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# Does Empathy Attenuate the Criminogenic Effect of Low Self-Control in Late Life?

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## ABSTRACT

The present study investigates whether empathy shapes the criminogenic effect of low self-control in late adulthood. Based on the assumption that the capacity to understand and share the thoughts and emotions of other people moderates the significance of the capability to consider the distant consequences of behaviour on oneself, we posit that poor self-control is less consequential among senior citizens of high empathy. The results of a postal survey of 3,000 randomly selected older adults from Germany indicate that both low trait self-control and weak trait empathy increase offending in advanced age. Furthermore, the findings provide evidence of an interaction according to which the relationship between the risk-taking component of the self-control trait and criminal activity is stronger for older adults characterised by low empathy. Impulsivity, on the other hand, seems to mediate the association of empathy and offending in late life.

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## KEYWORDS

Empathy; self-control; late life offending

## INTRODUCTION

Ten years ago, Frank Cullen (2011) coined the term “adolescence-limited criminology” to describe the fact that the bulk of research on the causes of criminal conduct draws on samples of adolescents and young adults. Not much has changed since then. Inquiries on why people break the law still concentrate on the aetiology of juvenile delinquency. The number of studies focusing on the causes of crime among older adults or senior citizens has remained remarkably small. This is astonishing, given that there are reasons to expect rising levels of elderly crime in most Western societies (Fattah & Sacco, 1989; Feldmeyer & Steffensmeier, 2007; Kunz, 2014). In many Western countries, the absolute number as well as the proportion of older adults in the population is growing (Bosworth & Burtless, 1998; Kunz, 2014). People not only live longer; they also stay healthy, fit and mobile until old age. Their rising nimbleness may facilitate senior citizens’ criminal activity. Increasing poverty among the aged arising from economic crises and the ongoing dismantling of the welfare state may render late life offending more likely (Kunz, 2014). Likewise, a general erosion of the moral foundation of contemporary societies may contribute to heightened criminal inclinations of older people (Bell, 1976). Currently, late life offending is a rare event that involves predominantly minor crimes (Feldmeyer & Steffensmeier, 2007; Hirtenlehner & Kunz, 2017; Hirtenlehner & Baier, 2019).

Building on recent inquiry establishing the significance of the self-control trait for the explanation of offending in late adulthood, the present work aims to answer the question of whether empathy ability – understood as a somewhat stable trait (D. Davis, 1994) – attenuates the impact of self-control capability on criminal conduct in advanced age.<sup>1</sup> People’s capacity for self-control

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represents one of the most popular predictors of their extent of criminal activity (Gottfredson & Hirschi, 1990, 2020). Innumerable studies found that low self-control facilitates antisocial and criminal behaviour in samples of adolescents and young adults (Pratt & Cullen, 2000; De Ridder et al., 2012; Vazsonyi et al., 2017). In recent years, several works showed that low self-control is also related to increased offending in the later stages of the life-course (Holtfreter et al., 2015; Wolfe, 2015; Hirtenlehner & Kunz, 2016, 2017; Wolfe et al., 2016; Reisig & Holtfreter, 2018; Hirtenlehner & Baier, 2019).

Empathy, on the other hand, reflects a somewhat neglected concept in criminological research (Posick et al., 2014). Although the ability to share other people's emotions and understand their mental states has received some attention as a predictor of bullying, antisocial behaviour and criminal conduct (Jolliffe & Farrington, 2004, 2021; Vachon et al., 2014; Van Langen et al., 2014; Zych et al., 2019), it has not been widely used in analyses of the roots of late life offending. Hence, little is known about the concrete role of the empathy trait in the formation of criminal activity in old age.

Departing from these insights, it is not far-fetched to ask whether older people's level of empathy has the potential to moderate the impact of their capacity for self-control. Gottfredson and Hirschi (1990, p. 89) observation that individuals of low self-control are "insensitive to the suffering and needs of others" suggest a non-negligible relationship between the investigated concepts. The presumption of an interplay of empathy and self-control in crime causation may also be derived from the diagnoses that "[o]ffending adolescents seem to combine a lack of care for what happens to others as a consequence of their criminal behavior with (. . .) a lack of care for one's own future" (Klapwijk et al., 2017, p. 257). Acknowledging that crime tends to produce harm to others, we hypothesise that high trait empathy mitigates the criminogenic effect of poor trait self-control in advanced age. This assumption will be tested based on a large representative sample of older adults living in Germany. The underlying mail survey focuses on the risk-taking and impulsivity dimensions of the self-control trait as well as on the cognitive facet of the empathy trait.

The present study contributes to the literature in several ways. First, general accounts of crime causation require testing in different cultural and institutional contexts. This is particularly true for research on the aetiology of late life offending. Ageing and retirement mean different things to citizens of different countries. The social framing and organisation of these processes may affect the impact of potentially criminogenic factors on older people's level of criminal activity. Second, while there are tests of the influence of low self-control on offending in late adulthood, inquiry on the crime-related implications of empathy deficits in old age represents a rare good. Whether a dearth of empathy relates to elderly crime to the same extent as it does to juvenile delinquency has remained unexplored. Since evidence on the interaction between self-control and empathy in late life is likewise absent, the current investigation helps to close a significant research gap.

## EMPATHY, SELF-CONTROL AND THE AETIOLOGY OF LATE LIFE OFFENDING

### *Empathy*

The concept of empathy has become an umbrella term referring to numerous distinct phenomena. Therefore, the research landscape is scattered by a large diversity in conceptual and operational definitions (Hall & Schwartz, 2019; Jolliffe & Farrington, 2021). In the framework of developmental psychology, empathy is usually understood as a multidimensional construct that covers distinct affective and cognitive mental processes (M. Davis, 1983; Jolliffe & Farrington, 2006; Decety & Cowell, 2014). Thereby, affective empathy describes a person's capacity for emotional congruence by *sharing* other people's emotions, whereas cognitive empathy characterises a person's capacity for perspective taking and *understanding* other people's emotions (Cuff et al., 2016). Cognitive empathy is housed in the theory-of-mind, which involves identifying another person's perspective in

order to construct social reality, comprehend social situations and guide social interaction (Decety & Michalska, 2010).

A crucial shift from self-concern in response to other individuals' distress to vis-à-vis-oriented prosocial behaviour occurs in infancy (Hoffman, 2000). Rudimentary forms of affective empathy like mimicry and emotional contagion are already discernible in the newborn phase, while cognitive empathy develops somewhat later (Zhuravlova & Chebykin, 2021).<sup>2</sup> Basic cognitive, affective and behavioural faculties to display integrated patterns of concern for others in distress emerge from the age of two years (Bretherton et al., 1986). However, even among adults reasoning about others is notoriously biased towards the self-perspective (Royzman et al., 2003). Suppressing this egocentric bias is therefore necessary for empathic responding, which involves various inhibitory mechanisms that direct attention away from the self. Accordingly, self-other differentiation and self-regulation capacity represent essential aspects of peoples' empathic abilities (Eisenberg et al., 2014).

There is indication that affective and cognitive empathy have different trajectories in advanced adulthood (Bailey & Henry, 2008; Henry et al., 2013; Sun et al., 2018). While affective empathy seems to withstand a deterioration in the later stages of the life-course, some evidence suggests that cognitive empathy is subject to a decline in old age. Compared to young adults aged around 20 years, adults of 50 years and over exhibit higher levels of affective empathy but lower levels of cognitive empathy (Sun et al., 2018). Interestingly, these often-observed age-related differences in perspective taking can be traced to lower levels of disinhibition of the self-perspective, but not to other aspects of cognitive functioning like memory, mental flexibility, and cognitive speed (Bailey & Henry, 2008). A meta-analysis shows that older adults have increased difficulties in theory-of-mind regardless of specific task parameters, with deficits evident across all task types, domains and modalities (Henry et al., 2013). Thus, it may be concluded that ageing especially affects the cognitive aspects of empathy-related responding and that the disinhibition of the self-perspective might be one mechanism causing the age-related decline in the capacity for perspective taking. Acknowledging this trajectory, the current study concentrates on the relationship between cognitive empathy and offending in late life.

Baron-Cohen (2011, p. 42) states that "empathy (.) is the most valuable resource in our world," as a lack of empathy plays a fundamental role in the aetiology of many cruel, antisocial and criminal behaviours. "Individuals who have lower levels of empathy are theorised to be more likely to (...) commit offences because they are unburdened by the experience or knowledge of the emotional consequences of their actions on others" (Jolliffe & Farrington, 2021, p. 2). Individuals possessing poor empathic abilities may be at risk to offend because they are free from inhibitions imposed by 'feeling' or comprehending the adverse effects of their actions on other people (Jolliffe & Murray, 2012). Hence, they have less cost to consider when contemplating acts of crime (Hirschi, 2004). In a similar way, empathy deficits have been assumed to result in less compassion for the suffering of other individuals (Klapwijk et al., 2017) and a reduced proneness to experience feelings of guilt when hurting others (Trivedi-Bateman, 2019).

Inspired by reflections of this kind, academics have attempted to decode empathy's relationship with criminality for the past fifty years, in particular since the new millennium (Posick et al., 2012). This endeavour resulted in ample support for criminogenic implications of poor empathic abilities (Jolliffe & Farrington, 2004; Vachon et al., 2014; Van Langen et al., 2014; Zych et al., 2019). Scholars agree that empathy is critical for fathoming people's propensity for crime (Trivedi-Bateman, 2019). A lack of empathy has been found to increase the likelihood of a broad range of antisocial and criminal behaviours, among them violent (Shechtman, 2002; Romero-Martinez et al., 2016), sexual (Hempel et al., 2015; Loinaz et al., 2021) and fraudulent (Craig, 2017; O'Neill, 2020) offending as well as substance abuse (Martinotti et al., 2009; Ferrari et al., 2014) and bullying (Mitsopoulou & Giovazolias, 2015; Van Noorden et al., 2015). Thereby, the magnitude of the empathy effect seems to be contingent on the employed sampling frame and the investigated crime type.

Whether cognitive or affective empathy represents a more powerful predictor of criminal involvement has remained contentious. Literature reviews come to different conclusions in this

regard. While some of them accord greater significance to the cognitive dimension of the concept (Jolliffe & Farrington, 2004; Van Langen et al., 2014), others portray affective empathy as more important (Klapwijk et al., 2017; Zych et al., 2019).

### **Self-control**

Gottfredson and Hirschi (1990) General Theory of Crime states that low self-control is a major cause of offending in all demographic groups and all stages of life. Thereby, they devised self-control as an enduring and multi-faceted trait that focuses on the individual's capacity "to avoid acts whose long-term costs exceed short-term benefits" (Hirschi & Gottfredson, 2001, p. 83). At its heart is the ability to anticipate and calculate the subsequent consequences of behaviour (Gottfredson & Hirschi, 2020). Low self-control is attributed to individuals marked by an inaptitude to defer gratification, plan for the future and take long-range effects of behaviour into consideration. Aside from an inability to consider the delayed implications of conduct when making behavioural choices, some of the constitutive elements of low self-control include risk-taking, impulsivity, bad temper, self-centredness and a preference for physical activity and simple problem solutions (Grasmick et al., 1993). These characteristics tend to come together in the same people. Individuals of low self-control are described as "impulsive, insensitive, physical (. . .), risk-taking, short-sighted, and non-verbal" (Gottfredson & Hirschi, 1990). A close association with the level of empathy is obvious. In the words of Gottfredson and Hirschi (1990, p. 89), "people with low self-control tend to be self-centered, indifferent, or insensitive to the suffering and needs of others." Insofar as empathy touches upon the capacity to recognise, understand and vicariously experience the pain of others, it likewise captures a lack of responsiveness to possible consequences of one's behaviour. It follows that individuals who lack self-control are prone to seek immediate gratification of desires without regard for the distant or social consequences of their actions. This is the case because they are plainly incapable of considering both the negative long-term implications of behaviour for themselves and its detrimental consequences for other people.

Controversies evolved around the self-control-related stability assumption. Gottfredson and Hirschi (1990) argue that individual differences in self-control are present early in life – as a result of parental child-rearing practices – and tend to persist over time. Although there are some misinterpretations owing to vague and ambiguous formulations, the General Theory of Crime does not submit that an individual's absolute level of self-control is set in stone after the first decade of life and from then on stays constant over time (Gottfredson & Hirschi, 2020). Such a pattern would contradict evidence according to which, following a temporary low during adolescence, self-control tends to become stronger with age. There is indication that self-control increases as individuals grow older, approximately up to age 50 or 60. In very old age, roughly from age 70 on, self-control may decrease again. In this late period of life, a deterioration of organic structures of the brain (especially the prefrontal cortex) may hamper executive functions, among them the ability to exercise self-control (Helson & Wink, 1992; West, 1996; Tittle & Grasmick, 1997; Burton et al., 1999; Tittle et al., 2003; Von Hippel, 2007; Cohen-Mansfield et al., 2013).

Instead, the General Theory of Crime posits a stability of differences in the sense that the rank ordering of individuals along the self-control continuum remains the same over the life-course (Gottfredson & Hirschi, 2020). The assumption of relative stability is supported by longitudinal research (Burt et al., 2006, 2014; Hay & Forrest, 2006; Winfree et al., 2006; Vazsonyi & Huang, 2010) and implies that self-control can explain individual-level variation in offending at all stages of the life-course.

A plethora of studies supports the notion that low self-control increases offending (Pratt & Cullen, 2000; Gottfredson, 2006; De Ridder et al., 2012; Vazsonyi et al., 2017). The distribution of criminal and analogous behaviours across individuals reflects differences in self-control. Among the various components of the self-control trait, risk-taking appears to be particularly predictive of criminal involvement (Arneklev et al., 1993; Piquero & Rosay, 1998; LaGrange & Silverman, 1999; Vazsonyi

et al., 2001). As it generally applies to criminological research, the bulk of the evidence stems from samples of adolescents and young adults. Only few studies address the impact of self-control in older populations, let alone the aged. Nonetheless, a handful of empirical works shows that low self-control does foster offending in old age (Holtfreter et al., 2015; Wolfe, 2015; Hirtenlehner & Kunz, 2016, 2017; Wolfe et al., 2016; Reisig & Holtfreter, 2018; Hirtenlehner & Baier, 2019).

### ***The interplay of self-control and empathy***

Existing research suggests that trait self-control and empathy ability represent correlated concepts. Several studies found measures of self-control to be positively associated with measures of empathy (Tangney et al., 2004; Pilarska & Baumeister, 2018; Javakhishvili & Vazsonyi, 2021; McGee et al., 2021; Narvey et al., 2021). Low self-control, on the other hand, tends to go hand in hand with diminished empathy: individuals who discount the long-term consequences of their actions for themselves exhibit also a lack of care for the suffering of others (Klapwijk et al., 2017).

The fact that low self-control is often accompanied by poor empathy does not necessarily imply purely additive effects of these characteristics on criminal behaviour. It is correct that those of low self-control *and* those of weak empathy tend to factor in fewer costs when pondering acts of crime. Both contemplating the consequences of one's acts for one's own future and considering the implications of one's actions for other people have the potential to curb criminal activity. However, self-control and empathy may substitute for one another in preventing criminal conduct, which comes down to an interactive interplay of the concepts. Both negative consequences for the (potential) perpetrator and detrimental implications for the (potential) victim can stop an individual from committing acts of crime, and the impact of certain repercussions may depend on the individual's ability to consider other ramifications when making behavioural choices. When individuals are not concerned with the delayed consequences of their behaviour on themselves, the capability to understand or "sense" the implications of their actions for other people may become especially relevant in crime causation. Conversely, among individuals who are indifferent against the emotions or suffering of others, the capability to contemplate the temporally remote effects of their behaviour on themselves may become particularly important in crime causation. In brief: low self-control may have a greater impact on offending under conditions of diminished empathy.

As outlined above, criminological inquiry backs the significance of the concepts discussed above. Both self-control (Pratt & Cullen, 2000; De Ridder et al., 2012; Vazsonyi et al., 2017) and empathy (Jolliffe & Farrington, 2004; Van Langen et al., 2014; Zych et al., 2019) relate to a wide variety of antisocial and criminal behaviours. Thereby, the former seems to be somewhat more predictive than the latter (McGee et al., 2021). Although the state of research is generally supportive of unconditional effects of self-control and empathy on crime involvement, evidence on their interworking has remained sparse and inconclusive.

Hints towards the presence of a systematic interaction of trait self-control and empathy ability among adults can be obtained from a study on the risk of intimate partner violence conducted in Spain. Romero-Martinez et al. (2016) observed that the capacity to understand the thoughts and emotions of others moderates the impact of antisocial personality traits on the likelihood of recidivating spousal violence, with antisocial personality becoming more predictive as cognitive empathy decreases. From these findings, the authors conclude that "empathy deficits could underlie the misinterpretation of others' intentions, facilitating the onset of violence, if the individual does not have an adequate regulation system" (2016, p. 355).<sup>3</sup>

Information on the interplay of trait self-control and empathy ability can also be gained from a survey of undergraduate students enrolled at an Australian university. McGee et al. (2021) demonstrated that both low self-control and weak cognitive empathy increase the likelihood of aggressive behaviours. The rates of physical aggression peak among those who combine poor self-control and low empathy.



A study on the roots of white-collar offending failed to confirm an interaction between trait self-control and empathy ability. In a sample of undergraduate students enrolled at an US-American university, Craig (2017) found no evidence of a conditioning role of empathy. Tobit regression models predicting intentions to commit embezzlement, credit card fraud and shoplifting did not yield significant interaction terms. Whether the observed absence of interaction is due to the fact that the investigated crimes include no direct contact with the victim remains an unsolved question (Bock & Hossler, 2014).

Research on the interworking of trait self-control and empathy ability in governing late life offending is entirely absent. As far as we know, the interplay of self-control and empathy has not yet been tested among senior citizens. To tackle this deficit, the present study addresses the question of whether people's empathy ability moderates the relationship between trait self-control and criminal activity in advanced adulthood. The underlying hypothesis posits that high empathy diminishes the criminogenic effect of low self-control in late life.

## METHODS

### *Sample*

The data underlying our analyses stem from a postal crime survey conducted among adults residing in the German federal state of Lower Saxony. Located in the North-Western part of Germany, Lower Saxony encompasses several large cities and altogether approximately 8 million inhabitants. It shines through economic prosperity and low unemployment rates.<sup>4</sup>

The large-scale mail survey was based on a two-stage probability sample. In stage one, 73 (out of 420) communities were randomly chosen, stratified proportionately by population size. In stage two, a random selection of residents of these communities took place. For this purpose, the resident registration offices of these communities were asked to provide a simple random sample of their inhabitants, with the desired sample size between 140 and 700 persons depending on the size of the community.<sup>5</sup> This strategy resulted in an overall sample size of 10,000 people aged sixteen years and over.

The mail survey was carried out in February and March 2014. Of the 10,000 addressees, 620 were not available for a survey, primarily because they had moved or died. Consequently, the contacted sample comprised 9,380 people living in Lower Saxony, of which 5,866 took part in the survey. This corresponds to a response rate of 63%.

Data gathering relied on Dillman's (2000) Total or Tailored Design Method. This means that the addressees initially received a personalised notification letter. A short time later, the questionnaire was sent, along with five Euros as unconditional incentive to participate. Shortly afterwards, a thank-you or reminder letter was dispatched.

Since the present study aims at investigating the aetiology of late life offending, the net sample had to be reduced to individuals in the later portions of the life-course. In this work, advanced adulthood is defined as the age period following a person's 50<sup>th</sup> birthday. This rather low age limit was chosen because in Germany some individuals enter forms of early retirement already in their fifties, thereby passing the social threshold into the last stage of life.

The population survey included 2,981 individuals aged 50 years and older, which amounts to approximately one half (51%) of the original data set. These 2,981 respondents form the basis of all analyses conducted in the course of this work. 49% of them are males, 51% females. 6% have migration background in the sense that at least one parent was born abroad. In terms of age, 37% are between 50 and 59, 30% between 60 and 69, and 33% 70 and more years old.

## Measures

*Offending:* In line with Hirschi and Gottfredson (1994) proposition that individuals of low self-control tend to engage in a wide variety of criminal and analogous behaviours, self-reported offending was measured in terms of a variety scale here. Variety scales count the number of different types of crime an individual has committed in a certain period of time, in our case in the twelve months preceeding the survey. A scale capturing the versatility of offending is also preferred because there is evidence that variety scales 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 conduct. Furthermore, they are not biased by a “guessing” of the frequency of criminal activity and less dominated by minor offences.<sup>6</sup> With regard to the testing of interaction relationships, the fact that crime variety scales generally exhibit lower levels of skewness than crime frequency scales is of particular significance (see the next section). In the present study, information was collected on eleven different offences. The resulting count variable has a range of values between 0 and 4. The corresponding skewness parameter amounts to 4.19. 9% of the respondents reported having committed at least one of these crimes in the past twelve months. Detailed information on this measure, as well as on the following ones, is provided in Appendix 1.

*Self-control:* The present study adopts an attitudinal approach to measuring self-control that focuses on risk-taking and impulsivity as pivotal ingredients of the concept. This emphasis is warranted by the fact that among the various components of the multidimensional self-control trait, an individual’s willingness to take risks and his or her level of impulsiveness have proven to be the best predictors of criminal activity (Arneklev et al., 1993; Longshore et al., 1996; Piquero & Rosay, 1998; LaGrange & Silverman, 1999; Vazsonyi et al., 2001).

Since the association between risk seeking and impulsivity ( $r = .11$ ;  $p = .000$ ) turns out to be rather modest in our sample, we abstain from combining them into a single measure of low self-control. Instead, we compute separate sum scores for both dimensions of the self-control trait. Risk-taking was measured with four and impulsivity with six items. While the statements employed to capture respondents’ willingness to take risks follow the scale proposed by Grasmick et al. (1993), the statements used to quantify participants’ impulsiveness were devised by Kanning (2009) as part of an inventory aimed at depicting various facets of adult people’s social competences. Four response categories between “not agree at all” and “strongly agree” were presented to grade the answers. Additive composite measures were computed for both trait dimensions, with high scores denoting elevated levels of risk-taking and impulsivity.

*Empathy:* Our measure of trait empathy taps into the cognitive facet of the construct. In earlier work cognitive empathy was equated with perspective taking capability (M. Davis, 1983), while later on cognitive empathy was conceptualised as capacity to understand the emotions of others (Jolliffe & Farrington, 2006). The items utilised in the present study stem from Kanning’s (2009) social competency inventory. They capture both aspects of cognitive empathy, i.e., perspective taking and understanding other people’s emotions. Four statements were to be assessed on a four-point response format ranging from “not agree at all” to “strongly agree.” The calculated total score was coded so that large values denote high empathy ability.

*Criminal associations:* To obtain a respondent-generated measure of criminal associations, participants were asked to state whether they have friends, acquaintances or relatives who had committed the following crimes in the last twelve months: fair dodging, shoplifting, car or bike theft, damaging property and physical assault. The available response categories were “no” and “yes.” Affirmative answers were added up. In the resulting composite measure, higher values describe increased perceived exposure to criminal associates.

*Physical mobility:* To determine participants’ level of physical mobility, we draw on the frequency of leisure activities outside the home. Respondents were asked how often they had attended cultural events, gone to concerts or the movies, and gone to pubs, bars and dancing events within



**Table 1.** Descriptive statistics and correlations (product-moment correlation coefficients).

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Offending	1.00									
2. Empathy	-.09***	1.00								
3. Risk-taking	.17***	-.08***	1.00							
4. Impulsivity	.09***	-.54***	.11***	1.00						
5. Mobility	.15***	.04*	.15***	.02	1.00					
6. Criminal associations	.20***	-.02	.10***	.05**	.11***	1.00				
7. Age	-.09***	.09***	-.06**	-.08***	-.22***	-.12***	1.00			
8. Gender	.10***	-.11***	.15***	-.01	.05**	.05*	.01	1.00		
9. Social status	.01	.06**	.03	-.04*	.21***	-.01	.05**	.03	1.00	
10. Migration background	-.01	-.02	-.00	-.00	-.03	.04*	-.05*	-.02	-.09***	1.00
Arithmetic mean/Standard deviation	0.11/0.39	12.78/2.28	4.75/1.51	11.24/3.26	6.27/1.90	0.08/0.27	64.42/10.07	0.49/0.50	3.62/0.78	0.06/0.23

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

the last year. Each item was equipped with a five-category answering scale with the endpoints “never” and “several times a week.” Responses were summed up to form a total score, which was coded in a way that high values indicate increased physical mobility.

In addition to the concepts outlined above, a number of socio-demographic controls were taken into account. Age was measured in years. Gender was coded 0 for females and 1 for males. Respondents were classified as having migration background if at least one parent was born abroad or does not have German nationality. Participants’ socio-economic status was inferred from a self-assessment of one’s own economic position, using a five-point answering scale ranging from “very bad” to “very good.”

Descriptive statistics for all variables included in the analyses as well as their product-moment correlations are presented in Table 1.

### Analytic strategy

The employed crime variety measure represents a count variable. Negative binomial regression (Hilbe, 2011) has been established as appropriate technique for modelling skewed overdispersed count outcomes.<sup>7</sup> Nevertheless, although negative binomial models best match the skewed and discrete nature of the employed response variable, our focus on moderation relationships speaks against relying primarily on this analytical procedure. In a nonlinear framework, neither the inspection of product term coefficients nor the comparison of subsample-specific regression slopes provide accurate information about the presence and direction of interaction effects (Karaca-Mandic et al., 2012; Mize, 2019; Hardie, 2020).

Owing to the logarithmic link function, negative binomial models are multiplicative by definition, which implies that both model inherent and product term interaction may be existent in these models. Both forms of interaction mutually affect each other (or even cancel each other out). This fact not only reduces the model’s sensitivity to product term interaction, it also renders the slope of the multiplicative term a possibly misleading estimate of the overall interplay of two predictors (Berry et al., 2010; Bowen, 2012).

Comparing regression weights across groups is impeded by the fact that the scaling of the regression coefficients depends on the level of unobserved heterogeneity. Negative binomial regression slopes can only be compared when the influence of all omitted third variables (even those that are uncorrelated with the included predictors) is the same for all subgroups – an assumption that will rarely be met (Allison, 1999; Mood, 2010).

Given these problems with determining interaction in nonlinear models, we decided to conduct the main analysis of the interplay of empathy and self-control in a linear framework.

The objection that the skewed distribution of self-reported offending violates key assumptions (normality and homoscedasticity) of linear regression models can be countered by pointing out that

ordinary least squares (OLS) regression is fairly robust in this regard and that the effect of a passably powerful predictor should appear in all types of regression analyses (Fox, 1991). More detrimental, however, is the fact that when dealing with a highly skewed response variable, OLS regression is biased towards establishing spurious interaction effects that merely reflect the non-normal distribution of the dependent variable (Osgood et al., 2002). To immunise ourselves against spurious moderator effects, we take various precautions. First, all conducted linear regression analyses are based on robust standard errors (Hannon & Knapp, 2003). Furthermore, we rely on a modelling strategy proposed by Lubinski and Humphreys (1990). These authors recommend introducing the squared terms of the predictor variables involved in interaction dynamics into the model equations – in addition to the individual predictors and their product. The quadratic terms soak up the nonlinear parts of the predictors' relationship with the target variable and thus enable an estimation of the interaction effect that is unaffected by the pitfalls of skewness. However, the combination of these safeguards represents a very conservative method of testing for interaction that can non-negligibly increase the risk of type II errors.

To strengthen the conclusions drawn from the linear models, we compare the OLS results with the findings of negative binomial regression analyses. In terms of the investigated interaction relationship, the performed sensitivity analyses draw on comparisons of marginal effects (Mood, 2010; Karaca-Mandic et al., 2012; Williams, 2012) obtained from negative binomial models. Marginal effects are largely invariant to the omission of third variables unrelated to the predictors included in a model and can therefore be the subject of comparisons (Mood, 2010). A marginal effect relates a continuous independent variable to the predicted change of a dependent variable, given specific values of other explanatory factors (Mize, 2019). In the case of a negative binomial regression, it expresses how the value of the count response changes with a one-unit increase in the predictor variable, with other regressors held at fixed values (Hilbe, 2011). Following the logic that variability in conditional marginal effects indicates the presence of interaction, conditional marginal effects of the self-control measures are calculated for three different levels of the moderator variable "empathy." Then the Z-test proposed by Paternoster et al. (1998) is employed to assess whether the conditional self-control effects differ significantly from each other.

All regression models were estimated with Stata 14. Predictor variables involved in interactions were z-standardised before calculating the multiplicative terms (Aiken & West, 1991). The marginal effects at representative values were computed as partial derivative ( $dy/dx$ ) from the negative binomial model using Stata's "margins" command (Williams, 2012). Since we examine directional hypotheses, one-sided significance testing was implemented for all relationships involving self-control or empathy.

## RESULTS

The statistical analysis starts with an inspection of the bivariate correlations between the self-control measures and respondents' empathic ability (see Table 1). The findings indicate that senior citizens with poorer self-control also score lower on empathy. While the association of risk-taking and empathy is negligible ( $r = -.08$ ), there is a close relationship between impulsiveness and empathy ( $r = -.54$ ). High impulsivity is accompanied by a weak capacity to understand the thoughts and feelings of other people.

### *Unconditional effects of empathy and self-control*

To assess whether trait self-control and empathy ability contribute to the understanding of criminal involvement in late adulthood, we conducted several linear regression analyses (Table 2). In Model 1, crime variety is regressed solely on the capacity to understand other people's thoughts and emotions. Here a lack of empathy turns out to be predictive of late life offending. Model 2 additionally includes the two measures of the self-control trait as independent variables. Both of

**Table 2.** Linear regression models predicting late life offending.

	Model 1		Model 2		Model 3		Model 4		Model 5	
	b	t	b	t	b	t	b	t	b	t
Empathy	-.02*	2.91	-.00	0.22	-.00	0.48	-.01	0.60	-.01	0.59
Risk-taking			+.07***	5.64	+.06***	5.67	+.05***	4.50	+.05*	2.48
Impulsivity			+.02**	2.54	+.03*	2.60	+.02*	2.12	+.02*	1.90
Risk-taking*Empathy					-.02*	1.79	-.02*	1.80	-.02*	1.75
Impulsivity*Empathy					+.00	0.56	+.00	0.05	+.01	1.09
Criminal associations							+.07***	5.23	+.07***	5.25
Mobility							+.04***	3.63	+.04***	3.72
Age							-.00	1.55	-.00	1.62
Gender							+.06***	3.76	+.06***	3.87
Social status							-.01	0.62	-.01	0.59
Migration background							-.03	1.07	-.03	1.11
Empathy (squared)									+.01	1.34
Risk-taking (squared)									+.00	0.10
Impulsivity (squared)									+.01	0.86
Overall model	R <sup>2</sup> = .003; p = .004		R <sup>2</sup> = .034; p = .000		R <sup>2</sup> = .037; p = .000		R <sup>2</sup> = .086; p = .000		R <sup>2</sup> = .087; p = .000	

Note: The predictors “empathy,” “risk-taking,” “impulsivity,” “mobility” and “criminal associations” are converted into Z-scores. All models are based on robust standard errors.

\* p < .05; \*\* p < .01; \*\*\* p < .001; b ... unstandardised regression coefficient; t ... t-value

them relate to the scope of criminal activity. Both an elevated taste for risk and a heightened level of impulsivity are significantly associated with increased crime involvement. A comparison of the regression weights suggests that risk-taking is more closely related to older people’s unlawful behaviour than impulsiveness.<sup>8</sup> However, adding these predictors deprives empathy of its explanatory power. As soon as self-control is taken into account, empathy ceases to exert an unconditional or “main” effect on the extent of offending in late life.<sup>9</sup>

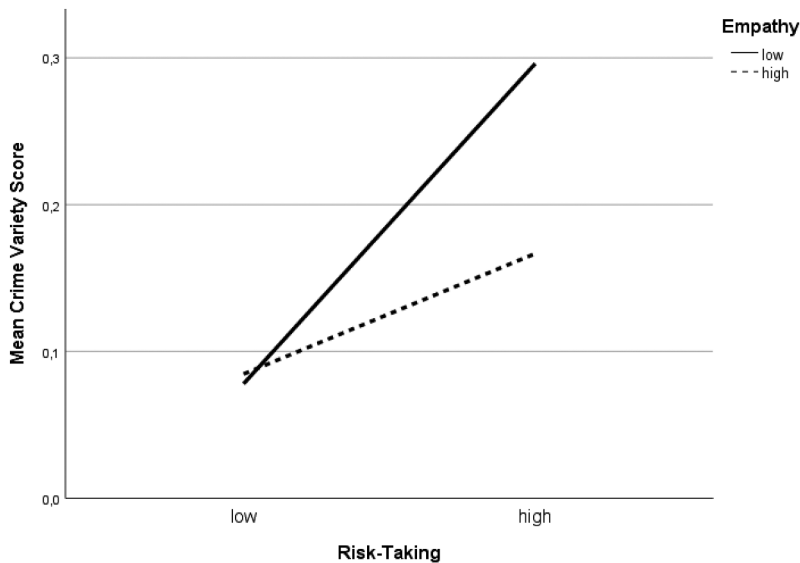
### **The interaction of empathy and self-control**

So far, we have shown that low self-control increases the likelihood of offending in advanced adulthood, regardless of senior citizens’ empathic abilities. However, this does not necessarily imply an irrelevance of the capacity to recognise and understand other people’s thoughts and emotions. It may well be that empathy conditions the effect of trait self-control on crime, with self-control deficits being less consequential among those of high empathy ability.

To assess the presence of such an interaction, Model 3 introduces two product terms into the equation, one depicting the interplay of risk-taking and empathy and one capturing the interworking of impulsivity and empathy. The interaction term constructed of risk-seeking and empathy achieves significance (whereas the other one does not). Its sign indicates that risk-taking loses some of its detrimental implications among older respondents characterised by higher levels of empathy. This pattern aligns with the proposition that an elevated capacity to identify and understand the suffering of others weakens the criminogenic effect of low self-control in late life. The strength of the observed interaction, however, must not be overestimated: adding the product terms increases the proportion of explained variance only by 0.3%.

Figure 1 illustrates the detected interaction relationship for median-dichotomised versions of the predictor variables. The chart shows that risk-taking makes a difference chiefly when senior citizens’ empathy ability is low.

In Model 4, several control variables are added. Adjusting the analyses for criminal associations, personal mobility and a few socio-demographic characteristics does not alter the findings. The results indicate again that trait empathy moderates the relationship between risk-taking and offending in late life. The model estimation yields a significant product term according to which, net of controls, a well-developed empathy ability attenuates the criminogenic effect of risk-taking among older adults. Evidence of an interaction of impulsiveness and empathy remains absent.<sup>10</sup>



**Figure 1.** The interaction of risk-taking and empathy. Note: Risk-taking and empathy were dichotomised at the median.

Model 5 introduces the squared terms of empathy, risk-taking and impulsivity into the equation. These quadratic terms are entered to correct for the skewness of the crime variety score and to partial out the nonlinear parts of the predictors' relationship to the response variable (Lubinski & Humphreys, 1990). With this, we want to ensure that the included multiplicative terms do not reflect spurious interactions that are actually due to the non-normality of the target variable. After adjustment for the squared terms, the product of risk-taking and empathy retains significance and sign. People's willingness to take risks continues to exercise a larger effect among older individuals who lack empathy. This rather strict test of the tenability of the hypothesised moderation relationship substantially enhances our confidence in the findings.

### **Further predictors of offending in late life**

Aside from the interplay of the concepts under study, the results of the regression analyses also inform about the significance of further explanatory factors. As mentioned above, Model 4 from Table 2 incorporates a series of control variables. Among these covariates, association with crime-prone others and physical mobility prove to be predictive of offending in late adulthood. Increased exposure to criminal associates – as perceived by the actor – goes hand in hand with higher crime variety scores. Senior citizens who more frequently engage in leisure activities away from home exhibit higher levels of criminal activity.

Among the considered socio-demographic characteristics, gender emerges as significant determinant of criminal conduct in the later sections of the life-course. Older males are more likely to offend than older females. This indicates that the well-known gender difference in criminal activity continues to exist in advanced adulthood and that the included predictor variables cannot fully account for this gender gap.

### **Differentiated sensitivity analyses**

Additional analyses were conducted to ensure that the findings presented above do not constitute an artefact produced by the linear modelling strategy. The sensitivity checks were performed within a negative binomial framework.

In their most recent monography, Gottfredson and Hirschi (2020) insist that introducing several measures of the same concept – namely the self-control trait – as predictors into the same regression equation represents a case of serious overcontrolling. In their view, this comes down to adjusting self-control for self-control, which would result in an undue underestimation of the significance of this concept in crime causation. Following their recommendations, we decided to include either risk-taking or impulsivity in the nonlinear models serving as sensitivity analyses, but not both of them simultaneously. The results of the negative binomial regression analyses can be seen in Appendix 2.

Model 1 includes only empathy as regressor. In isolated consideration, empathy deficits are predictive of criminal involvement in late adulthood. Adding risk-taking as predictor (Model 2) indicates that both a heightened appetite for risk and a lack of empathy foster offending in the later portions of the life-course, with the willingness to take risks being more influential than the capacity to understand other people's thoughts and emotions. Introducing the familiar control variables does not alter the findings (Model 3). When impulsivity is left aside, empathy shows a significant relationship to crime variety in old age.

A different picture emerges as soon as respondents' level of impulsiveness is employed as measure of the self-control trait. Adding impulsivity instead of risk-taking as predictor variable (Model 4) bereaves empathy of its significance. The impulsivity scores themselves relate to offending, with heightened impulsiveness facilitating criminal activity in advanced age. Entering control variables into the equation does not change the results (Model 5). From this pattern, we may infer that the impulsivity component of the self-control trait mediates the effect of senior citizens' empathy ability on their criminal involvement – a conclusion that harmonises with the moderate to strong correlation of these concepts. A Sobel test (Holmbeck, 2002) likewise points to an indirect empathy effect, with impulsiveness mediating the association between empathy ability and late life offending ( $Z = 2.97$ ;  $p = .003$ ).<sup>11</sup>

To address the question of moderation, Models 3 and 5 were re-estimated, each of them expanded with the corresponding self-control  $\times$  empathy product term as additional predictor. Since, as outlined in the methods section, in nonlinear models the product term alone is not informative regarding the total interplay of two concepts, we calculated marginal effects at representative values from the obtained results (Mize, 2019). The conditional marginal effects of risk-taking and impulsiveness were computed for low ( $\mu - 1$  StdDev), medium ( $\mu$ ) and high ( $\mu + 1$  StdDev) levels of empathy ability and then compared across groups. Z-tests were applied to determine whether these conditional marginal effects differ significantly from each other (Paternoster et al., 1998). Table 3 presents the results.

The findings of the conducted effect comparisons resemble those of the OLS models. The interaction of risk-taking and empathy could be replicated. Inspecting the conditional risk-taking effects at representative values of the empathy trait reveals that risk-seeking increases offending at all levels of empathy, but its influence slightly rises as empathy declines. Z-tests indicate significant

**Table 3.** Marginal effects of risk-taking at representative values of empathy (marginal effects from negative binomial regression models).

	Risk-taking	Impulsivity
Conditional effects	ME (p)	ME (p)
High empathy ( $\mu + 1$ SD)	0.025 (.000)	0.029 (.003)
Medium empathy ( $\mu$ )	0.028 (.000)	0.030 (.001)
Low empathy ( $\mu - 1$ SD)	0.032 (.000)	0.031 (.000)
Equality tests	Z (p)	Z (p)
High/low	1.67 (.047)	0.46 (.324)
High/medium	1.77 (.038)	0.47 (.321)
Medium/low	1.59 (.056)	0.45 (.327)

ME ... marginal effect; Z ... Z-value; p ... error probability

effect variation: for individuals scoring high on empathy, risk-taking is significantly less consequential than for people scoring low on empathy.

As already inferred from the linear models, the capacity to understand other people's thoughts and emotions does not moderate the impact of impulsiveness on elderly crime. Heightened impulsivity raises the likelihood of late life offending at all levels of empathy equally. The conditional marginal impulsivity effects do not vary across the range of respondents' empathy ability.

## CONCLUSIONS

The present article addresses the role of trait self-control and empathy ability in the aetiology of offending in the later stages of the life-course. At its heart is the hypothesis that high empathy diminishes the criminogenic effect of low self-control in late life. The findings of a large-scale survey of older adults from Germany indicate that a lack of concern for the repercussions of one's acts fosters criminal activity in advanced adulthood. Both the capacity to anticipate and calculate the delayed consequences of one's actions for oneself and the capability to recognise and understand the implications of one's behaviour for other people affect the extent of crime involvement in old age. The interplay of trait self-control and empathy ability, however, is complex. The effects of both properties are closely interlinked.

The results provide mixed support for a moderating role of empathy. There is evidence of a weak interaction of empathy ability and the risk-taking component of the multidimensional self-control trait. The willingness to take risks is more predictive of offending in late life among individuals characterised by poor empathic abilities. Risk-seeking increases crime involvement particularly among older adults who are free from inhibitions imposed by a comprehension of the distress and suffering their behaviour causes for other people. Risk-taking is significantly less influential among those of higher cognitive empathy.

Contrary to this, senior citizens' empathy ability does not condition the impact of the impulsivity element of the self-control construct. A tendency to act rapidly without thinking facilitates late life offending at all levels of empathy to the same extent. However, there are hints that impulsiveness mediates the effect of older adults' empathic abilities. Although the relationship between empathy and impulsivity has rarely been studied, a few inquiries report that lower cognitive empathy is associated with greater impulsiveness (Reniers et al., 2011; Koegl, 2021). In line with this, our findings likewise indicate that individuals who have empathy deficits score higher on impulsivity. Thereby, the latter seems to buffer the impact of the former. A well-developed capacity to understand the thoughts and emotions of others may decrease people's proneness to act spontaneously and inconsiderately, which then reduces the likelihood of criminal offending. A Sobel test confirms the existence of mediation.

Taken together, these observations suggest that treating self-control as unidimensional construct when studying its interrelationships with empathy is unwise. Our analyses demonstrate that empathy conditions the significance of risk-taking and that impulsivity mediates the influence of empathy in advanced adulthood. Self-control represents a multi-faceted trait whose elements may be involved in different interdependencies with other determinants of criminal conduct (Burt et al., 2014; Ward et al., 2015; Forrest et al., 2019). A poor capacity to act in the service of one's long-term goals and interests is not the sole cause of criminal behaviour (Gottfredson & Hirschi, 2020) and its precise interworking with other causes may vary across the different components of the self-control trait.

Similarly, as empathy is a multidimensional construct, analyses that concentrate on particular components of the concept may miss the influence of other important facets. In this context, it must also be mentioned that an individual's general ability to understand and share the feelings of other people may differ from his or her level of victim-specific empathy (Loinaz et al., 2021).

Senior citizens who have lower levels of self-control and empathy are more likely to offend. These observations are instructive for offender treatment. Efforts to prevent criminal conduct in the



later stages of the life-course are well advised to target deficits in self-control and empathy. Although the capacity for self-control marks the more powerful explanatory factor, strengthening people's ability to recognise and comprehend the distress and suffering of others is important, too, as empathy not only directly relates to offending but also affects the criminogenic potential of various elements of the self-control trait.

The conducted multivariate analyses furthermore reveal that (perceived) exposure to criminal associates and senior citizens' level of physical mobility predict offending in late adulthood. These relationships have already been interpreted as evidence of a criminogenic opportunity effect in old age (Hirtenlehner & Baier, 2019).

Finally, some methodological limitations must be addressed.

The first possible objection concerns the cross-sectional nature of the study, which is known to challenge inferences about causality. Problems arise especially when the outcome variable dates before the explanatory variables, which is the case here. However, both trait self-control and empathy ability can be understood as rather stable dispositions that change merely slowly over time – especially in advanced adulthood (Caspi & Roberts, 2001). Apart from this: on theoretical grounds, there is little reason to conjecture that prior offending brings about a specific interplay of self-control and empathy in governing subsequent behaviour. Nonetheless, longitudinal research on the formation of late life offending is definitely encouraged here.

Using an age threshold of 50 years to identify “older” people may be seen critically. This comparatively low age limit was chosen in our study because in Germany many individuals enter forms of early retirement already in their fifties. From our perspective, the withdrawal from working life marks the transition into the last portion of the life-course. Furthermore, shifting the age threshold downwards increases the variance in criminal activity, which is essential in terms of the power to detect significant interaction effects (Lubinski & Humphreys, 1990).

Finally, our measure of empathy is limited to the cognitive facet of the construct. Although cognitive empathy has been shown to be a better predictor of offending than affective empathy in some systematic reviews (Jolliffe & Farrington, 2004; Van Langen et al., 2014), our analyses nevertheless provide an incomplete picture of the role of empathy in shaping the implications of low self-control in old age. Insights are restricted to the significance of senior citizens' ability to understand other people's thoughts and emotions; the impact of their capacity to share other people's feelings is neglected here. It may well be that the capability to experience emotional congruence with others exerts a stronger influence on the association between poor self-control and criminal activity than cognitive empathy does. Affective empathy may also show different interrelationships with the various components of the self-control trait. Therefore, future research should address the role of the ability to share others' emotions in the genesis of late life offending in general and its potential to mitigate criminogenic self-control effects in particular. In this context, it will certainly make sense to include other dimensions of the self-control trait (e.g., temper, self-centredness) into the analyses. Since various measures of empathy exist – each with its own merits and pitfalls –, it would also be interesting to replicate our work using different empathy scales (Jolliffe & Farrington, 2006; Herrera-Lopez et al., 2017).

## Notes

1. The terms empathy ability and trait empathy are used synonymously in this article to describe empathy as an enduring characteristic of a person. The same applies to self-control ability and trait self-control.
2. Just like self-control, the development of empathy ability has been linked to productive parenting practices (Narvey et al., 2021).
3. An examination of the interplay of anger proneness and empathy ability is also worth mentioning. Sanchez-Perez and Gonzalez-Salinas (2021) showed that cognitive empathy conditions the effect of trait anger on aggressive conduct among schoolchildren in Spain. Pupils' proneness to experience anger was more closely related to their level of aggressive behaviour among those scoring lower on empathy.
4. The German car manufacturer Volkswagen has its headquarters and large production sites in Lower Saxony.

5. Five communities were not willing to draw a sample and provide address data. These communities were replaced with others with similar properties (e.g., number of inhabitants, geographical location).
6. Dichotomous prevalence measures waste most available information.
7. A LaGrange multiplier test reveals significant overdispersion of our dependent variable ( $p = .000$ ).
8. Since both predictor variables were converted into Z-scores, their regression slopes can be compared.
9. Subsequent analyses will show that it is the impulsivity and not the risk-taking measure that explains the empathy effect.
10. The interaction between risk-taking and empathy remains significant when Model 4 is re-estimated with a log-transformed version of the crime variety measure as outcome variable ( $b = -.01^*$ ;  $t = 1.73$ ).
11. All models necessary for the calculation of the Sobel test were estimated as linear regression analyses with robust standard errors.

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## References

- Aiken, L., & West, S. (1991). *Multiple regression: Testing and interpreting interactions*. Sage.
- Allison, P. (1999). Comparing logit and probit coefficients across groups. *Sociological Methods & Research*, 28(2), 186–208. <https://doi.org/10.1177/0049124199028002003>
- Arneklev, B., Grasmick, H., Tittle, C., & Bursick, R. (1993). Low self-control and imprudent behavior. *Journal of Quantitative Criminology*, 9(3), 225–239. <https://doi.org/10.1007/BF01064461>
- Bailey, P., & Henry, J. (2008). Growing less empathic with age: Disinhibition of the self-perspective. *Journal of Gerontology*, 63(4), 219–226. <https://doi.org/10.1093/geronb/63.4.P219>
- Baron-Cohen, S. (2011). *Zero degrees of empathy: A new theory of human cruelty*. Penguin Books.
- Bell, D. (1976). *The cultural contradictions of capitalism*. Basic Books.
- 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>
- 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>
- Bock, E., & Hosser, D. (2014). Empathy as a predictor of recidivism among young adult offenders. *Psychology, Crime & Law*, 20(2), 101–115. <https://doi.org/10.1080/1068316X.2012.749472>
- Bosworth, B., & Burtless, G. (1998). *Aging societies: The global dimension*. Brookings Institution Press.
- Bowen, H. (2012). Testing moderating hypotheses in limited dependent variable and other nonlinear models: Secondary versus total interactions. *Journal of Management*, 38(3), 860–889. <https://doi.org/10.1177/0149206309356324>
- Bretherton, I., Fritz, J., Zahn-Waxler, C., & Ridgeway, D. (1986). The acquisition and development of emotion language: A functionalist perspective. *Child Development*, 57(3), 529–548. <https://doi.org/10.2307/1130334>
- Burt, C., Simons, R., & Simons, L. (2006). A longitudinal test of the effects 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>
- Burt, C., Sweeten, G., & Simons, R. (2014). Self-control through emerging adulthood: Instability, multidimensionality, and criminological significance. *Criminology*, 52(3), 450–487. <https://doi.org/10.1111/1745-9125.12045>

- Burton, V., Evans, T., Cullen, F., Olivares, K., & Dunaway, R. (1999). Age, self-control, and adults' offending behaviors: A research note assessing a General Theory of Crime. *Journal of Criminal Justice*, 27(1), 45–54. [https://doi.org/10.1016/S0047-2352\(98\)00035-X](https://doi.org/10.1016/S0047-2352(98)00035-X)
- Caspi, A., & Roberts, B. (2001). Personality development across the life-course: The argument for change and continuity. *Psychological Inquiry*, 12(2), 49–66. [https://doi.org/10.1207/S15327965PLI1202\\_01](https://doi.org/10.1207/S15327965PLI1202_01)
- Cohen-Mansfield, J., Shmotkin, D., Blumstein, Z., Shorek, A., Eyal, N., & Hazan, H. (2013). The old, old-old, and the oldest-old: Continuation or distinct categories? *International Journal of Aging & Human Development*, 77(1), 37–57. <https://doi.org/10.2190/AG.77.1.c>
- Craig, J. (2017). The effects of social concern on white-collar offending. *Deviant Behavior*, 38(7), 837–854. <https://doi.org/10.1080/01639625.2016.1197703>
- Cuff, B., Brown, S., Taylor, L., & Howat, D. (2016). Empathy: A review of the concept. *Emotion Review*, 8(2), 144–153. <https://doi.org/10.1177/1754073914558466>
- Cullen, F. (2011). Beyond “adolescence-limited criminology”: Choosing our future. *Criminology*, 49(2), 287–330. <https://doi.org/10.1111/j.1745-9125.2011.00224.x>
- Davis, D. (1994). *Empathy: A social psychological approach*. Westview Press.
- Davis, M. (1983). Measuring individual differences in empathy: Evidence for a multidimensional approach. *Journal of Personality and Social Psychology*, 44(1), 113–126. <https://doi.org/10.1037/0022-3514.44.1.113>
- De Ridder, D., Lensvelt-Mulders, G., Finkenauer, C., Stok, F., & Baumeister, R. (2012). Taking stock of self-control: A meta-analysis of how trait self-control relates to a wide range of behaviors. *Personality and Social Psychology Review*, 16(1), 76–99. <https://doi.org/10.1177/1088868311418749>
- Decety, J., & Cowell, J. (2014). Friends or foes: Is empathy necessary for moral behavior? *Perspectives on Psychological Science*, 9(5), 525–537. <https://doi.org/10.1177/1745691614545130>
- Decety, J., & Michalska, K. (2010). Neurodevelopmental changes in the circuits underlying empathy and sympathy from childhood to adulthood. *Developmental Science*, 13(6), 886–899. <https://doi.org/10.1111/j.1467-7687.2009.00940.x>
- Dillman, D. (2000). *Mail and internet surveys: The Tailored Design Method*. Wiley.
- Eisenberg, N., Spinrad, T., & Morris, A. (2014). Empathy-related responding in children. In M. Killen & J. Smetana (Eds.), *Handbook of moral development* (pp. 184–207). Psychology Press.
- Fattah, E., & Sacco, V. (1989). *Crime and victimization of the elderly*. Springer.
- Feldmeyer, B., & Steffensmeier, D. (2007). Elder crime: Patterns and trends. *Research on Aging*, 29(4), 297–322. <https://doi.org/10.1177/0164027507300802>
- Ferrari, V., Smeraldi, E., Bottero, G., & Politi, E. (2014). Addiction and empathy: A preliminary analysis. *Neurological Science*, 35(6), 855–859. <https://doi.org/10.1007/s10072-013-1611-6>
- Forrest, W., Hay, C., Widdowson, A., & Rocque, M. (2019). Development of impulsivity and risk-seeking: Implications for the dimensionality and stability of self-control. *Criminology*, 57(3), 512–543. <https://doi.org/10.1111/1745-9125.12214>
- Fox, J. (1991). *Regression diagnostics*. Sage.
- Gottfredson, M. (2006). The empirical status of control theory in criminology. In F. Cullen, J. Wright, & K. Blevins (Eds.), *Taking stock. The status of criminological theory* (pp. 77–100). Transaction.
- 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., Tittle, C., Bursick, R., & Arneklev, B. (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>
- Hall, J., & Schwartz, R. (2019). Empathy present and future. *Journal of Social Psychology*, 159(3), 225–243. <https://doi.org/10.1080/00224545.2018.1477442>
- Hannon, L., & Knapp, P. (2003). Reassessing nonlinearity in the urban disadvantage/violent crime relationship: An example of methodological bias from log-transformation. *Criminology*, 41(4), 1427–1448. <https://doi.org/10.1111/j.1745-9125.2003.tb01026.x>
- Hardie, B. (2020). *Studying situational interaction: Explaining behaviour by analysing person-environment convergence*. Springer.
- Hay, C., & Forrest, W. (2006). The development of self-control: Examining Self-Control Theory's stability thesis. *Criminology*, 44(4), 739–774. <https://doi.org/10.1111/j.1745-9125.2006.00062.x>
- Helson, R., & Wink, P. (1992). Personality change in women from the early 40s to the early 50s. *Psychology and Aging*, 7(1), 46–55. <https://doi.org/10.1037/0882-7974.7.1.46>
- Hempel, I., Buck, N., van Vugt, E., & van Marle, H. (2015). Interpreting child sexual abuse: Empathy and offense-supportive cognitions among child sex offenders. *Journal of Child Sexual Abuse*, 24(4), 354–368. <https://doi.org/10.1080/10538712.2015.1014614>
- Henry, J., Phillips, L., Ruffman, T., & Bailey, P. (2013). A meta-analytic review of age differences in theory of mind. *Psychology and Aging*, 28(3), 826–839. <https://doi.org/10.1037/a0030677>

- Herrera-Lopez, M., Gomez-Ortiz, O., Ortega-Ruiz, R., Jolliffe, D., & Romera, E. (2017). Suitability of a three-dimensional model to measure empathy and its relationship with social and normative adjustment in Spanish adolescents: A cross-sectional study. *BMJ Open*, 7 (9), e015347. Article E015347. <https://doi.org/10.1136/bmjopen-2016-015347>
- Hilbe, J. (2011). *Negative binomial regression*. Cambridge University Press.
- Hirschi, T. (2004). Self-control and crime. In R. Baumeister & K. Vohs (Eds.), *Handbook of self-regulation: Research, theory, and applications* (pp. 537–552). Guilford Press.
- Hirschi, T., & Gottfredson, M. (1994). The generality of deviance. In T. Hirschi & M. Gottfredson (Eds.), *The generality of deviance* (pp. 1–22). Transaction.
- Hirschi, T., & Gottfredson, M. (2001). Self-Control Theory. In R. Paternoster & R. Bachman (Eds.), *Explaining criminals and crime* (pp. 81–96). Roxbury Press.
- 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., & 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., & Kunz, F. (2017). Can Self-Control Theory explain offending in late adulthood? Evidence from Germany. *Journal of Criminal Justice*, 48, 37–47. <https://doi.org/10.1016/j.jcrimjus.2016.12.001>
- Hoffman, M. (2000). *Empathy and moral development*. Cambridge University Press.
- Holmbeck, G. (2002). Post-hoc probing of significant moderational and mediational effects in studies of pediatric populations. *Journal of Pediatric Psychology*, 27(1), 87–96. <https://doi.org/10.1093/jpepsy/27.1.87>
- Holtfreter, K., Reisig, M., & O'Neal, E. (2015). Prescription drug misuse in late adulthood: An empirical examination of competing explanations. *Journal of Drug Issues*, 45(4), 351–367. <https://doi.org/10.1177/0022042615589405>
- Javakhishvili, M., & Vazsonyi, A. (2021). Empathy, self-control, callous-unemotionality, and delinquency: Unique and shared developmental antecedents. *Child Psychiatry and Human Development*. <https://doi.org/10.1007/s10578-021-01137-2>
- Jolliffe, D., & Farrington, D. (2004). Empathy and offending: A systematic review and meta-analysis. *Aggression and Violent Behavior*, 9(5), 441–476. <https://doi.org/10.1016/j.avb.2003.03.001>
- Jolliffe, D., & Farrington, D. (2006). Development and validation of the Basic Empathy Scale. *Journal of Adolescence*, 29(4), 589–611. <https://doi.org/10.1016/j.adolescence.2005.08.010>
- Jolliffe, D., & Farrington, D. (2021). *Empathy versus offending, aggression, and bullying. Advancing knowledge using the Basic Empathy Scale*. Routledge.
- Jolliffe, D., & Murray, J. (2012). Lack of empathy and offending: Implications for tomorrow's research and practice. In R. Loeber & B. Welsh (Eds.), *The future of criminology* (pp. 62–69). Oxford University Press.
- Kanning, U. (2009). *Inventar sozialer Kompetenzen: ISK*. Hogrefe.
- Karaca-Mandic, P., Norton, E., & Dowd, P. (2012). Interaction terms in non-linear models. *Health Services Research*, 47(1pt1), 255–274. <https://doi.org/10.1111/j.1475-6773.2011.01314.x>
- Klapwijk, E., van den Bos, W., & Güroglu, B. (2017). Neural mechanisms of criminal decision making in adolescence: The roles of executive functioning and empathy. In W. Bernasco, J.-L. Van Gelder, & H. Elffers (Eds.), *The Oxford handbook of offender decision making* (pp. 246–267). Oxford University Press.
- Koegl, C. (2021). The relationship between empathy, clinical problems, and reoffending in a sample of Canadian male offenders. In D. Jolliffe & D. Farrington (Eds.), *Empathy versus offending, aggression, and bullying. Advancing knowledge using the Basic Empathy Scale* (pp. 126–141). Routledge.
- Kunz, F. (2014). *Kriminalität älterer Menschen*. Duncker & Humblot.
- LaGrange, T., & Silverman, R. (1999). Low self-control and opportunity: Testing the General Theory of Crime as an explanation for gender differences in delinquency. *Criminology*, 37(1), 41–72. <https://doi.org/10.1111/j.1745-9125.1999.tb00479.x>
- Loinaz, I., Sanchez, L., & Vilella, A. (2021). Understanding empathy, self-esteem, and adult attachment in sexual offenders and partner-violent men. *Journal of Interpersonal Violence*, 36(5–6), 2050–2073. <https://doi.org/10.1177/0886260518759977>
- Longshore, D., Turner Rand, S., & Stein, J. (1996). Self-control in a criminal sample: An examination of construct validity. *Criminology*, 34(2), 209–228. <https://doi.org/10.1111/j.1745-9125.1996.tb01203.x>
- Lubinski, D., & Humphreys, L. (1990). Assessing spurious “moderator effects”: Illustrated substantively with the hypothesized (“synergistic”) relation between spatial and mathematical ability. *Psychological Bulletin*, 107(3), 385–393. <https://doi.org/10.1037/0033-2909.107.3.385>
- Martinotti, G., Di Nicola, M., Tedeschi, D., Cundari, S., & Janiri, L. (2009). Empathy ability is impaired in alcohol-dependent patients. *American Journal of Addiction*, 18(2), 157–161. <https://doi.org/10.1080/10550490802544391>
- McGee, T., Jolliffe, D., Erikson, L., Bond, C., & Farrington, D. (2021). Low cognitive empathy and its relationship to relational, online, and physical aggression in young adults in Australia. In D. Jolliffe & D. Farrington (Eds.),

- Empathy versus offending, aggression, and bullying. Advancing knowledge using the Basic Empathy Scale* (pp. 172–187). Routledge.
- Mitsopoulou, E., & Giovazolias, T. (2015). Personality traits, empathy and bullying behavior: A meta-analytic approach. *Aggression and Violent Behavior, 21*, 61–72. <https://doi.org/10.1016/j.avb.2015.01.007>
- Mize, T. (2019). Best practices for estimating, interpreting, and presenting nonlinear interaction effects. *Sociological Science, 6*, 81–117. <https://doi.org/10.15195/v6.a4>
- 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>
- Narvey, C., Yang, J., Wolff, K., Baglivio, M., & Piquero, A. (2021). The interrelationship between empathy and adverse childhood experiences and their impact on juvenile recidivism. *Youth Violence and Juvenile Justice, 19*(1), 45–67. <https://doi.org/10.1177/1541204020939647>
- O'Neill, K. (2020). Adolescence, empathy, and the gender gap in delinquency. *Feminist Criminology, 15*(4), 410–437. <https://doi.org/10.1177/1557085120908332>
- 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>
- 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>
- Pilarska, A., & Baumeister, R. (2018). Psychometric properties and correlates of the Polish version of the self-control scale. *Polish Psychological Bulletin, 49*, 95–106.
- Piquero, A., & Rosay, A. (1998). The reliability and validity of Grasmick et al.'s self-control scale: A comment on Longshore et al. *Criminology, 36*(1), 157–173. <https://doi.org/10.1111/j.1745-9125.1998.tb01244.x>
- Posick, C., Rocque, M., & Rafter, N. (2014). More than a feeling: Integrating empathy into the study of lawmaking, lawbreaking, and reactions to lawbreaking. *International Journal of Offender Therapy and Comparative Criminology, 58*(1), 5–26. <https://doi.org/10.1177/0306624X12465411>
- 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>
- Reisig, M., & Holtfreter, K. (2018). The victim-offender overlap in late adulthood. *Journal of Elder Abuse & Neglect, 30*(2), 144–166. <https://doi.org/10.1080/08946566.2018.1426512>
- Reniers, R., Corcoran, R., Drake, R., Shryane, N., & Völlm, B. (2011). The QCAE: A questionnaire of cognitive and affective empathy. *Journal of Personality Assessment, 93*(1), 84–95. <https://doi.org/10.1080/00223891.2010.528484>
- Romero-Martinez, A., Lila, M., & Moya-Albiol, L. (2016). Empathy impairments in intimate partner violence perpetrators with antisocial personality traits: A key factor in the risk of recidivism. *Violence and Victims, 31*(2), 347–360. <https://doi.org/10.1891/0886-6708.VV-D-14-00149>
- Royzman, E., Cassidy, K., & Baron, J. (2003). I know you know: Epistemic egocentrism in children and adults. *Review of General Psychology, 7*(1), 38–65. <https://doi.org/10.1037/1089-2680.7.1.38>
- Sanchez-Perez, N., & Gonzalez-Salinas, C. (2021). Cognitive empathy as a moderator in the relation between negative emotionality traits and schoolchildren's aggressive behaviours. In D. Jolliffe & D. Farrington (Eds.), *Empathy versus offending, aggression and bullying. Advancing knowledge using the Basic Empathy Scale* (pp. 157–171). Routledge.
- Shechtman, Z. (2002). Cognitive and affective empathy in aggressive boys: Implications for counseling. *International Journal for the Advancement of Counselling, 24*(4), 211–222. <https://doi.org/10.1023/A:1023316712331>
- Sun, B., Luo, Z., Zhang, W., Li, W., & Li, X. (2018). Age-related differences in affective and cognitive empathy: Self-report and performance-based evidence. *Aging, Neuropsychology and Cognition, 25*(5), 655–672. <https://doi.org/10.1080/13825585.2017.1360835>
- Sweeten, G. (2012). Scaling criminal offending. *Journal of Quantitative Criminology, 28*(3), 533–557. <https://doi.org/10.1007/s10940-011-9160-8>
- Tangney, J., Baumeister, R., & Boone, A. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality, 72*(2), 271–334. <https://doi.org/10.1111/j.0022-3506.2004.00263.x>
- Tittle, C., & Grasmick, H. (1997). Criminal behavior and age: A test of three provocative hypotheses. *Journal of Criminal Law and Criminology, 88*(1), 309–342. <https://doi.org/10.2307/1144079>
- Tittle, C., Ward, D., & Grasmick, H. (2003). Gender, age, and crime/deviance: A challenge to self-control theory. *Journal of Research in Crime and Delinquency, 40*(4), 426–453. <https://doi.org/10.1177/0022427803256074>
- Trivedi-Bateman, N. (2019). The combined roles of moral emotion and moral rules in explaining acts of violence using a Situational Action Theory perspective. *Journal of Interpersonal Violence, 088626051985263*. <https://doi.org/10.1177/0886260519852634>
- Vachon, D., Lynam, D., & Johnson, J. (2014). The (non)relation between empathy and aggression: Surprising results from a meta-analysis. *Psychological Bulletin, 140*(3), 751–773. <https://doi.org/10.1037/a0035236>



- Van Langen, N., Wissink, I., Van Vugt, E., Van der Stouwe, T., & Stams, G. (2014). The relation between empathy and offending: A meta-analysis. *Aggression and Violent Behavior, 19*(2), 179–189. <https://doi.org/10.1016/j.avb.2014.02.003>
- Van Noorden, T., Haselager, G., Cillessen, A., & Bukowski, W. (2015). Empathy and involvement in bullying in children and adolescents: A systematic review. *Journal of Youth and Adolescence, 44*(3), 637–657. <https://doi.org/10.1007/s10964-014-0135-6>
- Vazsonyi, A., & Huang, L. (2010). Where self-control comes from: On the development of self-control and its relationship to deviance over time. *Developmental Psychology, 46*(1), 245–257. <https://doi.org/10.1037/a0016538>
- 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>
- Von Hippel, W. (2007). Aging, executive functioning, and social control. *Current Directions in Psychological Science, 16*(5), 240–244. <https://doi.org/10.1111/j.1467-8721.2007.00512.x>
- 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>
- West, R. (1996). An application of prefrontal cortex function theory to cognitive aging. *Psychological Bulletin, 120*(2), 272–292. <https://doi.org/10.1037/0033-2909.120.2.272>
- Williams, R. (2012). Using the Margins command to estimate and interpret adjusted predictions and marginal effects. *Stata Journal, 12*(2), 308–331. <https://doi.org/10.1177/1536867X1201200209>
- Winfrey, L., Taylor, T., He, N., & Esbensen, F. (2006). Self-control and variability over time: Multivariate results using a 5-Year multisite panel of youths. *Crime and Delinquency, 52*(2), 253–286. <https://doi.org/10.1177/0011128705278012>
- Wolfe, S. (2015). Low self-control, gender, race, and offending in late life. *Psychology, Crime and Law, 21*(5), 426–451. <https://doi.org/10.1080/1068316X.2014.989169>
- Wolfe, S., Reising, M., & Holtfreter, K. (2016). Low self-control and crime in late adulthood. *Research on Aging, 38*(7), 767–790. <https://doi.org/10.1177/0164027515604722>
- Zhuravlova, L., & Chebykin, O. (2021). *The development of empathy. Phenomenology, structure and human nature.* Routledge.
- Zych, I., Tofi, M., & Farrington, D. (2019). Empathy and callous-unemotional traits in different bullying roles: A systematic review and meta-analysis. *Trauma, Violence & Abuse, 20*(1), 3–21. <https://doi.org/10.1177/1524838016683456>

## Appendix 1: Measures

Offending	Crime variety scale based on the perpetration of 11 distinct crimes in the last 12 months [crime (prevalence)]: <ul style="list-style-type: none"> <li>- drunk driving (3.8%)</li> <li>- tax fraud (2.1%)</li> <li>- illicit work (1.9%)</li> <li>- fare dodging (1.6%)</li> <li>- bribery (0.8%)</li> <li>- shoplifting (0.5%)</li> <li>- physical assault (0.1%)</li> <li>- vandalism (0.0%)</li> <li>- theft of a bike or other vehicle (0.0%)</li> <li>- theft from a person (0.0%)</li> <li>- social security fraud (0.0%)</li> </ul>
Risk-taking	Assessment of 4 statements: (alpha = .81) I like to test myself every now and then by doing something dangerous; Sometimes I take a risk just for the fun of it; I sometimes find it exciting to do things for which I might get in trouble; Excitement and adventure are more important to me than security. 4-point scale: strongly agree – strongly disagree
Impulsivity	Assessment of 6 statements: (alpha = .71) Often I cannot prevent anger and joy blurting out of me; I live by the rule 'Think before you act' (r); I always have my feelings under control (r); I react too often quick-tempered on other people; In stressful situations I am often more self-restrained than most other people I know (r); Even under great stress I take the time for contemplating my behaviour (r). 4-point scale: strongly agree – strongly disagree

(Continued)



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Offending	<p>Crime variety scale based on the perpetration of 11 distinct crimes in the last 12 months [crime (prevalence)]:</p> <ul style="list-style-type: none"> <li>- drunk driving (3.8%)</li> <li>- tax fraud (2.1%)</li> <li>- illicit work (1.9%)</li> <li>- fare dodging (1.6%)</li> <li>- bribery (0.8%)</li> <li>- shoplifting (0.5%)</li> <li>- physical assault (0.1%)</li> <li>- vandalism (0.0%)</li> <li>- theft of a bike or other vehicle (0.0%)</li> <li>- theft from a person (0.0%)</li> <li>- social security fraud (0.0%)</li> </ul>
Risk-taking	<p>Assessment of 4 statements: (alpha = .81)</p> <p>I like to test myself every now and then by doing something dangerous; Sometimes I take a risk just for the fun of it; I sometimes find it exciting to do things for which I might get in trouble; Excitement and adventure are more important to me than security.</p> <p>4-point scale: strongly agree – strongly disagree</p>
Impulsivity	<p>Assessment of 6 statements: (alpha = .71)</p> <p>Often I cannot prevent anger and joy blurring out of me; I live by the rule 'Think before you act' (r); I always have my feelings under control (r); I react too often quick-tempered on other people; In stressful situations I am often more self-restrained than most other people I know (r); Even under great stress I take the time for contemplating my behaviour (r).</p> <p>4-point scale: strongly agree – strongly disagree</p>
Empathy	<p>Assessment of 4 statements: (alpha = .76)</p> <p>In almost every situation I try to see the facts also from the perspective of my dialog partner; Even in cases of disagreement I normally succeed in seeing things with the eyes of my vis-à-vis; In most situations I try to see the world with the eyes of my conversation partner; It is no problem for me to understand the feelings of other people.</p> <p>4-point scale: strongly agree – strongly disagree</p>
Criminal associations	<p>Do you have friends, acquaintances or relatives who have committed the following crimes in the last 12 months?</p> <p>[fare dodging, shoplifting, theft of a bike or other vehicle, vandalism, physical assault]</p> <p>Dichotomy: yes/no</p>
Mobility	<p>Answers to three questions: (alpha = .70)</p> <p>"How often did you attend cultural events in the last 12 months?"</p> <p>"How often did you go to concerts or the movies in the last 12 months?"</p> <p>"How often did you go to pubs, bars or dancing events in the last 12 months?"</p> <p>5-point scale: never – several times a week</p>
Socio-economic status	<p>How do you assess your own economic position?</p> <p>5-point scale: very bad – very good</p>
Migration background	<p>Is it true that at least one of your parents was born abroad or does not have German nationality?</p> <p>Dichotomy: yes/no</p>

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**Appendix 2: Negative binomial regression models predicting late life offending**

	Model 1		Model 2		Model 3		Model 4		Model 5	
	b	Z	b	Z	b	Z	b	Z	b	Z
Empathy	-0.19**	2.84	-0.14*	2.11	-0.13*	1.89	-0.04	0.57	-0.02	0.25
Risk-taking			+0.41***	7.37	+0.26***	4.85				
Impulsivity							+0.26***	3.39	+0.26***	3.25
Criminal associations					+0.30***	6.89			+0.32***	7.04
Mobility					+0.33***	5.04			+0.38***	5.75
Age					-0.02*	2.44			-0.02**	2.95
Gender					+0.52***	3.79			+0.68***	4.90
Social status					-0.08	0.92			-0.06	0.70
Migration background					-0.33	1.06			-0.27	0.85
Model fit	$\chi^2 = 8.04;$ p = .005		$\chi^2 = 61.79;$ p = .000		$\chi^2 = 166.36;$ p = .000		$\chi^2 = 18.59;$ p = .000		$\chi^2 = 153.19;$ p = .000	

Note: The predictors "risk-taking," "empathy," "mobility" and "criminal associations" were converted into Z-scores.  
\*p < .05; \*\* p < .01; \*\*\* p < .001; b . . . unstandardised regression coefficient; Z . . . Z-value