops from .050 to .025, which clearly suggests rejecting the null hypothesis.

Table 6. Results of lagged robust regression models predicting crime variety.

	Model 1			Model 2			Model 3			Model 4		
	B	SE	p	B	SE	p	B	SE	p	B	SE	p
Perceived peer delinquency	0.286	0.068	.000	0.204	0.042	.000	0.177	0.086	.040	0.086	0.042	.039
Low self-control	0.130	0.032	.000	0.142	0.023	.000	0.063	0.021	.003	0.095	0.024	.000
Weak morality	0.133	0.041	.001	0.072	0.048	.131	0.154	0.084	.066	0.085	0.026	.001
Peer delinquency × self-control	—	—	—	0.178	0.026	.000	—	—	—	0.071	0.025	.005
Peer delinquency × morality	—	—	—	—	—	—	0.172	0.134	.201	0.060	0.027	.026
Morality × self-control	—	—	—	—	—	—	—	—	—	0.098	0.020	.000
Peer delinquency × self-control × morality	—	—	—	—	—	—	—	—	—	0.061	0.031	.050
Perceived sanction risk	0.012	0.028	.668	0.009	0.016	.589	0.007	0.012	.583	0.001	0.005	.858
Type of school: grammar school	0.131	0.059	.026	0.060	0.032	.064	0.067	0.029	.022	0.023	0.013	.075
Age	0.032	0.037	.385	0.014	0.020	.484	0.018	0.016	.270	0.009	0.007	.199
Sex: male	0.065	0.059	.274	0.034	0.035	.334	0.038	0.029	.178	0.016	0.012	.172
Ethnicity: non-Austrian	−0.032	0.063	.604	−0.026	0.038	.497	−0.013	0.028	.647	−0.009	0.011	.423
Domicile: Linz	−0.034	0.121	.775	0.000	0.066	.996	0.011	0.066	.874	0.001	0.028	.982
Model fit	$R^2(w) = .210$ $R^2(\rho) = .118$ $n = 681$			$R^2(w) = .377$ $R^2(\rho) = .124$ $n = 681$			$R^2(w) = .377$ $R^2(\rho) = .118$ $n = 681$			$R^2(w) = .643$ $R^2(\rho) = .101$ $n = 681$		

B: unstandardized regression coefficient; SE: standard error; p: p-value; R^2 : determination coefficient; n: sample size.

Persons of high crime propensity are particularly vulnerable to criminogenic properties of the environment. This insight supports Wright et al.'s (2001) "social amplification hypothesis," according to which antisocial ties or bonds to delinquent peers facilitate offending predominately among individuals with a strong disposition for crime.

However, our findings do not imply that adolescents with a low propensity for crime are entirely immune to deleterious peer influence. Although the peer effect is smaller for young people with a low propensity to offend, having delinquent friends increases the probability of criminal behavior even among youths of strong morality and high self-control – though to a lesser extent. Hints that criminogenic peer effects vanish completely at high levels of morality or self-control ability are virtually absent in our data. Whether the observable impact of criminal associates among low-propensity individuals is limited to adolescents or emerges also among adults is a worthwhile question for future research. In a cross-sectional study on the etiology of late life offending, Hirtenlehner and Baier (2019) found that association with crime-prone others relates to self-reported crime involvement even among senior citizens characterized by a poor capacity for self-control.

Going beyond revealing differential vulnerability to criminogenic exposure, the present study provides further insights into the interplay of various individual characteristics in determining young people's susceptibility to peer influence. Results concerning a three-way interaction of personal morality, trait self-control and association with delinquent friends suggest a joint operation of the concepts in governing adolescent offending. Self-control modifies the criminogenic peer effect mainly among youths of weak morality. This observation harmonizes with the presumption that weak personal morals increase the probability that crime is actually being pondered as a means of responding to peer-generated temptations and provocations, which brings self-control into play as a necessary restraining force (Wikström, 2010).

Conversely, individuals with strong law-consistent morality tend to refrain from crime contemplation even in situations loaded with social incentives for crime – a fact that renders their self-control ability largely irrelevant. Affiliation with delinquent peers boosts offending predominately for youths with higher levels of criminal propensity, but what really counts is the interplay of the various facets of an individual's disposition for crime. High trait self-control decreases the influence of delinquent friends chiefly among adolescents characterized by weak morality. In all, the emerging interaction pattern is very consistent with predictions deducible from SAT (Wikström et al., 2012). It accords not only with the elementary "person propensity – environmental inducements" interaction (Wikström et al., 2018, p. 12) but also with the assumed workings of the moral filter and a solely conditional relevance of self-control.

The established interworking of pivotal dispositional characteristics speaks against aggregating personal morality and self-control ability to an additive measure of a person's propensity to offend. High trait self-control unfolds its protective power especially among youths of weak morality. This observation also suggests that analyzing the potential of an individual's morality and self-control ability to defuse criminogenic peer effects in isolation of each other may provide an incomplete picture of the factual impact dynamics. Personal morals and the capacity for self-control represent disparate concepts (both confirmatory factor analyses and moderate correlations

between the constructs indicate discriminant validity) that jointly shape the significance of delinquent friends.

Needless to say, our findings also indicate that exposure to delinquent peers amplifies the significance of an individual's morality and self-control ability. Criminogenic setting features render personal qualities relevant in the process of crime causation (Wikström et al., 2018). Among the investigated individual characteristics, a subsidiary relationship evolves: qualities that influence cost and consequence considerations become salient primarily when one's moral forces hit a low point. This complex interworking of personal morality and self-control ability may be responsible for the inconsistent evidence regarding the moderating role of morality and self-control in studies that constrain their focus on the interaction of one of these characteristics with delinquent peer association.

The presented results undeniably bear implications for crime prevention. The obtained evidence suggests that efforts to prevent criminal conduct – at least in the young years of life – are well advised to address people's sense of morality and their capacity for self-control. Early interventions aimed at building law-relevant morality and self-control ability can help decrease individuals' proneness to offend in general and their susceptibility to criminogenic peer influence in particular. Research shows that programs for moral education (Schlaefli et al., 1985) or cognitive nurturing (Frieze et al., 2017) can successfully promote the development of law-consistent morals and self-control ability. Strengthening these individual properties is essential because they not only directly relate to offending but also work as a buffer against the detrimental impact of involvement with delinquent peers. The company of crime-encouraging peers cannot be avoided entirely in adolescence. Their routine activities imply that most young people are sometimes exposed to crime-prone others (although there are great differences in the extent of delinquent peer association). This is why such an approach also promises a high level of indirect profitability: widespread measures to increase law-relevant morality and trait self-control will reduce the number of delinquent peers that are available in a society.

Of course, our work is not without limitations.

First, relying on perceptions of peer delinquency in a study dedicated to the analysis of person–environment interactions is certainly debatable. Extant research demonstrates that perceived peer offending is a crucial part of the etiology of adolescent delinquency (Pratt et al., 2010). However, critics have argued that projection bias and false consensus effects contaminate perceptual measures of peer offending (Young et al., 2014). Peer-reported delinquency and perceptions of peer delinquency are distinct constructs (Boman et al., 2012). Which of these concepts a study should use, depends on the underlying research question. The present inquiry is concerned with the question how an individual's morality and self-control ability govern the significance of affiliation with crime-prone friends. The mechanism responsible for the interplay of these features is the perception–choice process outlined in SAT (Wikström, 2004, 2010). SAT makes it very clear that perceived and not true setting criminogeneity affects the role of self-control and morality in crime causation. It is the task and function of self-control to counteract perceived incentives to offend. An individual's morality influences whether crime is seen as a viable response to a felt motivation.

The fact that perceptions of peer delinquency may be inaccurate or distorted does neither undermine their power to influence behavior nor render self-control and morality irrelevant. On the contrary, *thinking* that friends advocate, expect or commit acts of crime brings about the interaction between peer delinquency and one's personal propensity to offend.

A critical note regarding the operationalization of trait self-control is also indispensable. The present study draws on an attitudinal measure of the capacity for self-control. This measurement strategy runs contrary to the preferences of Gottfredson and Hirschi (2020) who favor a behavior-based operationalization of the construct. Whether behavioral measures would produce similar findings remains an open question. In any case, the employed self-control scale focuses on those elements of the self-control trait that proved to be most predictive of criminal conduct (Arneklev et al., 1993; Vazsonyi et al., 2001; Ward et al., 2015).

Furthermore, we concede that the conducted analyses suffer from an insufficient control for the respondents' access to criminal opportunities. Affiliation with delinquent peers can be assumed to go hand in hand with increased exposure to crime-conducive outer circumstances (Hoeben et al., 2016), but it certainly represents an incomplete measure of the total supply of opportunities for crime. Therefore, future research on the interplay of delinquent peer association and individual characteristics will be well advised to pay more attention to environmental conditions favorable to the commission of crime.

Referring to a situational process while drawing on person-level data is admittedly problematic (Hardie, 2020). The situational argument that the presence of crime-prone peers generates temptations and provocations to offend that render an individual's inhibiting forces relevant has been examined here only at the individual level. Underlying were the assumptions (I) that adolescents who think their friends are supportive of criminal behavior more often perceive their immediate surroundings as criminogenic and (II) that youths who possess strong law-consistent personal morals and a high capacity for self-control more frequently engage in a successful moral filtering of action alternatives and effective activities of self-restraint. To delve deeper into the situational interplay of exposure to delinquent others and an individual's disposition for crime, future research should make use of hypothetical scenarios or space-time budget data enriched with information on the present others' level of crime proneness.

Disclosure statement

No potential conflict of interest was reported by the authors.

Notes on contributors

Helmut Hirtenlehner is Associate Professor of Criminology and head of the Centre for Criminology at the Johannes Kepler University Linz (Austria). His current research interests include Situational Action Theory, deterrence and self-control. Recent publications appeared in *Deviant Behavior* and the *Criminal Justice Review*.

Johann Bacher is full Professor of Sociology and Empirical Social Research as well as head of the Department of Empirical Social Research at the Johannes Kepler University Linz (Austria). His current research interests include quantitative research methods, youth unemployment, value orientations and social structure. Recent publications appeared in *Quality and Quantity* and the *Journal of Human Values*.

Heinz Leitgöb is academic councilor at the University of Eichstätt-Ingolstadt (Germany). His research interests cover action theories in criminology, survey methodology and statistical modeling. Recent publications appeared in *Survey Research Methods* and the *SAGE Research Methods Foundations*.

Doris Schartmueller is an Assistant Professor of Criminal Justice in the Department of Political Science and Criminal Justice at California State University Chico. Her research interests include comparative penology, life imprisonment, and discretionary prison release.

References

- Ai, C., & Norton, E. (2003). Interaction terms in logit and probit models. *Economics Letters*, 80(1), 123–129. [https://doi.org/10.1016/S0165-1765\(03\)00032-6](https://doi.org/10.1016/S0165-1765(03)00032-6)
- Aiken, L., & West, S. (1991). *Multiple regression: Testing and interpreting interactions*. Sage.
- Akers, R. (1998). *Social learning and social structure. A general theory of crime and deviance*. Northeastern University Press.
- Akers, R., & Jensen, G. (2006). The empirical status of Social Learning Theory of crime and deviance: The past, presence, and future. In F. Cullen, J. Wright, & K. Blevins (Eds.), *Taking stock: The status of criminological theory* (pp. 37–76). Transaction.]
- Andersen, R. (2008). *Modern methods for robust regression*. Sage.
- Anderson, E. (1999). *Code of the street. Decency, violence, and the moral life of the inner city*. Norton.
- Antonaccio, O., & Tittle, C. (2008). Morality, self-control, and crime. *Criminology*, 46(2), 479–510. <https://doi.org/10.1111/j.1745-9125.2008.00116.x>
- Arneklev, J., Grasmick, H., Tittle, C., & Bursik, R. (1993). Low self-control and imprudent behavior. *Journal of Quantitative Criminology*, 9(3), 225–247. <https://doi.org/10.1007/BF01064461>
- Baerveldt, C., Völker, B., & van Rossem, R. (2008). Revisiting selection and influence: An inquiry into the friendship networks of high school students and their association with delinquency. *Canadian Journal of Criminology and Criminal Justice*, 50(5), 559–587. <https://doi.org/10.3138/cjccj.50.5.559>
- Barnes, J., Raine, A., & Farrington, D. (2020). The interaction of biopsychological and socio-environmental influences on criminal outcomes. *Justice Quarterly*. (Online first) <https://doi.org/10.1080/07418825.2020.1730425>
- Barton-Crosby, J., & Hirtenlehner, H. (2020). The role of morality and self-control in conditioning the criminogenic effect of provocation. *A Partial Test of Situational Action Theory. Deviant Behavior*. (online first) <https://doi.org/10.1080/01639625.2020.1738645>
- Baumeister, R., Heatherton, D., & Tice, D. (1994). *Losing control. How and why people fail at self-regulation*. Academic Press.
- Beier, H. (2018). Situational peer effects on adolescents' alcohol consumption: The moderating role of supervision, activity structure, and personal moral rules. *Deviant Behavior*, 39(3), 363–379. <https://doi.org/10.1080/01639625.2017.1286173>
- Bendixen, M., Endresen, I., & Olweus, D. (2003). Variety and frequency scales of antisocial involvement: Which one is better? *Legal and Criminological Psychology*, 8(2), 135–150. <https://doi.org/10.1348/135532503322362924>
- Bernasco, W., Ruiter, S., Bruinsma, G., Pauwels, L., & Weerman, F. (2013). Situational causes of offending: A fixed-effects analysis of space-time budget data. *Criminology*, 51(4), 895–926. <https://doi.org/10.1111/1745-9125.12023>

- Berry, W., DeMeritt, J., & Esarey, J. (2010). Testing for interaction in binary logit and probit models: Is a product term essential? *American Journal of Political Science*, 54(1), 248–266. <https://doi.org/10.1111/j.1540-5907.2009.00429.x>
- Boers, K., Reinecke, J., Seddig, D., & Mariotti, L. (2010). Explaining the development of adolescent violent delinquency. *European Journal of Criminology*, 7(6), 499–520. <https://doi.org/10.1177/1477370810376572>
- Boman, J., Stogner, J., Miller, B., Griffin, O., & Krohn, M. (2012). On the operational validity of perceptual peer delinquency: Exploring projection and elements contained in perceptions. *Journal of Research in Crime and Delinquency*, 49(4), 601–621. <https://doi.org/10.1177/0022427811419367>
- Bowen, H. (2012). Testing moderating hypotheses in limited dependent variable and other non-linear models: Secondary versus total interactions. *Journal of Management*, 38(3), 860–889. <https://doi.org/10.1177/0149206309356324>
- Braithwaite, J. (1989). *Crime, shame and reintegration*. Cambridge University Press.
- Brauer, J., & Tittle, C. (2017). When crime is not an option: Inspecting the moral filtering of criminal action alternatives. *Justice Quarterly*, 34(5), 818–846. <https://doi.org/10.1080/07418825.2016.1226937>
- Brown, T. (2006). *Confirmatory factor analysis for applied research*. Guilford Press.
- Bruinsma, G., Pauwels, L., Weerman, F., & Bernasco, W. (2015). Situational Action Theory: Cross-sectional and cross-lagged tests of its core propositions. *Canadian Journal of Criminology and Criminal Justice*, 57(3), 363–398. <https://doi.org/10.3138/cjccj.2013.E24>
- Burt, C. (2020). Self-control and crime: Beyond Gottfredson & Hirschi's theory. *Annual Review of Criminology*, 3(1), 43–73. <https://doi.org/10.1146/annurev-criminol-011419-041344>
- Burt, C., Simons, R., & Simons, L. (2006). A longitudinal test of the effect of parenting and the stability of self-control: Negative evidence for the General Theory of Crime. *Criminology*, 44(2), 353–396. <https://doi.org/10.1111/j.1745-9125.2006.00052.x>
- Caspi, A., Moffitt, T., Silva, P., Stouthamer-Loeber, M., Krueger, R., & Schmutte, P. (1994). Are some people crime-prone? Replications of the personality–crime relationship across countries, genders, races, and methods. *Criminology*, 32(2), 163–195. <https://doi.org/10.1111/j.1745-9125.1994.tb01151.x>
- Cohen, L., & Felson, M. (1979). Social change and crime rate trends: A Routine Activity Approach. *American Sociological Review*, 44(4), 588–608. <https://doi.org/10.2307/2094589>
- Craig, J. (2019). Extending Situational Action Theory to white-collar crime. *Deviant Behavior*, 40(2), 171–186. <https://doi.org/10.1080/01639625.2017.1420444>
- Crump, R., Hotz, V., Imbens, G., & Mitnik, O. (2008). Nonparametric tests for treatment effect heterogeneity. *Review of Economics and Statistics*, 90(3), 389–405. <https://doi.org/10.1162/rest.90.3.389>
- DeLisi, M. (2017). *Psychopathy as unified theory of crime*. Palgrave Macmillan.
- Desmond, S., Bruce, A., & Stacer, M. (2012). Self-control, opportunity, and substance use. *Deviant Behavior*, 33(6), 425–447. <https://doi.org/10.1080/01639625.2011.584055>
- Etzioni, A. (1988). *The moral dimension. Toward a new economics*. Free Press.
- Evans, T., Cullen, F., Burton, V., Dunaway, R., & Benson, M. (1997). The social consequences of self-control: Testing the General Theory of Crime. *Criminology*, 35(3), 475–504. <https://doi.org/10.1111/j.1745-9125.1997.tb01226.x>
- Fishbein, D. (2001). *Biobehavioral perspectives in criminology*. Wadsworth.
- Ford, J., & Blumenstein, L. (2013). Self-control and substance use among college students. *Journal of Drug Issues*, 43(1), 56–68. <https://doi.org/10.1177/0022042612462216>
- Franken, A., Moffitt, T., Steglich, C., Dijkstra, J., Harakeh, Z., & Volleberg, W. (2016). The role of self-control and early adolescents' friendships in the development of externalizing behavior: The SNARE study. *Journal of Youth and Adolescence*, 45(9), 1800–1811. <https://doi.org/10.1007/s10964-015-0287-z>
- Friese, M., Frankenbach, J., Job, V., & Loschelder, D. D. (2017). Does self-control training improve self-control? A meta-analysis. *Perspectives on Psychological Science: A Journal of the Association for Psychological Science*, 12(6), 1077–1099. <https://doi.org/10.1177/1745691617697076>

- Gallupe, O., McLevey, J., & Brown, S. (2019). Selection and influence: A meta-analysis of the association between peer and personal offending. *Journal of Quantitative Criminology*, 35(2), 313–335. <https://doi.org/10.1007/s10940-018-9384-y>
- Gerstner, D., & Oberwittler, D. (2018). Who's hanging out and what's happening? A look at the interplay between unstructured socializing, crime propensity and delinquent peers using social network data. *European Journal of Criminology*, 15(1), 111–129. <https://doi.org/10.1177/1477370817732194>
- Glueck, S., & Glueck, E. (1950). *Unraveling juvenile delinquency*. Harvard University Press.
- Gottfredson, M., & Hirschi, T. (1990). *A General Theory of Crime*. Stanford University Press.
- Gottfredson, M., & Hirschi, T. (2020). *Modern control theory and the limits of criminal justice*. Oxford University Press.
- Grasmick, H. G., Tittle, C. R., Bursik, R. J., & Arneklev, B. J. (1993). Testing the core empirical implications of Gottfredson and Hirschi's General Theory of Crime. *Journal of Research in Crime and Delinquency*, 30(1), 5–29. <https://doi.org/10.1177/0022427893030001002>
- Hannon, L., DeFronzo, J., & Prochnow, J. (2001). Moral commitment and the effects of social influences on violent delinquency. *Violence and Victims*, 16(4), 427–439. <https://doi.org/10.1891/0886-6708.16.4.427>
- Hardie, B. (2020). *Studying situational interaction: Explaining behaviour by analysing person-environment convergence*. Springer.
- Hay, C., & Meldrum, R. (2016). *Self-control and crime over the life course*. Sage.
- Haynie, D., & Osgood, W. (2005). Reconsidering peers and delinquency: How do peers matter? *Social Forces*, 84(2), 1109–1130. <https://doi.org/10.1353/sof.2006.0018>
- Higgins, G. (2004). Can low self-control help with the understanding of the software piracy problem? *Deviant Behavior*, 26(1), 1–24. <https://doi.org/10.1080/01639620490497947>
- Hilbe, J. (2011). *Negative binomial regression*. Cambridge University Press.
- Hill, K., Howell, J., Hawkins, J., & Battin-Pearson, S. (1999). Childhood risk factors for adolescent gang membership: Results from the Seattle Social Development Project. *Journal of Research in Crime and Delinquency*, 36(3), 300–322. <https://doi.org/10.1177/0022427899036003003>
- Hindelang, M., Gottfredson, M., & Garofalo, J. (1978). *Victims of personal crime: An empirical foundation for a Theory of Personal Victimization*. Ballinger.
- Hirtenlehner, H., & Baier, D. (2019). Self-control and offending in late adulthood. Investigating self-control's interaction with opportunities and criminal associations in advanced age. *Journal of Criminal Justice*, 60, 117–129. <https://doi.org/10.1016/j.jcrimjus.2018.09.002>
- Hirtenlehner, H., & Hardie, B. (2016). On the conditional relevance of controls. An application of Situational Action Theory to shoplifting. *Deviant Behavior*, 37(3), 315–331. <https://doi.org/10.1080/01639625.2015.1026764>
- Hirtenlehner, H., & Kunz, F. (2016). The interaction between self-control and morality in crime causation among older adults. *European Journal of Criminology*, 13(3), 393–409. <https://doi.org/10.1177/1477370815623567>
- Hirtenlehner, H., Pauwels, L., & Mesko, G. (2015). Is the criminogenic effect of exposure to peer delinquency dependent on the ability to exercise self-control? Results from three countries. *Journal of Criminal Justice*, 43(6), 532–543. <https://doi.org/10.1016/j.jcrimjus.2015.05.006>
- Hirtenlehner, H., & Treiber, K. (2017). Can Situational Action Theory explain the gender gap in adolescent shoplifting? Results from Austria. *International Criminal Justice Review*, 27(3), 165–187. <https://doi.org/10.1177/1057567717690199>
- Hoeben, E., Meldrum, R., Walker, D., & Young, J. (2016). The role of peer delinquency and unstructured socializing in explaining delinquency and substance use: A state-of-the-art review. *Journal of Criminal Justice*, 47, 108–122. <https://doi.org/10.1016/j.jcrimjus.2016.08.001>
- Huber, P. (2004). *Robust statistics*. Wiley.
- Inzlicht, M., Werner, K., Briskin, J., & Roberts, B. (2021). Integrating models of self-regulation. *Annual Review of Psychology*, 72(1), 319–345. <https://doi.org/10.1146/annurev-psych-061020-105721>

- Jensen Arnett, J. (1996). Sensation seeking, aggressiveness, and adolescent reckless behavior. *Personality and Individual Differences*, 20(6), 693–702. [https://doi.org/10.1016/0191-8869\(96\)00027-X](https://doi.org/10.1016/0191-8869(96)00027-X) [https://doi.org/10.1016/0191-8869\(96\)00027-X](https://doi.org/10.1016/0191-8869(96)00027-X)
- Karaca-Mandic, P., Norton, E., & Dowd, B. (2012). Interaction terms in nonlinear models. *Health Services Research*, 47(1 Pt 1), 255–274. <https://doi.org/10.1111/j.1475-6773.2011.01314.x>
- Krohn, M., & Thornberry, T. (2008). Longitudinal perspectives on adolescent street gangs. In A. Liberman (Ed.), *The long view of crime. A synthesis of longitudinal research* (pp. 128–160). Springer.
- Kokkalera, S., Marshall, I. H., & Marshall, C. (2020). How exceptional is India? A test of Situational Action Theory. *Asian Journal of Criminology*, 15(3), 195–218. <https://doi.org/10.1007/s11417-020-09312-5>
- Kroneberg, C., Heintze, I., & Mehlkop, G. (2010). The interplay of moral norms and instrumental incentives in crime causation. *Criminology*, 48(1), 259–294. <https://doi.org/10.1111/j.1745-9125.2010.00187.x>
- Kroneberg, C., & Schulz, S. (2018). Revisiting the role of self-control in Situational Action Theory. *European Journal of Criminology*, 15(1), 56–76. <https://doi.org/10.1177/1477370817732189>
- Kuhn, E., & Laird, R. (2013). Parent and peer restrictions of opportunities attenuate the link between low self-control and antisocial behavior. *Social Development*, 22(4), 813–830. <https://doi.org/10.1111/sode.12028>
- LeBlanc, M. (2006). Self-control and social control of deviant behavior in context: Development and interactions along the life-course. In R. Sampson & P.-O. Wikström (Eds.), *The explanation of crime: Context, mechanisms, and development* (pp. 195–242). Cambridge University Press.
- Longshore, D., & Turner, S. (1998). Self-control and criminal opportunity: Cross-sectional test of the General Theory of Crime. *Criminal Justice and Behavior*, 25(1), 81–98. <https://doi.org/10.1177/0093854898025001005>
- Marshall, I. H., & Enzmann, D. (2012). The generalizability of Self-Control Theory. In J. Junger-Tas, I. H. Marshall, D. Enzmann, M. Killias, M. Steketee, & B. Gruszczynska (Eds.), *The many faces of youth crime* (pp. 285–325). Springer.
- Marshall, I. H., & Marshall, C. (2018). Shame and wrong: Is there a common morality among young people in France, the UK, the Netherlands, Germany, and the USA?. In S. Roché & M. Hough (Eds.), *Minority youth and social integration: The ISRD-3 Study in Europe and the US* (pp. 29–59). Springer.
- Matsueda, R., & Anderson, K. (1998). The dynamics of delinquent peers and delinquent behavior. *Criminology*, 36(2), 269–306. <https://doi.org/10.1111/j.1745-9125.1998.tb01249.x>
- McGloin, J., & Shermer, L. (2009). Self-control and deviant peer network structure. *Journal of Research in Crime and Delinquency*, 46(1), 35–72. <https://doi.org/10.1177/0022427808326585>
- Mears, D., Ploeger, M., & Warr, M. (1998). Explaining the gender gap in delinquency: Peer group influence and moral evaluations of behavior. *Journal of Research in Crime and Delinquency*, 35(3), 251–266. <https://doi.org/10.1177/0022427898035003001>
- Megens, K., & Weerman, F. (2012). The social transmission of delinquency: Effects of peer attitudes and behaviors revisited. *Journal of Research in Crime and Delinquency*, 49(3), 420–443. <https://doi.org/10.1177/0022427811408432>
- Meldrum, R., & Hay, C. (2012). Do peers matter in the development of self-control? Evidence from a longitudinal study of youth. *Journal of Youth and Adolescence*, 41(6), 691–703. <https://doi.org/10.1007/s10964-011-9692-0>
- Meldrum, R., Young, J., & Weerman, F. (2009). Reconsidering the effect of self-control and delinquent peers: Implications of measurement for theoretical significance. *Journal of Research in Crime and Delinquency*, 46(3), 353–376. <https://doi.org/10.1177/0022427809335171>
- Meldrum, R., Young, J., & Weerman, F. (2012). Changes in self-control during adolescence: Investigating the influence of the adolescent peer network. *Journal of Criminal Justice*, 40(6), 452–462. <https://doi.org/10.1016/j.jcrimjus.2012.07.002>
- Messner, S. (2012). Morality, markets, and the ASC: 2011. Presidential address to the American Society of Criminology. *Criminology*, 50(1), 5–25. <https://doi.org/10.1111/j.1745-9125.2011.00264.x>

- Mize, T. (2019). Best practices for estimating, interpreting, and presenting nonlinear interaction effects. *Sociological Science*, 6(1), 81–117. <https://doi.org/10.15195/v6.a4>
- Mobarake, R., Juhari, R., Yaacob, S., & Esmaeili, N. (2014). The moderating role of self-control in the relationship between peer affiliation and adolescents' antisocial behavior in Teheran, Iran. *Asian Social Science*, 10(9), 71–81. <https://doi.org/10.5539/ass.v10n9p71>
- Moffitt, T. (1993). Adolescence-limited and life-course-persistent antisocial behavior: A developmental taxonomy. *Psychological Review*, 100(4), 674–701. <https://doi.org/10.1037/0033-295X.100.4.674>
- Mood, C. (2010). Logistic regression: Why we cannot do what we think we can do, and what we can do about it. *European Sociological Review*, 26(1), 67–82. <https://doi.org/10.1093/esr/jcp006>
- Morselli, C., & Tremblay, P. (2004). Criminal achievement, offender networks, and the benefits of low self-control. *Criminology*, 42(3), 773–804. <https://doi.org/10.1111/j.1745-9125.2004.tb00536.x>
- Nagin, D., & Paternoster, R. (1993). Enduring individual differences and rational choice theories of crime. *Law & Society Review*, 27(3), 467–496. <https://doi.org/10.2307/3054102>
- Osgood, W., Finken, L., & McMorris, B. (2002). Analyzing multiple-item measures of crime and deviance II: Tobit regression analysis of transformed scores. *Journal of Quantitative Criminology*, 18(4), 319–347. <https://doi.org/10.1023/A:1021198509929>
- Osgood, D. W., Wilson, J. K., O'Malley, P. M., Bachman, J. G., & Johnston, L. D. (1996). Routine activities and individual deviant behavior. *American Sociological Review*, 61(4), 635–655. <https://doi.org/10.2307/2096397>
- Ousey, G., & Wilcox, P. (2007). Interactions between antisocial propensity and life-course varying correlates of delinquent behavior: Differences by method of estimation and implications for theory. *Criminology*, 45(2), 313–442. <https://doi.org/10.1111/j.1745-9125.2007.00080.x>
- Parsons, T. (1937). *The structure of social action*. Free Press.
- Paternoster, R., Brame, R., Mazerolle, P., & Piquero, A. (1998). Using the correct statistical test for the equality of regression coefficients. *Criminology*, 36(4), 859–866. <https://doi.org/10.1111/j.1745-9125.1998.tb01268.x>
- Pauwels, L., Svensson, R., & Hirtenlehner, H. (2018). Testing Situational Action Theory: A narrative review of studies published between 2006 and 2015. *European Journal of Criminology*, 15(1), 32–55. <https://doi.org/10.1177/1477370817732185>
- Piquero, N. L., Gover, A., MacDonald, J., & Piquero, A. (2005). The influence of delinquent peers on delinquency: Does gender matter? *Youth & Society*, 36(3), 251–275. <https://doi.org/10.1177/0044118X04265652>
- Pratt, T. (2016). A self-control/life-course theory of criminal behavior. *European Journal of Criminology*, 13(1), 129–146. <https://doi.org/10.1177/1477370815587771>
- Pratt, T., & Cullen, F. (2000). The empirical status of Gottfredson and Hirschi's General Theory of Crime: A meta-analysis. *Criminology*, 38(3), 931–964. <https://doi.org/10.1111/j.1745-9125.2000.tb00911.x>
- Pratt, T., Cullen, F., Sellers, C., Winfree, T., Madensen, T., Daigle, L., Fearn, N., & Gau, J. (2010). The empirical status of Social Learning Theory: A meta-analysis. *Justice Quarterly*, 27(6), 765–802. <https://doi.org/10.1080/07418820903379610>
- Rebellon, C., Straus, A., & Medeiros, R. (2008). Self-control in global perspective: An empirical assessment of Gottfredson and Hirschi's General Theory within and across 32 national settings. *European Journal of Criminology*, 5(3), 331–361. <https://doi.org/10.1177/1477370808090836>
- Rebellon, C., & Modecki, K. (2014). Accounting for projection bias in models of delinquent peer influence: The utility and limits of latent variable approaches. *Journal of Quantitative Criminology*, 30(2), 163–186. <https://doi.org/10.1007/s10940-013-9199-9>
- Reiss, A., & Farrington, D. (1991). Advancing knowledge about co-offending: Results from a prospective longitudinal survey of London males. *The Journal of Criminal Law and Criminology*, 82(2), 360–395. <https://doi.org/10.2307/1143811>
- Sampson, R. (2012). *Great American city. Chicago and the enduring neighborhood effect*. University of Chicago Press.
- Sampson, R., & Laub, J. (1993). *Crime in the making. Pathways and turning points through life*. Harvard University Press.

- Schlaefli, A., Rest, J., & Thoma, S. (1985). Does moral education improve moral judgment? A meta-analysis of intervention studies using the Defining Issues Test. *Review of Educational Research*, 55(3), 319–352. <https://doi.org/10.3102/00346543055003319>
- Schnell, R., Bachteler, T., & Reiher, J. (2010). Improving the use of self-generated identification codes. *Evaluation Review*, 34(5), 391–418. <https://doi.org/10.1177/0193841X10387576>
- Schoepfer, A., & Piquero, A. (2006). Self-control, moral beliefs, and criminal activity. *Deviant Behavior*, 27(1), 51–71. <https://doi.org/10.1080/016396290968326>
- Seddig, D. (2014). Peer group association, the acceptance of norms and violent behaviour: A longitudinal analysis of reciprocal effects. *European Journal of Criminology*, 11(3), 319–339. <https://doi.org/10.1177/1477370813496704>
- Stams, G., Brugman, D., Dekovic, M., van Rosmalen, L., van der Laan, P., & Gibbs, J. (2006). The moral judgment of juvenile delinquents: a meta-analysis. *Journal of Abnormal Child Psychology*, 34(5), 697–713. <https://doi.org/10.1007/s10802-006-9056-5>
- Steketee, M. (2012). The lifestyles of youth and their peers. In J. Junger-Tas, I. H. Marshall, D. Enzmann, M. Killias, M. Steketee, & B. Gruszczynska (Eds.), *The many faces of youth crime* (pp. 237–255). Springer.
- Stets, J., & Carter, M. (2012). A theory of the self for the sociology of morality. *American Sociological Review*, 77(1), 120–140. <https://doi.org/10.1177/0003122411433762>
- Stummvoll, G., Kromer, I., & Hager, I. (2010). Austria. In J. Junger-Tas, I.H. Marshall, D. Enzmann, M. Killias, M. Steketee, & B. Gruszczynska (Eds.), *Juvenile delinquency in Europe and beyond. Results of the Second International Self-Report Delinquency Study* (pp. 97–110). Springer.
- Sweeten, G. (2012). Scaling criminal offending. *Journal of Quantitative Criminology*, 28(3), 533–557. <https://doi.org/10.1007/s10940-011-9160-8>
- Sutherland, E. (1956). A sociological theory of criminal behavior. In A. Cohen, A. Lindesmith, & K. Schuessler (Eds.), *The Sutherland papers* (pp. 76–81). Indiana University Press.
- Svensson, R., & Oberwittler, D. (2010). It's not the time they spend, It's what they do: The interaction between delinquent friends and unstructured routine activity on delinquency. *Journal of Criminal Justice*, 38(5), 1006–1004. <https://doi.org/10.1016/j.jcrimjus.2010.07.002>
- Svensson, R., Pauwels, L., & Weerman, F. (2010). Does the effect of self-control on adolescent offending vary by level of morality? A test in three countries. *Criminal Justice and Behavior*, 37(6), 732–743. <https://doi.org/10.1177/0093854810366542>
- Svensson, R., Weerman, F., Pauwels, L., Bruinsma, G., & Bernasco, W. (2013). Moral emotions and offending: Do feelings of anticipated shame and guilt mediate the effect of socialization on offending? *European Journal of Criminology*, 10(1), 22–39. <https://doi.org/10.1177/1477370812454393>
- Thomas, K., & McGloin, J. M. (2013). A dual-systems approach for understanding differential susceptibility to processes of peer influence. *Criminology*, 51(2), 435–474. <https://doi.org/10.1111/1745-9125.12010>
- Thornberry, T., Krohn, M., Lizotte, A., Smith, C., & Tobin, K. (2003). *Gangs and delinquency in developmental perspective*. Cambridge University Press.
- Trasler, G. (1993). Conscience, opportunity, rational choice and crime. In R. Clarke & M. Felson (Eds.), *Routine activity and rational choice* (pp. 305–322). Transaction.
- Tsai, T., & Gill, J. (2013). Interactions in generalized linear models: Theoretical issues and an application to personal vote-earning attributes. *Social Sciences*, 2(2), 91–113. <https://doi.org/10.3390/socsci2020091>
- Tyler, T. (2006). *Why people obey the law*. Princeton University Press.
- Vazsonyi, A., Mikuska, J., & Kelley, E. (2017). It's time: A meta-analysis of the self-control–deviance link. *Journal of Criminal Justice*, 48, 48–63. <https://doi.org/10.1016/j.jcrimjus.2016.10.001>
- Vazsonyi, A., Pickering, E., Junger, M., & Hessing, T. (2001). An empirical test of a General Theory of Crime: A four-nation comparative study of self-control and the prediction of deviance. *Journal of Research in Crime and Delinquency*, 38(2), 91–131. <https://doi.org/10.1177/0022427801038002001>

- Ward, J., Nobles, M., & Fox, K. (2015). Disentangling self-control from its elements: A bifactor analysis. *Journal of Quantitative Criminology*, 31(4), 595–627. <https://doi.org/10.1007/s10940-014-9241-6>
- Warr, M. (2002). *Companions in crime: The social aspects of criminal conduct*. Cambridge University Press.
- Warr, M. (2009). Peers and delinquency. In M. Krohn, A. Lizotte, & G. Penly Hall (Eds.), *Handbook on crime and deviance* (pp. 383–404). Springer.
- Warr, M., & Stafford, M. (1991). The influence of delinquent peers: What they think or what they do? *Criminology*, 29(4), 851–866. <https://doi.org/10.1111/j.1745-9125.1991.tb01090.x>
- Weerman, F., Bernasco, W., Bruinsma, G., & Pauwels, L. (2015). When is spending time with peers related to delinquency? The importance of where, what, and with whom. *Crime & Delinquency*, 61(10), 1386–1413. <https://doi.org/10.1177/001128713478129>
- Weerman, F., & Hoeve, M. (2012). Peers and delinquency among girls and boys: Are sex differences in delinquency explained by peer factors? *European Journal of Criminology*, 9(3), 228–244. <https://doi.org/10.1177/1477370811435736>
- Weerman, F. M., & Smeenk, W. H. (2005). Peer similarity in delinquency for different types of friends: A comparison using two measurement methods. *Criminology*, 43(2), 499–523. <https://doi.org/10.1111/j.0011-1348.2005.00015.x>
- Wikström, P.-O. (2004). Crime as alternative. Towards a cross-level Situational Action Theory of crime causation. In J. McCord (Ed.), *Beyond empiricism: Institutions and intentions in the study of crime* (pp. 1–37). Transaction.
- Wikström, P.-O. (2010). Explaining crime as moral action. In S. Hitlin & S. Vaisey (Eds.), *Handbook of the sociology of morality* (pp. 211–240). Springer.
- Wikström, P.-O. (2020). Explaining crime and criminal careers: The DEA model of Situational Action Theory. *Journal of Developmental and Life-Course Criminology*, 6(2), 188–203. <https://doi.org/10.1007/s40865-019-00116-5>
- Wikström, P.-O., & Butterworth, D. (2006). *Adolescent crime: Individual differences and lifestyles*. Willan.
- Wikström, P.-O., Mann, R., & Hardie, B. (2018). Young people's differential vulnerability to criminogenic exposure: Bridging the gap between people- and place-oriented approaches in the study of crime causation. *European Journal of Criminology*, 15(1), 10–31. <https://doi.org/10.1177/1477370817732477>
- Wikström, P.-O., Oberwittler, D., Treiber, K., & Hardie, B. (2012). *Breaking rules. The social and situational dynamics of young people's urban crime*. Oxford University Press.
- Wikström, P.-O., & Svensson, R. (2010). When does self-control matter? The interaction between morality and self-control in crime causation. *European Journal of Criminology*, 7(5), 395–410. <https://doi.org/10.1177/1477370810372132>
- Wilcox, P., Land, K., & Hunt, S. (2003). *Criminal circumstance. A dynamic multicontextual criminal opportunity theory*. Aldine de Gruyter.
- Williams, R. (2012). Using the Margins command to estimate and interpret adjusted predictions and marginal effects. *The Stata Journal: Promoting Communications on Statistics and Stata*, 12(2), 308–331. <https://doi.org/10.1177/1536867X1201200209>
- Wilson, J., & Herrnstein, R. (1985). *Crime and human nature*. Simon & Schuster.
- Wright, B., Caspi, A., Moffitt, T., & Silva, P. (2001). The effects of social ties on crime vary by criminal propensity: A Life-Course Model of Interdependence. *Criminology*, 39(2), 321–351. <https://doi.org/10.1111/j.1745-9125.2001.tb00925.x>
- Yarbrough, A., Jones, S., Sullivan, C., Sellers, C., & Cochran, J. (2012). Social learning and self-control: Assessing the moderating potential of criminal propensity. *International Journal of Offender Therapy and Comparative Criminology*, 56(2), 191–202. <https://doi.org/10.1177/0306624X10396041>
- Young, J., Rebellon, C., Barnes, J., & Weerman, F. (2014). Unpacking the black box of peer similarity in deviance: Understanding the mechanisms linking personal behavior, peer behavior, and perceptions. *Criminology*, 52(1), 60–86. <https://doi.org/10.1111/1745-9125.12029>

Appendix 1: Lagged negative binomial models with product terms

	Model 1 (full sample)			Model 2 (full sample)			Model 3a ("weaker morality" group)			Model 3b ("stronger morality" group)		
	B	SE	p	B	SE	p	B	SE	p	B	SE	p
Perceived peer delinquency	+0.39	0.08	.000	+0.35	0.09	.000	+0.44	0.09	.000	+0.47	0.14	.001
Low self-control	+0.35	0.07	.000	+0.31	0.07	.000	+0.43	0.08	.000	+0.28	0.13	.030
Weak morality	+0.29	0.09	.001	+0.31	0.10	.002	—	—	—	—	—	—
Peer delinquency $\times$ self-control	-0.13	0.04	.004	—	—	—	-0.13	0.05	.004	-0.05	0.15	.768
Peer delinquency $\times$ morality	—	—	—	-0.06	0.04	.166	—	—	—	—	—	—
Perceived sanction risk	+0.06	0.07	.426	+0.06	0.07	.374	+0.20	0.08	.010	-0.05	0.12	.668
Type of school: grammar school	+0.26	0.14	.066	+0.25	0.14	.084	+0.35	0.19	.064	-0.02	0.25	.929
Age	+0.03	0.09	.705	+0.03	0.09	.718	+0.06	0.08	.455	-0.03	0.17	.882
Sex: male	+0.20	0.16	.203	+0.20	0.16	.196	+0.23	0.16	.162	+0.09	0.29	.764
Ethnicity: non-Austrian	+0.12	0.16	.442	+0.08	0.16	.634	+0.01	0.21	.981	+0.27	0.26	.294
Domicile: Linz	-0.10	0.21	.632	-0.07	0.21	.747	-0.11	0.30	.706	-0.11	0.43	.796
Model fit	$n = 681$; $\chi^2 = 145.75$; $df = 10$; $p = .000$			$n = 681$; $\chi^2 = 135.67$; $df = 10$; $p = .000$			$n = 321$; $\chi^2 = 94.27$; $df = 9$; $p = .000$			$n = 360$; $\chi^2 = 21.07$; $df = 9$; $p = .012$		

B: unstandardized regression coefficient; SE: standard error; p: p-value.