



Co-offending and Criminal Careers in Organized Crime

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Abstract

The growing research on co-offending over the life course is based on relatively small, general offending samples, followed for a short period, and from a limited set of countries. This study expands current knowledge by examining the relation of co-offending with age, criminal experience, crime type, and crime seriousness in a large sample of Italian serious organized crime offenders with criminal careers spanning between age 14 and late adulthood. The sample includes 160,262 offenses by 10,530 Italian mafia offenders. After preliminary descriptive statistics, random-effects logistic regressions estimate how age, criminal experience, crime type, and seriousness are independently related to the co-offending probability. Co-offending decreases only moderately with both the age and criminal experience of organized crime offenders, while more prolific offenders exhibit a stable co-offending prevalence as their experience increases. Co-offending varies significantly by crime type, and it is more frequent for more serious offenses. In line with previous research, co-offending has a relevant functional component even for organized crime offenders: results suggest it is instrumental to perpetrating specific offense types and more serious offenses. However, results also show that specific social and criminal contexts promote co-offending among older and more experienced offenders.

Keywords Co-offending · Organized crime · Serious offenders · Criminal careers

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Introduction

One of the most documented findings on delinquent behavior is that many crimes are committed in the company of others. The literature disagrees on the prevalence of co-offending over offending in general: estimates are highly dependent on the data source, on recording strategies and legal definitions of “co-offending,” and on the unit of analysis (offenders, offenses, offense participations; see Van Mastrigt & Farrington, 2009). Recent research on co-offending has moved beyond the dispute on the “true” prevalence of co-offending to focus on its role within the criminal career. The literature has consistently shown that co-offending is more common among young, inexperienced offenders, and it varies significantly by crime type (see, for example, Carrington, 2014; Van Mastrigt, 2014). Other features of co-offending are more disputed: for example, researchers disagree on the reasons driving its negative relation with age.

Co-offending research has mostly relied on small samples of general offenders based in North America and spanning a limited, and relatively young, age range (Lantz & Ruback, 2017; Piquero et al., 2003). Studies considering larger samples, specific types of offenders, and from different countries are needed to validate previous findings on co-offending. In particular, there is limited research on serious offenders, representing a small share of total offenders—thus hard-to-reach in small samples of a population or of offenders in general—but responsible for a disproportionate amount of serious offending (DeLisi, 2001; Loeber & Ahonen, 2014; McCuish et al., 2021). Even fewer studies consider the co-offending behavior of offenders involved in organized criminal activities: although it is natural to assume that organized crime offenders co-offend more than other types of offenders, it remains unclear how co-offending varies with their age, criminal experience, and type of crime committed. The analysis of co-offending for serious organized crime offenders is theoretically relevant, as previous research showed that co-offending increases the likelihood of persistent and violent criminality (Andresen & Felson, 2012; Conway & McCord, 2002; Lantz & Hutchison, 2015), which often characterizes the offending trajectory of these offenders (Campedelli et al., 2021; Kleemans & Van Koppen, 2020; Meneghini et al., 2021).

This study analyzes the characteristics of co-offending over the criminal careers of serious organized crime offenders. The analysis relies on a large sample of 160,262 crimes committed by 10,530 organized crime offenders in Italy. First, we analyze the bivariate relations of co-offending with age, criminal experience, crime type, and seriousness. Subsequently, we estimate the independent effect of the correlates of co-offending on the probability of the offense participation being a co-offense versus a solo offense. Compared to prior findings in other offending samples, results confirm that co-offending varies significantly by crime type, it is more frequent for more serious offenses, and its relationship with criminal experience depends on the offender’s total career activity. However, we find that co-offending decreases only moderately with age when this relationship is examined among organized crime offenders. We discuss the results in the context of existing theories on co-offending and present implications in terms of policy and research.

Background

The Impact of Age, Experience, and Type of Crime on Co-offending

While research on co-offending has grown over the past decade, most studies adopt a cross-sectional perspective, overlooking the variation of co-offending over the criminal career (Carrington, 2009; McGloin et al., 2008; Van Mastrigt & Carrington, 2019). This is mainly a consequence of the scarce availability of longitudinal data on co-offending, with the few exceptions relying on relatively small samples of juveniles (e.g., McCord & Conway, 2002; McGloin et al., 2008; Reiss & Farrington, 1991). Whereas co-offending has been found to vary over the criminal career and even affect its course, the limited intersection between co-offending and developmental and life-course criminology prevents further theoretical and empirical advancements (Conway & McCord, 2002; Lantz & Hutchison, 2015; McGloin & Piquero, 2010). Previous studies examining co-offending from a criminal career perspective primarily investigate the variation of co-offending by age, criminal experience, and crime type—with a focus on violent offending.

There is converging evidence across different countries and offending samples that the co-offending incidence peaks in adolescence and subsequently declines with age (e.g., Andresen & Felson, 2010, 2012; Bright et al., 2020; Carrington, 2002; Carrington & Van Mastrigt, 2013; Reiss, 1988; Reiss & Farrington, 1991; Sarnecki, 2001; Stolzenberg & D'Alessio, 2008; Van Mastrigt & Farrington, 2009). Competing theories explain the decline of co-offending with age by focusing on either selective attrition (i.e., the desistance of offenders who favor co-offending) or within-individual change in offending behavior. In support of selective attrition, Moffitt's (1993) dual taxonomy theory posits that adolescence-limited offenders "appear to need peer support for crime," while life-course persistent offenders "are willing to offend alone" due to a strong internal motivation to offend (Moffitt, 1993, p. 688). Other theories emphasize a within-individual change in the tendency to co-offend due to factors associated with maturation: decreased gregariousness (Stolzenberg & D'Alessio, 2008), greater autonomy (Carrington, 2002, 2009), and lower susceptibility to peer influence (Farrington, 2005; Warr, 2002). Current empirical evidence points to a combination of selective desistance and within-individual change in offending behavior in explaining the decline of co-offending with age (Carrington, 2009; Lantz & Ruback, 2017; McGloin et al., 2008; Reiss & Farrington, 1991; Van Mastrigt & Carrington, 2019).

Previous research has also argued that co-offending decreases with criminal experience (Carrington, 2009; Lantz & Ruback, 2017; Reiss & Farrington, 1991). The extent of the decrease depends on the characteristics of the offender and is more modest or almost null for high-activity offenders (Carrington, 2009). Several contributions explained it in terms of rational choice perspectives—presented under different labels: "functional" theory (Reiss, 1988), "instrumental" perspective (Weerman, 2003), and "rational choice" (Lantz & Ruback, 2017). Co-offending is seen as the outcome of a rational decision-making process balancing the

costs and benefits of committing a crime with others rather than solo, and it prevails whenever the expected benefits outweigh the costs. These theories suggest that, as offenders learn successful offending techniques and accumulate criminal confidence, the costs of co-offending (higher risks and the need to “split the take”) begin to outweigh the benefits, pushing offenders towards solo offending (Lantz & Ruback, 2017; Warr, 2002).

Another established finding emerging from previous studies is that co-offending varies by crime type. In general, serious property offenses (burglary, robbery), arson, and theft tend to be committed in a group (Bright et al., 2020; Carrington, 2002, 2009; Piquero et al., 2007; Reiss & Farrington, 1991; Van Mastrigt, 2008; Van Mastrigt & Farrington, 2009). Low rates of co-offending characterize sexual assaults, other sex crimes, and fraud (Carrington, 2009; Daly, 2005; Piquero et al., 2007; Reiss & Farrington, 1991; Van Mastrigt, 2008; Van Mastrigt & Farrington, 2009). Drug offenses are also more likely to be committed by lone offenders (Baker & Faulkner, 1993; Carrington, 2009; Daly, 2005; Piquero et al., 2007), although some studies report that major drug crimes display higher than average rates of co-offending (e.g., Van Mastrigt, 2008). Rational choice perspectives argue that costs and benefits of co-offending depend on the contingencies related to each offense type, which explains why certain crime types are systematically more likely to be committed in groups.

Finally, a growing body of research analyzes co-offending in relation to serious violent offending. The actual prevalence of co-offending for violent crimes is debated and depends on the specific crime types considered: for example, in samples with a high frequency of violent sexual offenses, the prevalence of co-offending is relatively low (Andresen & Felson, 2012; Bright et al., 2020). Nonetheless, there is increasingly compelling evidence that co-offenders facilitate the commission of violent crimes (Conway & McCord, 2002; Lantz, 2019; Lantz & Kim, 2019; McCord & Conway, 2002; McGloin & Piquero, 2009; Tillyer & Tillyer, 2019) and increase the severity of violence (Carrington, 2002; Lantz, 2018). Previous studies also found that co-offenses are on average more serious than solo offenses (Conway & McCord, 2002; Erickson, 1973). These findings are explained through collective behavior mechanisms: violent or serious offenses can be regarded as more morally unacceptable crimes, hence requiring a higher diffusion of responsibilities (and thus the presence of co-offenders) to be legitimated by participating individuals (McGloin & Piquero, 2009; Warr, 2002).

Co-offending in Organized Crime

While previous research identified specific patterns of co-offending over the life course, studies adopting a longitudinal, life-course perspective are still few and have important limitations (Van Mastrigt & Carrington, 2019). First, they focused on a restricted set of countries, including the USA (e.g., McGloin & Piquero, 2009; Stolzenberg & D'Alessio, 2008), Canada (e.g., Andresen & Felson, 2010, 2012; Carrington, 2002, 2009), the UK (e.g., Reiss & Farrington, 1991; Van Mastrigt & Farrington, 2009), Australia (Bright et al., 2020), Sweden (Sarnecki, 2001), and

the Netherlands (Bernasco, 2006). This limits the generalizability of the findings to countries with different legal and social systems. Second, research mostly focused on youth samples: Van Mastrigt and Farrington (2009) reviewed the major empirical studies on co-offending up until 2009, finding that 12 out of 17 studies account for offenders up to age 20 only. With few exceptions (Carrington, 2002; Carrington & Van Mastrigt, 2013; Hodgson, 2007; Stolzenberg & D'Alessio, 2008; Van Mastrigt & Farrington, 2009), the knowledge on co-offending trends during adulthood remains scarce. Third, most studies examined general offenders or samples of the total population in a country. As such, results might not accurately characterize the behavior of specific categories of offenders, especially if underrepresented in the total population.

To the best of our knowledge, there are no studies that analyze the life-course development of co-offending among organized crime offenders. Existing research at the intersection between organized crime and co-offending relies on social network analysis to explore the group's criminal organization (e.g., Heber, 2009; Malm et al., 2010; Mondani & Rostami, 2021), rather than focusing on the developmental component of co-offending. The set of research more akin to this aim investigates co-offending dynamics among chronic or serious offenders, "a small group of individuals who are responsible for a disproportionate amount of serious crime" (Loeber & Ahonen, 2014, p. 117), and is nevertheless limited. McGloin and Stickle (2011) relied on a sample of 500 individuals born in Racine, Wisconsin (USA) observed from age 6 through age 25. The authors show that chronic offenders are equally likely to engage in co-offending compared to non-chronic offenders, but they are less likely to cite peer influence as the cause of their offending behavior (McGloin & Stickle, 2011). Furthermore, in the analysis of a large sample of Canadian youths, Carrington (2009) finds that more prolific offenders, although not explicitly classified as serious offenders, display different co-offending patterns over their life-course compared to the rest of the sample.

Organized crime offenders can be regarded as serious offenders since they exhibit more long, prolific, and serious criminal careers compared to the "average" offender (Campedelli et al., 2021; Denley & Ariel, 2019; Kleemans & Van Koppen, 2020). However, they also have an inherent tendency to cooperate in serious offending (Kleemans & Van Koppen, 2020; Van Koppen et al., 2010), which differentiates them from serious offenders considered in previous co-offending research. While co-offending can be considered a defining feature of their criminal careers, it does not account for all the crimes they commit: studying its variation with age, criminal experience, and crime type is a first step to understanding the role of criminal cooperation in shaping the persistence of their criminal careers.

The Current Study

This study contributes to co-offending research by examining co-offending in a large sample comprising 160,262 offenses committed by 10,530 serious organized crime offenders in Italy. First, to the best of our knowledge, there is no prior research on co-offending in Italy, a Southern European country with a legal and social system

different from countries so-far studied in this field.¹ Second, our data set allows us to longitudinally reconstruct the entire criminal career of serious offenders starting from age 14 until late adulthood. Third, our sample comprises individuals who received at least one final conviction for mafia offenses² but engaged in a mix of solo and co-offenses over their criminal careers, thus enabling us to examine co-offending patterns in a large group of organized crime offenders.

Resting on previous theoretical and empirical findings, our hypotheses are as follows:

Hypothesis 1: Co-offending decreases with the age of organized crime offenders. Due to the consistent evidence on the decline of co-offending with age, we expect to find a higher co-offending prevalence for younger offenders in the sample. We also expect a slower decline in the co-offending prevalence compared to previous studies, due to two factors. First, our sample of serious offenders should include fewer individuals who conform to the “adolescence-limited” offending behavior (Moffitt, 1993): we should thus expect a minor impact of selective desistance on the shape of the co-offending curve. Second, individuals in our sample offend—at least at some point in their life—in the context of

¹ From the legal point of view, the Italian system rests upon civil law tradition, unlike Canada, the UK, and the USA, which are predominantly common law countries. This impacts the legal and procedural notion of co-offending under multiple perspectives. For example, Article 110 of the Italian Criminal Code states that “whenever more individuals contribute to committing the same offense, each of them is subject to the punishment imposed for that offense.” This provision fosters a broad characterization of the contribution to an offense, encompassing all forms of cooperation between offenders, including those in which one offender contributed only minimally, or morally (e.g., by participating in the planning of the offense), to the perpetration of a crime. For example, the Italian Supreme Court has established that a mafia leader instigating a crime is a co-offender (Cassazione Penale, Sez. I, 2015). Furthermore, due to the reliance on anti-organized crime prosecutors and professional judges, criminal investigations and trials for organized crime cases often involve hundreds of suspects and defendants. This practice substantially facilitates the prosecution’s task of bringing charges against multiple co-offenders as well as the court’s evaluation of the evidence against multiple offenders (La Spina, 2014). The frequent use of association offenses (offenses where three or more people associate to commit crimes) further strengthens this tendency by pushing the prosecution to investigate all possible connections among suspects, including their joint participation in the predicate offenses (the crimes planned by the participants in the criminal association) (Levi & Smith, 2002; Sergi, 2018). Also, Italy is possibly the most famous example of a mandatory prosecution system: by constitutional provision, Italian prosecutors are obliged to investigate any offense brought to their attention and to bring charges whenever there is sufficient evidence against a suspect with virtually no discretion. As a result, they are unable to, e.g., drop charges in exchange for information, or to substantially modify the charges in return for a plea agreement (Antonucci, 2021; Di Federico, 1998; Ma, 2002; Neri, 2021). From the social perspective, Southern European countries have often been classified as a distinct social model than, e.g., Northern European countries with regards to the economy, the welfare system, and family structure (Esping-Andersen, 1999; Ferrera, 1996; Reher, 1998). This distinct model likely has an impact on motivations to offend and, in turn, on co-offending patterns.

² Mafia offenses include mafia association (Article 416-bis of the Italian Criminal Code (CC)), electoral deal between politics and mafia (Article 416-ter of the CC), assistance to the associates (Article 418 of the CC), and any other offense aggravated by the use of the mafia method or the purpose to benefit a mafia association (now under Art. 416-bis 1 of the CC).

criminal groups that are likely to encourage their criminal cooperation even in the later stages of their criminal careers.

Hypothesis 2: Co-offending decreases with the criminal experience of organized crime offenders.

Consistently with prior studies, we anticipate a negative relation between co-offending and criminal experience. However, we expect a moderate decline, as organized crime offenders are on average high-activity offenders (they commit on average a higher number of crimes compared to the overall mean in the population of offenders), who were found to have a more stable co-offending prevalence as their experience increases compared to low-activity offenders (Carrington, 2009). Moreover, as pointed out for the previous hypothesis, involvement in the activities of organized criminal groups is expected to promote co-offending even among more experienced individuals.

Hypothesis 3: Co-offending varies by the type of crime committed by organized crime offenders.

Hypothesis 4: More serious crimes are more likely to be co-offenses.

Due to their intrinsic characteristics, certain crimes require co-offenders to be successfully executed. Moreover, offenders may prefer to commit more serious offenses (those carrying a higher statutory penalty) only with accomplices to lighten their individual responsibility for the illegal act. We thus hypothesize that, in line with previous research on co-offending, in our sample of organized crime offenders the co-offending prevalence varies by crime type and it is higher for more serious offenses.

Data and Methods

The PMM Data Set

The analysis relies on the PMM (Proton Mafia Members) data set,³ which contains anonymized information on the entire criminal career of 11,138 Italian mafia offenders. The criterion of inclusion in the sample is having a final conviction—a final, unappealable sentence—for mafia association.⁴ Italian mafia offenders can be considered serious offenders by definition: the inclusion offense currently carries minimum imprisonment of between 10 and 15 years and can be further aggravated for several circumstances; furthermore, membership to a mafia-type organization is often a turning point leading to a life in crime, causing most mafia members to have prolific and serious criminal careers (Campedelli et al., 2021; Paoli, 2003).

³ The PMM data set was developed in the framework of the research project PROTON, funded by the European Union's Horizon 2020 research and innovation program under grant agreement number 699824.

⁴ Most of the offenders included in the data set received a conviction for mafia association (Article 416-bis of the Italian Criminal Code), which is a specific type of criminal association whose members use the intimidatory power of the association and the consequent conditions of subjection and silence (the so-called *omertà*) to commit serious offenses and obtain other unjust advantages (see La Spina, 2014, p. 594).

Table 1 Trend in the individual-level share of co-offending

Decade of birth	<i>N</i> offenders	Mean individual co-offending prevalence (%)	SD
1927–1949	1198	37.07	31.06
1950–1959	2518	49.88	28.58
1960–1969	3645	55.17	29.21
1970–1979	2575	57.41	29.55
1980–1994	594	65.01	30.41
All	10,530	52.95	30.19

Offenders who committed only associative crimes are not included in the computation. *SD*, standard deviation

The PMM includes data on all the 178,427 final convictions of the mafia offenders for any type of offense at any moment of their life, as well as different sociodemographic variables. The data include details on the year of commission of each crime, the type of offense, and information on whether the crime has been committed in cooperation with other offenders.

The PMM data set comprises offenders born between 1927 and 1994. Historical events and policy changes occurring over this period have likely affected the recorded co-offending prevalence. Younger offenders in the data set have on average higher individual co-offending prevalence compared to offenders born in older decades (Table 1). While this might suggest that mafia offenders have increased their tendency to commit crimes with accomplices, the 1980s saw the adoption of a series of laws and policies directly targeting mafia members, including the introduction of Article 416-bis in the Criminal Code in 1982 (which criminalizes the participation in mafia-type organizations), and the conferment of special investigative powers to anti-mafia prosecutors (La Spina, 2014).

Anti-mafia measures promoted a stronger law enforcement reaction, which may have contributed to the observed increase in the prevalence of co-offending. To rule out this bias, in all models we controlled for the year of the crime, for a dummy indicating whether the crime was committed after 1982, and for the interaction between the dummy and the crime year. We also checked for the robustness of our results by running the models on two subsamples considering only offenders born in or after 1950, and in or after 1960, thus excluding offenders whose careers had a more limited overlap with laws and policies introduced in the 1980s.

As a last note, we excluded from the analysis offenses falling into the categories of “Mafia association,” “Drug trafficking criminal association,” and “Criminal association.” In the Italian Criminal Code, these offenses punish the active participation in mafia-type, drug trafficking, or criminal (i.e., aiming at committing any crime) organizations composed of at least three people. Thus, they are co-offenses by definition, but they are also considered as “continued crimes,” i.e., a series of acts

arising from a single criminal resolution that may occur over a prolonged period. For this reason, while we can identify the year in which the criminal behavior started, it is problematic to place it at a specific point in time.⁵ Our final sample includes 160,262 offenses committed between 1943 and 2017 by 10,530 serious offenders.

Outcome Variable

The outcome variable is a dummy indicating whether an *offense participation* is in a co-offense or a solo offense.⁶ With *offense participation*, we indicate the involvement of one individual in one offense: hence, a crime committed by two offenders would result in two offense participations (see Van Mastrigt & Farrington, 2009 for a discussion on the different units of analysis used to study co-offending). The *co-offending prevalence* is the share of offense participations that are in co-offenses over the total number of offense participations. We relied on offense participations since this unit of analysis allows us to analyze variations in the co-offending prevalence across both offense-specific (e.g., the crime category or seriousness) and offender-specific (e.g., the age or criminal experience of involved individuals) characteristics. Fifty-six percent of the considered offense participations were in co-offenses (SD = 49.63; see Table 2), suggesting that offending is predominantly a group phenomenon for Italian organized crime offenders.⁷

Explanatory Variables

Offender's age The offender's age at crime commission was computed as the difference (in years) between the recorded year of crime commission and the offender's year of birth (Min = 14, Max = 77, Avg = 30.01, SD = 9.59; see Table 2).⁸

⁵ To check for the impact of this exclusion on our results, we run the model presented in Table 4 including the crimes of "Criminal association" and "Drug trafficking criminal association," to which we attributed the starting year of the offense (results are available upon request to the authors). "Mafia association" offenses—the inclusion criterion for the sample—could not be included in the model since they are classified as a crime category of their own, thus perfectly predicting co-offending (as they are all co-offenses by definition). Results confirm those presented in Table 4 in terms of direction and level of significance, with only minor changes in the magnitude of coefficients, suggesting that associative crimes follow developmental dynamics similar to those of other co-offenses.

⁶ Technically, the dummy variable is coded as 1 when the offense participation was in a crime for which the offender was also jointly sentenced for Article 110 of the Italian Criminal Code, which sets provisions for offenders who cooperate in the commission of a crime. Article 110 outlines a broad conceptualization of co-offending, encompassing all forms of cooperation between offenders, which is not unprecedented in co-offending research: for example, Tremblay (1993) gives the term "co-offenders" "[...] a larger definitional scope, and refers not only to the subset of an offender's pool of accomplices but rather to all those other offenders he must rely on before, during, and after the crime event in order to make the contemplated crime possible or worthwhile" (Tremblay, 1993, p. 21).

⁷ All the presented results relied on offense participations as the unit of analysis. However, for the sake of simplicity, throughout the text we sometimes refer to "offense" in lieu of "offense participation."

⁸ Fourteen is the minimum age for children to be held criminally liable for any offense in Italy. It must also be noted that PMM data are likely to underrepresent the number of crimes committed when offenders were aged between 14 and 17, as in the Italian criminal justice system minors are subject to less strict judgment procedures.

Table 2 Descriptive statistics

Variable	Mean	SD	Min	Max	Median
Offender level (N = 10,530)					
Gender (male = 0)	0.015	0.12	0	1	0
Total career activity	16.88	17.01	2	300	13
Offense level (N = 160,262)					
Co-offense dummy (co-offense = 1)	0.56	0.50	0	1	1
Age at crime commission	30.01	9.59	14	77	28
Criminal experience at crime commission	13.93	21.70	0	299	8
Offense seriousness	62.03	75.65	0	360	42
Year	1992	9.89	1943	2017	1992
Dummy post 1982	0.85	0.36	0	1	1
<i>Offense category (dummy coded)</i>					
Weapons	0.23	0.42	0	1	0
Property	0.18	0.38	0	1	0
Threat and extortion	0.14	0.35	0	1	0
Violent	0.14	0.35	0	1	0
Drugs and smuggling	0.07	0.26	0	1	0
Other	0.25	0.43	0	1	0

SD, standard deviation

Offender's criminal experience The criminal experience at crime commission is captured by the total number of offenses committed prior to the considered one, in line with previous studies (Carrington, 2009; Lantz & Ruback, 2017; Reiss & Farrington, 1991). This variable does not necessarily correspond to the sequential crime number in the offender's criminal career, since the PMM data set includes only the crime year, thus impeding us to order crimes committed in the same year. Crimes committed in the same year as the considered offense were excluded from the computation of the criminal experience variable (min = 0, max = 299). To corroborate the robustness of our findings, we also employed as an alternative measure of criminal experience the sequential crime number (min = 1, max = 30, meaning that offenders have committed crimes in 30 different calendar years, at most; see the Supplementary Materials).

Crime category For each crime, the original PMM data set provided detailed information on the legislative source, article number, and even paragraph of the violated provisions. We classified the offenses into 6 synthetic categories according to the content and purpose of the violated provision (Table 2). Weapon-related and property offenses are the most frequent crime types committed by Italian serious offenders.

Offense seriousness We assigned a seriousness score to each offense in the data set by computing the average punishment of each crime as the mean between the maximum and minimum statutory penalty (measured in months of imprisonment) set

by the Italian legislation (as of 2017). The literature suggests different approaches to derive the crime seriousness, including relying on the views of criminal justice professionals (Sellin & Wolfgang, 1964) and using the average length of prison sentences (Carrington et al., 2005), but we decided to rely on statutory penalty information due to the availability of this data for the large majority of offenses in the data set.⁹

Control Variables

Offender's gender While members of Italian mafia groups are predominantly males, as reflected by the data at disposal (which includes only 158 females, approximately 1.50% of the total sample), the sample size allows testing for any effect of the offender's gender on the probability of co-offending. Most existing evidence on co-offending highlights that females are slightly more likely than males to offend with others (Carrington, 2009, 2014; Reiss, 1988; Van Mastrigt, 2014; Van Mastrigt & Farrington, 2009).

Offender's total career activity The total number of committed crimes was added as a control for the offender's career activity, which proved to be a confounder for the relationship between co-offending and some offense characteristics (e.g., the offender's experience; see Carrington, 2009).

Offense year The crime year was added to control for any trend in the capacity of the judicial system to identify the cooperating offenders.

Dummy post 1982 We included a dummy variable with the value of 1 for crimes committed after the introduction of Article 416-bis in 1982 to further control for the impact of this major legislative change on the correct coding of co-offenses in the data set.

Analytic Approach

First, we relied on basic descriptive statistics to identify the bivariate relationship of co-offending with age, criminal experience, crime type, and seriousness.

Second, we used logistic regression to estimate the independent effect of the correlates of co-offending on the probability of an offense participation being a co-offense versus a solo offense. The aim was to disentangle possible spurious

⁹ The seriousness variable allows evaluating the relation between offense severity and co-offending probability even within crimes that belong to the same category, since each category aggregates violations to different laws or articles that may have a different statutory penalty. The statutory penalty differs at the paragraph level of the provision, thus resulting in more than 40,000 distinct types of violations in terms of their seriousness. It was impossible to retrieve the statutory penalty for all of them, but starting from most frequent offenses the seriousness was assigned to about 95% of the total offenses in the PMM data set. The remaining offenses have a missing seriousness value.

correlations between the co-offending probability and the other variables. Logistic regressions assume that responses of different cases are independent of each other (Tabachnick & Fidell, 2013, p. 445), which is not the case for the data under study. Offense participations are nested both within the offender's criminal career and within each offending incident. Unfortunately, we lacked information allowing us to link offenders cooperating in the same crime, but even if we had such information, models accounting for cross-nested data are at high risk of not converging when the data are sparsely grouped, as in our case (see Carrington, 2009, p. 1309). We thus followed a second-best solution and accounted for the nesting of observations within each offender by relying on a multilevel (random-effects) logistic regression model. The model considers pooled and unpooled variability in the data and weighs it according to the sample size of the nesting units and the within and between-unit variation (Gelman & Hill, 2007). We also corrected the standard errors by allowing for intragroup correlation (within each offender).¹⁰ In previous similar applications, this model yielded parameter estimates and standard errors that were substantially the same as those derived from a model with the offending incident as nesting variable (Carrington, 2009), which is reassuring on the robustness of our results. As explained at the beginning of the "Data and Methods" section, models were run on the full sample and on two subsamples restricted to offenders born in or after 1950 and in or after 1960, to rule out any possible bias caused by temporal trends or policy changes.

Results

Co-offending and Age

At the aggregate level, Italian organized crime offenders display a constant tendency to co-offend as they age (Fig. 1). The aggregate co-offending prevalence ranges between 50 and 60% from the beginning of the criminal career until late age 60, after which estimates are based on fewer than 30 crimes per year. For this specific sample of serious offenders, the aggregate rate at which crimes are committed in a group is thus a stable characteristic of a major part of their criminal career. Remarkably, while this finding is in contrast with co-offending research analyzing samples of general offenders, the shape of the aggregate age-crime curve is not dissimilar from the one derived for other offending samples, although the peak of offending happens slightly later in age.

¹⁰ We discarded the option to run a fixed-effects model, which would lead to dropping all the observations related to offenders with only one (non-associative) crime in their entire criminal career, and to ignoring all the across-individual variation in the estimation of the effects of interest. We believe that for the objective under scrutiny (the estimation of the independent effects of the offense characteristics on the odds of co-offending) exploiting only within-individual variability would be an unsuitable strategy.

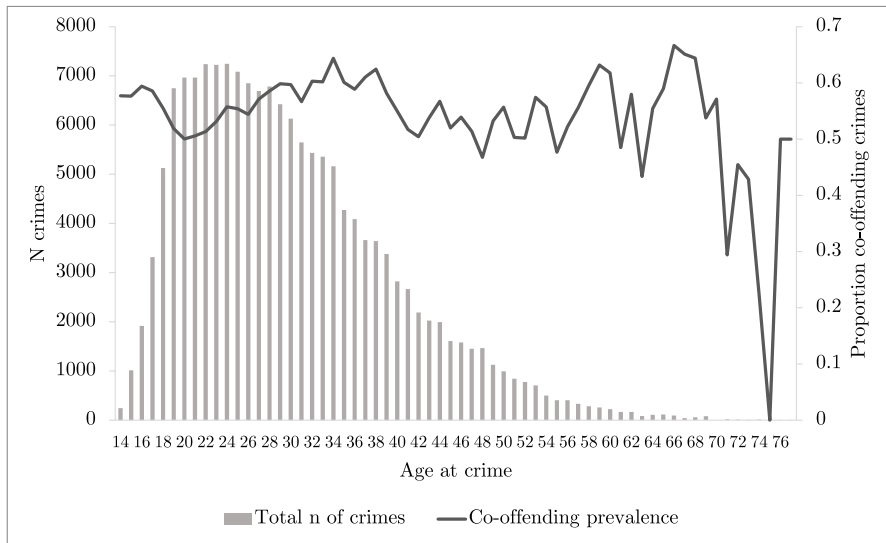


Fig. 1 Co-offending prevalence and total number of crimes committed by age ($n = 160,262$)

Co-offending and Criminal Experience

The age trajectory of the co-offending prevalence may reflect changes due to criminal expertise rather than an age-related maturation process. To explore this idea, Fig. 2 charts the share of offense participations in co-offenses against the individual's criminal experience. The aggregate co-offending prevalence shows a slightly increasing trend as criminal experience increases. This increase is modest but evident up until approximately 30 offenses of criminal experience, after which the trend is less apparent due to fluctuating values.

The relationship between co-offending and criminal experience may be confounded by the offender's total career activity (the total number of committed offenses), which may also reflect incapacitation or mortality effects (Reiss & Farrington, 1991). The data show indeed some heterogeneity in the total number of crimes committed by each offender (Table 2). To investigate the trivariate relationship between co-offending, criminal experience, and career activity, Fig. 3 plots the co-offending prevalence by criminal experience curves for careers with differing levels of activity. The figure excludes offenders who committed only one crime in their entire criminal career: their only offense would necessarily be a mafia offense (the inclusion criterion for the sample), which we excluded from the analysis since it is a co-offense by definition.

The aggregate co-offending prevalence for offenders with different career activity is similar for the first two to four crimes. As experience increases, the co-offending prevalence first moderately rises and then drops towards the end of the criminal career. Offenders with lower career activity experience a steeper decrease in the final stages of their careers compared to high-activity offenders. Moreover, only very prolific offenders (committing 31 or more offenses throughout their career) maintain a

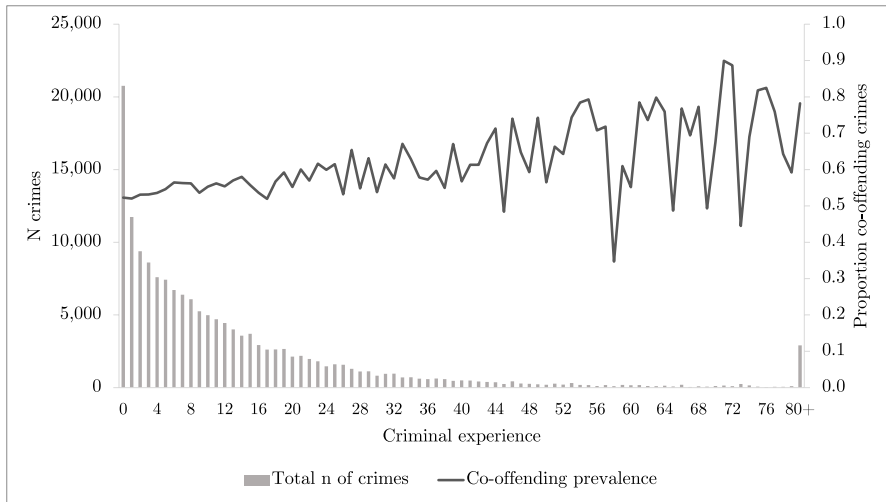


Fig. 2 Co-offending prevalence and total number of crimes committed by criminal experience ($n=160,262$)

high share of co-offenses until the very end of their criminal career, as reflected also at the right end of Fig. 2.

Co-offending and Crime Type

Our sample shows a substantial variation in the co-offending prevalence across the considered crime categories (Table 3). The categories of threat and extortion, violent, weapon, and drugs and smuggling crimes report a higher co-offending prevalence than the average (56%). Conversely, the “other” category, which includes mostly minor offenses (e.g., administrative violations), offenses against public officers and the criminal justice system, prison evasion, and false documentation, has a low mean co-offending prevalence compared to the general mean. The average co-offending prevalence of property crimes—50%—is just below the overall mean.

Considering all offenses, co-offenses are on average significantly more serious (83.25) than solo offenses (32.57). Table 3 reports also the average seriousness of both solo and co-offenses within each crime category. Within all the 6 categories, co-offenses are on average more serious than solo offenses, and the difference is always statistically significant at the 0.1% level.

Correlates of Co-offending: Multivariate Analysis

The analyses presented so far indicate that specific levels of criminal experience and certain crime types (including the most serious ones) are associated with higher co-offending prevalence. However, some types of offenses may be disproportionately

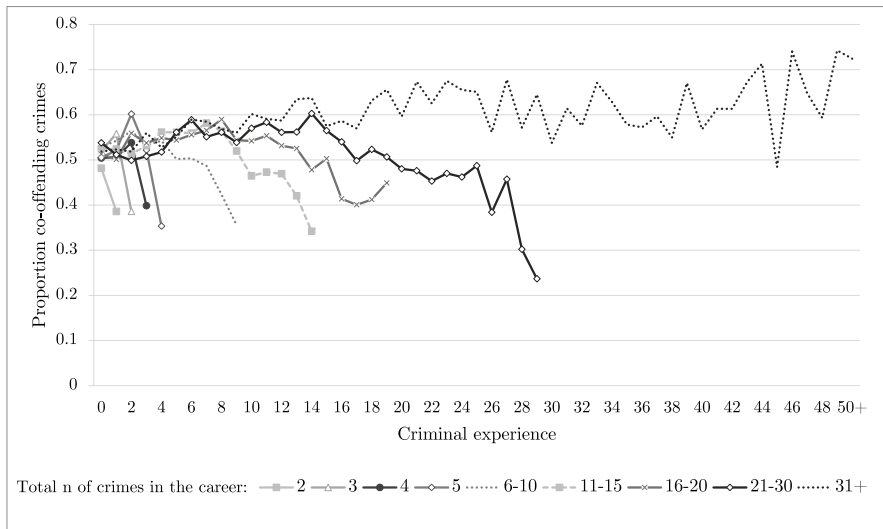


Fig. 3 Co-offending prevalence by criminal experience and total career activity ($n=160,262$). Note: Due to reduced sample sizes, careers of offenders who committed 6 or more crimes were combined in the aggregate 6–10, 11–15, 16–20, 21–30, and 31+ classes

committed by more experienced offenders, or by individuals with a general higher propensity to offend. Moreover, longitudinal variations in co-offending may depend on either age-related or experience-related maturation processes, or a combination of the two. Our multivariate models aim to disentangle possible spurious correlations between co-offending and age, criminal experience, crime type, and crime severity.

The offender's age, the crime type, and the seriousness all have a direct correlation with co-offending (Table 4). The regression largely confirms the results of the bivariate analyses. At the same time, the model uncovers that age does affect co-offending—differently from the bivariate statistics. Certain crime types (in particular, threat and extortion offenses), crimes with high seriousness, and offenses committed by younger individuals report a higher probability of being committed with accomplices.

The crime type is the most prominent correlate of co-offending in this sample of organized crime offenders. Compared to “other” offenses, the odds that threats and extortions are committed with accomplices are approximately 11 times higher. For the other categories, the odds of co-offending are between 4.6 and 5.2 times higher than for “other” offenses.¹¹ When controlling for the crime type, an increase of one month of average statutory penalty is associated with a 1% increase in the odds that the offense is committed with accomplices. Turning to life-course variations,

¹¹ In interpreting the magnitude of the estimated coefficients, it is important to consider that the included crime type variable is a categorical variable based on the synthetic crime categories presented in Table 2, and the baseline category is “Other crimes,” which has the lowest average co-offending prevalence (22%).

Table 3 Co-offending prevalence and mean seriousness of solo and co-offenses, by crime category ($n = 160,262$)

Crime category	% co-offending	N	Mean seriousness				N
			All	Solo offenses (a)	Co-offenses (b)	Sig. for (a) ≠ (b)	
Weapons	0.66	36,107	53.22	46.65	56.58	***	35,776
Property	0.50	28,634	22.64	20.44	24.85	***	28,631
Threat & extortion	0.82	22,478	72.72	47.84	78.32	***	22,413
Violent	0.80	22,254	176.27	93.80	196.55	***	22,254
Drugs & smuggling	0.60	11,391	49.05	38.83	55.96	***	11,213
Other	0.22	39,398	23.71	17.67	43.88	***	31,151
Total	0.56	160,262	62.03	32.57	83.25	***	151,438

***, **, and * indicate that the difference in the mean seriousness of solo and co-offenses is statistically significant at the 0.1, 1, and 5% level, respectively (output of t-tests for the difference in means)

Table 4 Logistic regression for the joint predictors of co-offending ($n = 151,438$)

Predictor (reference)	β	SE for β	Exp (β)	SE for exp (β)	Sig
Age	-0.017	0.002	0.983	0.002	***
Criminal experience	-0.003	0.002	0.997	0.002	
Crime seriousness	0.010	0.000	1.010	0.000	***
Career activity	0.009	0.001	1.009	0.001	***
<i>Gender (male)</i>					
Female	0.672	0.148	1.957	0.289	***
<i>Crime type (other)</i>					
Drugs and smuggling	1.620	0.039	5.054	0.196	***
Property	1.519	0.030	4.566	0.137	***
Threat and extortion	2.401	0.036	11.030	0.398	***
Violent	1.592	0.036	4.915	0.179	***
Weapons	1.642	0.029	5.166	0.150	***
Year scaled	0.049	0.006	1.051	0.006	***
Dummy post 1982	1.432	0.230	4.189	0.964	***
Year scaled \times dummy post 1982	-0.030	0.007	0.971	0.006	***
Intercept	-3.612	0.205	0.027	0.006	***
σ_u (offender)	1.073	0.030			
Observations	151,438				

The year variable has been scaled by subtracting 1942 to the observed value to ease interpretability. ***, **, and * indicate that the estimated coefficient is statistically significant at the 0.1, 1, and 5% level, respectively. Standard errors are clustered at the offender level.

co-offending decreases with age also for this sample of organized crime offenders, even though the age effects are modest compared to similar findings from other types of offending samples (see, for example, Carrington & Van Mastrigt, 2013; Van Mastrigt & Farrington, 2009). Contrarily, different levels of criminal experience are not associated with different co-offending probabilities.

As expected, offense participations committed after the introduction of Article 416-bis in 1982 (which, together with other policy measures, increased the capacity of authorities to identify all the cooperating offenders), and more in general offense participations committed more recently, have a higher likelihood to be in co-offenses. Females are approximately twice as likely to co-offend compared to males, and the offender's career activity has a positive effect on the odds of co-offending.

We checked for the robustness of our results to temporal trends and policy changes by restricting the analysis to offenders born in or after 1950 (Table 5, left pane) and in or after 1960 (Table 5, right pane). Results corroborate those presented in Table 4, with most coefficients confirmed in terms of direction and level of significance, and only slight variations in magnitude. The only exceptions are the criminal experience variable and the temporal indicators. Criminal experience now has a negative and significant impact on the co-offending probability, suggesting that—controlling for the career activity—more inexperienced organized crime offenders are more likely to commit group crime. This result might not have emerged from

the full sample regression due to the imprecise coding of co-offending of less recent offenses committed in earlier stages of the criminal career. All the temporal indicators (except for the year variable, which is significant at the 5% level in the “Born in or after 1950” sample) do not have a significant impact on the co-offending probability, in line with our expectation that the major discrepancies in co-offending trends were between offenses committed by the first cohorts in the sample and more recent ones.

Discussion

In line with our first hypothesis, co-offending decreases with the age of organized crime offenders when the other crime and individual characteristics are accounted for. However, the decrease is remarkably smaller compared to results from general offending samples. For example, Carrington and Van Mastrigt (2013) rely on large samples of offense participations committed between age 10 and 74 in Canada, the UK, and the USA and find that—controlling for the crime type and gender of the offender—offenders aged 18–21 have approximately between 2.6 times (in the UK) and 3.3 times (in Canada) greater odds to co-offend than offenders aged 51 or more (the odds in the US sample are 2.7 times greater). In our sample of organized crime offenders, the odds are approximately 1.6 times greater compared to the same reference group.¹² The aggregate co-offending prevalence by age (Fig. 1) shows a sustained tendency to co-offend throughout the criminal career. These findings suggest that the co-offending behavior of organized crime offenders represents an exception to the documented prevalence of co-offending in youth rather than adult years (e.g., Andresen & Felson, 2010; Carrington, 2002; Reiss, 1988; Reiss & Farrington, 1991; Warr, 2002).

Prior research on the decline of co-offending with age points to the selective desistance of adolescence-limited offenders and/or to the within-individual change caused by a decreased gregariousness and susceptibility to peer influence as individuals age (Farrington, 2005; Stolzenberg & D’Alessio, 2008; Warr, 2002). The disentanglement of the contribution of selective desistance and within-individual change falls outside of the scope of this study and may be addressed by future research. Nevertheless, both theoretical interpretations provide compelling arguments to interpret the modest decrease of co-offending with the age of organized crime offenders. First, because of its nature, the PMM data set likely includes few individuals following adolescence-limited offending patterns. Offenders committed on average approximately 17 crimes throughout their criminal career—a value significantly higher compared to prior studies with comparable age range (e.g., Carrington, 2002;

¹² Result computed on our sample by substituting the continuous age variable with a categorical one (age categories: “14–17,” “18–21,” “22–25,” “26–30,” “31–40,” “41–50,” “51+”; results not reported and available upon request). Direct comparisons must nonetheless be interpreted with caution, as they may be affected by different definitions of co-offending and units of analysis (e.g., counts of offenses instead of offense participations) besides the differences in the nature of the offending sample.

Table 5 Logistic regression for the joint predictors of co-offending: robustness checks

Predictor (reference)	Year of birth: ≥ 1950				Year of birth: ≥ 1960					
	β	SE for β	Exp (β)	SE for Exp (β)	Sig	β	SE for β	Exp (β)	SE for Exp (β)	Sig
Age	-0.014	0.002	0.986	0.002	***	-0.018	0.003	0.982	0.003	***
Criminal experience	-0.006	0.001	0.995	0.001	***	-0.005	0.002	0.995	0.002	**
Crime seriousness	0.011	0.000	1.011	0.000	***	0.011	0.000	1.011	0.000	***
Career activity	0.011	0.001	1.011	0.001	***	0.009	0.001	1.009	0.002	***
<i>Gender (male)</i>										
Female	0.689	0.163	1.992	0.324	***	0.711	0.195	2.037	0.398	**
<i>Crime type (other)</i>										
Drugs and smuggling	1.679	0.040	5.360	0.217	***	1.776	0.049	5.908	0.287	***
Property	1.612	0.032	5.012	0.158	***	1.733	0.038	5.658	0.215	***
Threat and extortion	2.454	0.038	11.63	0.441	***	2.612	0.046	13.63	0.631	***
Violent	1.694	0.038	5.441	0.207	***	1.851	0.046	6.367	0.291	***
Weapons	1.708	0.031	5.515	0.169	***	1.871	0.037	6.492	0.242	***
Year scaled	0.026	0.010	1.027	0.010	*	0.002	0.046	1.002	0.046	
Dummy post 1982	0.571	0.366	1.770	0.648		-0.700	1.682	0.497	0.836	
Year scaled \times dummy post 1982	-0.007	0.010	0.993	0.010		0.017	0.046	1.017	0.047	
Intercept	-2.861	0.351	0.057	0.020	***	-1.587	1.677	0.205	0.343	
σ_u (offender)	1.052	0.031				1.071	0.037			
Observations	136,024					91,971				

The year variable has been scaled by subtracting 1942 to the observed value to ease interpretability. ***, **, and * indicate that the estimated coefficient is statistically significant at the 0.1, 1, and 5% level, respectively. Standard errors are clustered at the offender level.

Van Mastrigt & Farrington, 2009). Moreover, 68% of them were still criminally active at age 35, and approximately half of the sample was still active past age 40, indicating that selective desistance should be of minor impact.

Second, factors traditionally associated with the within-individual change towards solo offending are less applicable to serious organized crime offenders, whereas other social and contextual factors come into play (Schaefer et al., 2014; Weaver & Fraser, 2021). The criminal careers of Italian mafia offenders develop in a context of criminal collaboration and trust that characterizes organized criminal groups in general. In this context, the criminal behavior of offenders is less likely to be impacted by, e.g., the greater autonomy or lower susceptibility to peer influence that derives from maturation (Carrington, 2002, 2009; Farrington, 2005; Warr, 2002). Albeit for a very different sample, McGloin and Stickle (2011) also found that peer influence may not be the primary reason driving chronic offenders to engage in crime. In our sample, the involvement in organized criminal activities may promote a habit of criminal interaction that mitigates the expected decrease in the co-offending prevalence.

The relation between criminal experience and co-offending is more complex than hypothesized. While the multivariate models point to a negative relationship between co-offending and experience in the more robust sample of offenders born from 1950 onwards, the preliminary analysis suggests that this relationship is non-linear and likely to be affected by the offender's total career activity. For almost all the organized crime offenders, co-offending increases in the first part of their criminal career. For less prolific offenders, the age co-offending curves exhibit a concave shape. Conversely, very prolific offenders maintain sustained (if not increasing) levels of co-offending until the end of their criminal careers. These results differ from prior research considering other types of offending samples. For example, Carrington (2009) analyzed offenders aged 5–17 and found a stable co-offending prevalence for high-activity offenders, but a marked decrease in the co-offending prevalence for low-activity offenders starting from their second offense. The longer time span we analyze uncovers a more heterogeneous trend, undoubtedly influenced by the specific social environment of our sample. In the context of organized crime groups, co-offending may give access to valuable criminal opportunities and consolidate trust with newly acquired members (Campana & Varese, 2013; Gambetta, 2009; Van Koppen, 2013). Moreover, prospect members may engage in co-offending to prove their trustworthiness and criminal credentials in front of established mafia affiliates (Gambetta, 2009). These mechanisms may firstly counteract and subsequently mitigate the expected decline in the prevalence of co-offending of less prolific offenders. Only towards the end of their criminal career, when they grow in confidence and competence and have gained full trust from higher rank members, they may perceive lower benefits from co-offending and lower risks of offending alone, and increasingly switch to solo offending. For more prolific offenders, co-offending may instead play a specific function in sustaining their high volumes of offending in the context of organized criminal activities. For them, the benefits of co-offending may outweigh the perceived costs also in later stages of the criminal career. These prolific offenders might for example act as leaders or recruiters, which

would explain why accomplices continue to be valuable in later stages of their career (McGloin & Nguyen, 2012; Van Mastrigt & Farrington, 2011).

In line with our third hypothesis, co-offending significantly varies by the type of crime committed by organized crime offenders. This result is consistent with previous findings on co-offending emerging from different types of offending samples (e.g., Bright et al., 2020; Carrington, 2002, 2009; Piquero et al., 2007; Reiss & Farrington, 1991; Van Mastrigt, 2008; Van Mastrigt & Farrington, 2009). The significant variation of co-offending by crime type supports “functional” theories contending that co-offending is at least partially instrumental to perpetrating specific offenses, rather than being just the result of group influences leading to criminal behavior (such as social rewards and pressures) or the outcome of the tendency of offenders with similar characteristics to engage in certain activities together (Weerman, 2003). In other words, costs and benefits of co-offending depend also on the nature of the crime itself, and certain crime types require more criminal cooperation or coordination than others due to their complexity or intrinsic characteristics.

Consistent with hypothesis 4, co-offending is correlated with more serious crimes, even after controlling for the crime type. Riskier crimes (those more heavily sanctioned) are thus more likely to involve co-offenders, coherently with previous studies considering different types of offenders (Carrington, 2002, 2014; Erickson, 1971; Lantz, 2018). We point to two competing—although not necessarily alternative—interpretations. First, if crime seriousness is a proxy of crime complexity even within the same offense category, more complex crimes may require co-offenders. Second, referring to collective behavior mechanisms (McGloin & Piquero, 2009), the presence of “group support” may be needed to legitimate offenders’ involvement in a more serious (and thus more morally unacceptable) offense. Individuals acting in the company of others engage in behaviors that they would not have contemplated had they been alone (Festinger et al., 1952; Wallach et al., 1964; Zimbardo, 1969). It is remarkable that this mechanism—previously observed in samples of general offenders—may also apply to a group of offenders who are “serious” by definition and operate in a social and criminal environment that naturally encourages co-offending. Even in the context of criminal activities legitimated by an organized criminal group, crimes regarded as more complex and/or more morally unacceptable are more frequently committed in a group.

Overall, findings related to the functional component of co-offending—the fact that co-offending may be necessary to commit certain crime types and/or riskier crimes—support previous results obtained from different offending samples. Conversely, our sample of organized crime offenders appears to be an exception with respect to some of the developmental findings on co-offending derived from other sample types. Co-offending decreases only moderately with age and criminal experience and remains the dominant form of offending for a major part of mafia offenders’ criminal careers. This pattern also contrasts with evidence from samples of general offenders followed for an extended age span (e.g., Carrington, 2002; Carrington & Van Mastrigt, 2013; Stolzenberg & D’Alessio, 2008; Van Mastrigt & Farrington, 2009). The divergence suggests that certain social and criminal contexts favor co-offending in any stage of the criminal career, by lowering its perceived costs and/or increasing the expected benefits. Factors such as the trust deriving from pre-existing

social relations, a shared criminal organization's goal, or the need to signal one's trustworthiness and criminal credentials all contribute to raising the net gain of co-offending (Gambetta, 2009; Schaefer et al., 2014; Weaver & Fraser, 2021; Weerman, 2003). Such factors are common within Italian mafia organizations, but they were also reported for other contexts, such as gangs (Decker et al., 2013; Pyrooz & Densley, 2016), outlaw motorcycle gangs (Blokland et al., 2019; Morselli, 2009; Van Deuren et al., 2021), and among members of the Japanese Yakuza (Hill, 2014) and of Hong Kong-based triads (Chin, 2014). Research has also shown that neighborhood context may favor youth co-offending (Schaefer et al., 2014). While our data set lacks information on the neighborhood, we note that most offenders were born in the South of Italy, a territory with relatively low social mobility, high racial/ethnic homogeneity, and low socio-economic conditions. These factors may have facilitated the building of trust necessary to sustain co-offending for a prolonged period. Contexts promoting co-offending often lead offenders towards serious and persistent offending, as joining an organized criminal group often represents a negative turning point leading to a life in crime (Campedelli et al., 2021; Melde & Esbensen, 2011; Paoli, 2003; Steffensmeier & Ulmer, 2005).

While offering insights on the co-offending patterns of a large sample of organized crime offenders over an extended time span, our research presents some limitations. First, the generalizability of results is bounded by the specificity of the measure we use to identify co-offending—which depends on both the data source (in our case, official conviction data) and the country's legal and procedural system. Reliance on official conviction data entails an underestimation of the volume of crimes, particularly for crimes committed in more recent years due to the length of criminal trials in Italy (Italian Ministry of Justice, 2021). Furthermore, Erickson (1971) contends that official records may raise the “group hazard hypothesis”: co-offenses may be overestimated compared to solo offenses, due to selective enforcement. In this regard, we note that the use of official records is frequent in co-offending research (Carrington, 2002, 2009; McGloin et al., 2008; Sarnecki, 2001) and that the group hazard hypothesis did not find support in empirical examinations (Feyerherm, 1980; Van Mastrigt, 2008). Nevertheless, we invite to consider this limitation in the interpretation of the results. The country's legal and procedural system likely also affects our co-offending measure, especially when comparing our results with those emerging from other countries. Specifically, the Italian criminal law defines a broad conceptualization of co-offending, which includes all the criminal acts functional to committing a single criminal resolution. While this approach is not unprecedented, it may lead to higher estimates of the co-offending prevalence compared to other studies. However, we note that this operationalization may partially compensate for the use of official records, which notably underestimate the true number of both solo and co-offenses. The exclusion of “associative” crimes (which punish the mere participation in a criminal organization) from the analysis also contributes to offset any overestimation of co-offending in the sample. Ultimately, we recognize how these methodological aspects limit the possibility to generalize our results, although this issue is inherent to any attempt to study co-offending across different countries.

Second, we acknowledge that the inclusion criterion in our sample (the commission of a mafia-related co-offense) leads to considering only offenders who are

willing to engage in at least some co-offending while excluding those who are not willing to co-offend at all. As such, while this factor does not impact the interpretation of our developmental results, we caution once again against direct comparison with other offending samples. Third, even though our data set contains comprehensive longitudinal information on all the crimes committed by organized crime offenders, we only have information on the crime year, preventing us from ordering crimes committed in the same year. This reduces the amount of available information on within-individual changes in age and experience. The last limitation concerns the age of criminal liability. The Italian judicial system punishes offenders aged 14 or older, and thus we lack information on crimes committed before this age. However, the age-crime curve for our sample (Fig. 1) peaks in the mid-20s, suggesting that the bias caused by left censoring should be minimal. We also consider that the possible bias against offenses in adolescence is offset by the availability of information for the entire criminal career, allowing to encompass a wider age range than most prior research.

Conclusions

Our study shows that, for Italian organized crime offenders, co-offending is a common behavior that characterizes a major part of their criminal careers. The modest decrease of co-offending with age, and its increasing trend in the first part of the criminal career, contrast with previous findings derived from other types of offending samples. We argue that certain social and criminal contexts encourage involvement in serious offending as well as a prolonged propensity to cooperate in crime. At the same time, our analysis highlights that co-offending has a strong functional component even among organized crime offenders, as the probability to co-offend depends on the type of committed crime and it is higher for more serious offenses.

The results of this study carry important implications in terms of both research and policy. Our analysis offered novel insights into co-offending over the life course for a specific category of offenders, suggesting that dynamics of criminal cooperation vary depending on the offender's social and criminal context. While this is an expected conclusion, it underscores the importance for developmental and life-course research to analyze offending trajectories within different types of offending samples. In terms of policy, results corroborate the argument of Van Mastrigt and Farrington (2009), who contend that co-offending needs to be accounted for in deriving estimates of the probability of conviction or the number of crimes saved by incapacitation, which would otherwise suffer from a risk of bias.

In conclusion, to the best of our knowledge, this is the first study centered on the analysis of co-offending for a large sample of serious organized crime offenders considered over an extended age span. Given the limited intersection between studies on co-offending and research on organized crime, we aimed to investigate aggregate patterns of co-offending in this previously overlooked category of offenders. Future research can take different directions. As advocated by McGloin and colleagues (2008), future studies should exploit individualized methods (e.g., trajectory analysis) to better understand how co-offending interacts with the individual

criminal career of organized crime offenders. Studies may explore what individual-level patterns determine the aggregate prevalence of co-offending. Moreover, future analyses may focus on how co-offending impacts the probability of engaging in specific crime types or the offending frequency. Valuable perspectives can be also derived from the analysis of alternative data sources, such as surveys, interviews, or pretrial transcripts. These approaches would generate more information on the social context of the offenders, making it possible to corroborate many of the proposed interpretations of the results.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s40865-022-00202-1>.

Author contributions Both authors contributed to the study conception and design. FC coordinated the data acquisition process. Data preparation and analysis were performed by CM. The first draft of the manuscript was written by CM and subsequently revised by both authors. Both authors read and approved the final manuscript.

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