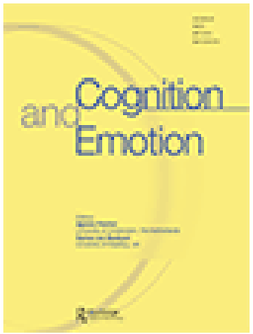

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"I feel your fear": superior fear recognition in organised crime members

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ABSTRACT

Individuals who deviate from social norms by committing crimes may have reduced facial emotion recognition abilities. Nevertheless, a specific category of offenders – i.e. organised crime (OC) members – is characterised by hierarchically organised social networks and a tendency to manipulate others to reach their illicit goals. Since recognising emotions is crucial to building social networks, OC members may be more skilled in recognising the facial emotion expressions of others to use this information for their criminal purposes. Evidence of a difference between OC and non-organised crime (NOC) offenders in terms of facial emotion recognition is still lacking. To fill this gap in the literature, we tested 50 OC, 50 NOC offenders, and 50 non-offender controls for their ability to identify six basic emotions (happiness, sadness, fear, anger, disgust, and surprise). All participants underwent a cognitive and psychological evaluation to avoid alternative explanations. Results show that OC members were more able to detect the expression of fear in others as compared to NOC. We interpreted this finding in light of the social context and the behavioural criminal attitude of OC members.

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Human interactions rely on the perception of social stimuli, of which faces are the most salient type. Faces convey a considerable amount of information, including emotional expressions, and the ability to recognise others' emotions expressed by specific facial muscle configurations is a relevant component of social cognition. Studies on healthy individuals and brain-damaged patients have demonstrated that facial emotion recognition is crucial for modulating social interactions (Adolphs, 1999; Frith & Frith, 2007; Haxby et al., 2002; Knutson, 1996). Supplementing the behavioural evidence, the neural basis of emotion and social cognition partially overlaps. Lesions confined to the amygdala, a key region in the perception and recognition of facial expressions of emotions, may lead to social cognition impairments (Adolphs, 2010; Frith & Frith, 2007; Haxby et al., 2002; Knutson, 1996).

Given the link between emotion and social cognition, one might postulate that high emotional abilities promote socially appropriate behaviours and thus prevent antisocial conduct. However, if on the one hand, more efficient emotion recognition correlates with higher self-reported social skills (Besel & Yuille, 2010), on the other hand, higher emotional skills may foster potentially harmful interpersonal behaviour (Austin et al., 2007; Côté et al., 2011). More specifically, emotion codification abilities may be strategically used by people with antisocial dispositions for personal benefit (Buss & Chiodo, 1991; Côté et al., 2011; Nagler et al., 2014; Schmitt et al., 2020).

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For instance, Schmitt and colleagues (2020) have demonstrated that in western societies, machiavellianism and narcissism presented the strongest positive associations with emotionally manipulative tactics at high levels of emotion recognition performance in females. A similar pattern of results was found among males for psychopathy.

Individuals who deviate from social norms by committing crimes typically present emotional deficits. Violent offenders, for example, are less accurate in recognising disgust and fear than non-violent offenders (Chapman et al., 2018). Furthermore, offenders perform significantly worse than controls in identifying anger, fear, sadness, and disgust, with the ability to recognise disgust showing more consistent impairment (Robinson et al., 2012). Interestingly, among individuals committing crimes, members of organised crime (OC) such as the Italian mafia are typified by intense social interactions, which could be more advantageous for them to achieve illicit goals (Kleemans & Van de Bunt, 1999; Schimmenti et al., 2014a). OC members exert social control, gain respect, and establish hierarchies inside the OC group by sowing fear (Becchi, 2002; Kleemans & de Poot, 2008; Kleemans & Van de Bunt, 1999; Schimmenti et al., 2014b). They may intimidate targeted individuals via the actual or potential use of threats and violence. Their extensive social networks maintain group cohesion and promote lucrative activities outside of it (Kleemans & de Poot, 2008); Kleemans & Van de Bunt, 1999). Based on this particular social connotation of OC groups, one intriguing hypothesis is that they may present preserved facial emotion recognition abilities compared to non-OC individuals in those emotions supporting the social behaviour, such as fear (Marsh et al., 2007a; Marsh & Ambady, 2007), happiness (Calder, 2011) and disgust (Gan et al., 2022) recognition. However, specifically, if it is true that OC members may use intimidation to exert control and establish hierarchies of power sustained by extensive social relationships, we expect to find a preserved or increased ability to recognise fearful facial expressions, representing a potential source of feedback for their intimidatory behaviour. Furthermore, among other emotions, the facial recognition of fear has been linked to a higher competence in establishing social relationships (Marsh et al., 2007b; Marsh & Ambady, 2007), a characteristic of OC groups.

We tested these hypotheses by administering the Emotion Recognition Task (ERT) to 50 mafia-type OC offenders, 50 ordinary non-organised crime (NOC) offenders, and 50 non-offender controls (C). Importantly, we assessed the three groups for global cognitive functioning, reasoning, anxiety, depression, and psychopathic traits to control for possible confounding factors. We predict a preserved or increased facial emotion recognition ability in OC compared to NOC offenders relative to the emotion of fear. Alternatively, we may find differences in facial emotion recognition abilities supporting social behaviour such as happiness and disgust.

2. Materials and method

2.1. Participants

This study is part of a broader project (the European Union's Horizon 2020 research and innovation programme under grant agreement N° 699824, for the project "Modelling the Process leading to Organized crime and TerrOrist Networks – PROTON"). We analysed data collected from 100 offenders randomly selected from two lists provided by two Italian penitentiaries, which house 1125 and 1253 prisoners, respectively (as in Salvato, Fiorina, De Maio, et al., 2020; Salvato, Fiorina, Ovadia, et al., 2020). Offenders were divided into two groups according to their criminal records. To be included in the OC group, they had to have committed and been condemned for mafia-related crimes (Article 416 bis of the Italian Penal Code). The groups were balanced according to the nature of the crime committed (25 violent and 25 non-violent for each group). We also enrolled a control group of 50 non-offenders participants, which informed us about the behavioural performance at the ERT in a non-incarcerated population. All participants were all male individuals, native or highly proficient Italian speakers, had a normal or corrected-to-normal vision, and had no history of neurological or psychiatric disorders. Informed consent was obtained from volunteers before they participated in the study, using a form purposely developed for this project within the framework of the Charter of Fundamental Rights of the European Union and the principles of the Office for Human Research Protections of the US Department of Health and Human Services for research on prisoners. In accordance with the Declaration of Helsinki (BMJ 1991; 302: 1194), all the experimental procedures were approved by the Ethical Committee of the Department of Brain and Behavioral Sciences of the University of Pavia (protocol n. 010).

2.2. Neuropsychological screening

An expert clinical neuropsychologist (*GS*) conducted a brief neuropsychological interview to assess their global cognitive functioning and intelligence integrity. Subsequently, we tested participants using the Addenbrooke's Cognitive Examination-Revised (ACE-R) (Mioshi et al., 2006) and the Raven's Coloured Progressive Matrices (CPM) (Raven, 1976). The ACE-R is a brief battery that evaluates six cognitive domains (orientation, attention, memory, verbal fluency, language, and visuospatial ability). The total score indicates the status of the individual's global cognitive functioning. The CPM is a test of non-verbal intelligence (cut-off = 28). It consists of 36 non-representational coloured designs, each incomplete in the bottom right-hand corner. Participants had to choose the most appropriate completion pattern from the six alternatives provided.

The ACE-R and CPM served to exclude those participants presenting deficits in global cognitive functioning and reasoning. All participants showed scores in the normal range, and none were subsequently excluded.

2.3. Assessment of anxiety, depression and psychopathic traits

As facial emotion recognition abilities may be influenced by the individual's psychological status (e.g. levels of anxiety (Surcinelli et al., 2006), depression (Demenescu et al., 2010), and psychopathic traits (Dawel et al., 2012)) to control for possible confounding factors, we administered the Beck Depression Inventory (BDI) (Beck et al., 1961), the State-Trait Anxiety Inventory (STAI) (Spielberger, 1983), and the Psychopathic Personality Inventory-Revised (PPI-R) (Lilienfeld & Widows, 2005) to the participants. The BDI is a 21-question multiple-choice self-report inventory and is one of the most widely used psychometric tests for measuring the severity of depression. The STAI is a self-report psychological inventory based on 40 four-point Likert scale questions. It measures two types of anxiety – state anxiety (i.e. the current level of anxiety) and trait anxiety (i.e. anxiety level as a personal characteristic). Finally, the PPI-R is a personality test used to identify traits associated with psychopathy in adults. It consists of a series of statements to which subjects respond by indicating, using a four-point Likert scale ("False", "Mostly False", "Mostly True", "True"), how accurately each statement describes them.

2.4. Emotion recognition task (ERT)

We used the ERT from the Cambridge Automated Neuropsychological Test Battery (CANTAB) (2019) to assess the facial emotion recognition abilities of our participants. Extensive descriptions and interactive demonstrations of the tasks are available on the creators' website (www.cambridgecognition.com). The tests were administered using a 12.1-inch touchscreen tablet (screen resolution 1280×800). The ERT measures the individual's ability to identify six basic emotions (happiness, sadness, fear, anger, disgust, and surprise) in facial expressions. Coloured still images displaying each of the six basic facial emotions were presented on the screen, one at a time. These images were derived from the facial features of real individuals. A fixation cross was displayed in the centre of a black screen for 150–250 ms; then, a picture was presented for 200 ms. Soon after, a grey screen covered the picture, lasting for 250 ms to prevent residual processing of the image. Participants were asked to select the emotion the face showed from six written options appearing on the screen. Pictures were presented in randomised order for 90 trials after five practice trials.

2.5. Statistical analysis

Data preprocessing. As the time spent in prison may affect the individuals' cognitive status (Umbach et al., 2018), we adopted a specific statistical approach to include the imprisoning time as a covariate in the statistical models. Following our previous publications (Salvato, Fiorina, De Maio, et al., 2020; Salvato, Fiorina, Ovadia, et al., 2020), for all the emotion recognition variables (i.e. performances at the ERT for each of the six basic emotions), we standardised the OC and NOC participants' scores based on those of the non-prisoner control group. Values from the two groups of prisoners were transformed into *z*-score according to the mean and standard deviation calculated for each test using the control group's scores. This method allows us to overcome the fact that the control group has not spent time in prison. Thus, the subsequent analysis regarding the ERT performances only involved the two offenders' groups whose test scores were normalised using the

non-incarcerated group's scores, including imprisoning time as a covariate.

Analyses plan. As a first step, we compared the socio-demographic variables between the two groups of offenders. We ran a Mann–Whitney non-parametrical test to compare the two groups' age, educational level, and incarceration time. As a second step, we analysed data from the ERT. In line with previous studies that have administered the ERT from the CANTAB battery (Lim et al., 2020; Petrovic et al., 2019; Saylik et al., 2018; Wagner, 1993), for each emotion recognition performance, we extracted and analysed the unbiased hit rate (UHR). UHR is defined as the recognition accuracy of an emotion that is not influenced by response guessing or response bias effects. It considers the joint probability of an individual making a correct response based on the presentation of the correct stimulus out of the available possibilities. UHRs for each basic emotion for all three groups before the data preprocessing are reported as Supplementary Material in Table S1. We used binary logistic regression to determine which of the six facial emotion recognition performances were the most important predictors of the group membership. We used Group (OC, NOC) as the dependent variable and the UHR *z*-scores for each emotion (happiness, sadness, fear, anger, disgust, and surprise) as predictors. To control for possible confounding factors and to strengthen the potential evidence for the specificity of emotion recognition performance distinguishing the groups, we included in the regression model level of state and trait anxiety, level of depression, psychopathic trait scores, and incarceration time. The absence of multicollinearity between predictors has been ascertained (all VIFs < 5). To deal with potential outliers influencing the regression model, we also performed a case-wise diagnostic on Standardised Residuals (i.e. the standardised difference between the observed and the predicted value), and cases >3 were excluded. We found one influential case within the OC group that was excluded from the subsequent analyses. A Receiver Operating Characteristic (ROC) curve on all the predictors was performed to evaluate the prediction power/ability of our model to our dichotomous outcome (group membership) using a 10-fold cross-validation procedure setting a random seed. Statistical analyses were conducted using JAMOVI (version 1.2). This study was not preregistered.

3. Results

We compared socio-demographic variables between the three groups before calculating *z*-scores for the OC and NOC individuals based on the non-prisoners test scores. Age ($\chi^2(2) = 4.695$; $p = .096$) and years of education ($\chi^2(2) = 3.612$; $p = .164$) did not differ significantly across the three groups (Table 1).

We then compared the two prisoners' groups for cognitive and psychological variables (Table 2). At the neuropsychological screening, all the subjects showed preserved global cognitive function and intelligence. A Mann–Whitney non-parametric t-test showed that there was no between-groups difference for the OC and NOC groups at the ACE-R ($U = 1094$; $p = .282$), CPM ($U = 1232.5$; $p = .906$), STAI-state ($U = 1156.5$; $p = .521$), STAI-trait ($U = 1156$; $p = .518$), BDI ($U = 1135.5$; $p = .431$), PPI-R ($U = 1246.5$; $p = .983$).

When comparing the two prisoners' groups for the time spent in prison, a Mann–Whitney non-parametric *t*-test showed that OC members were in prison for many more years than NOC individuals ($U = 576.5$; p

Table 1. Socio-demographic characteristics.

	Organised crime offenders	Non-organised crime offenders	Control group
	Median [percentiles: 2.5–97.5]		
Age	47.5 [26.675–67]	44.5 [27.225–71.55]	53.5 [28.225–73.75]
Education (years)	10 [8–17.5]	11 [8–17.775]	13 [8–17.55]
Imprisoning time (years)	9 [1–26.775]	4 [0.545–13.325]	

Table 2. Neuropsychological and psychological data.

	Organised crime offenders ($N = 50$)	Non-organised crime offenders ($N = 50$)
	Median [percentiles: 2.5–97.5]	
Global cognitive Functioning (ACE-R)	93 [81.675–98.775]	92.5 [81.225–98]
Fluid Intelligence (CPM)	31 [24–36]	31.5 [23.225–35.775]
Anxiety (STAI – state)	41 [26.45–72.65]	40.5 [25.45–67.775]
Anxiety (STAI – trait)	40 [26.45–72.1]	39.5 [23.225–65.55]
Depression (BDI)	15 [2–42.075]	11 [0–29.775]
Psychopathy personality traits (PPI-R)	273 [230.675–342.975]	264 [225.45–351.525]

< .001) (Table 2). This expected result is attributable to the difference in the sentences that OC and NOC offenders receive for the same type of offence. As the Italian legal system gives harsher punishments to mafia-like offenders, the OC group had longer prison times than the NOC group.

The binary logistic regression was significant (omnibus test $\chi^2_{(11)} = 53.79$; $p < 0.001$; *Nagelkerke's* $R^2 = 0.56$). We found that the odd to belong to the OC group is five times higher for a one-unit increase in fear recognition scores (*Estimate* = 1.6; $z = 2.73$; $p = .006$; *OR* = 5; *95% CI* = 1.56–14.78; Figure 1). Apart from the time spent in prison ($p < .001$), level of state ($p = .302$) and trait anxiety ($p = .503$), level of depression ($p = .156$), and psychopathic traits ($p = .312$) did not predict the OC membership (Table 3). The model showed an accuracy (area under the curve) of 0.88 (Figure 1). We have also performed a sensitivity analysis using G*Power, a freely available software. With a power of 0.90, alpha of 0.05, $Pr(Y = 1|X = 1)$ $HO = 0.2$, and a previously calculated R^2 other X equal to 0.45, with a sample size of 100 participants, the minimal detectable effect size for one-tailed logistic regression was *Odds Ratio* = 2.93.

4. Discussion

Organised Crime (OC) groups, such as the Italian mafia, are characterised by hierarchically organised structures built upon an extensive social network that exerts power via the actual or potential use of threats and violence (Berlusconi, 2014). Indeed, OC members, while striving to weave relationships sustaining their lucrative goals, frequently engage in intimidating behaviour to exert control over others and gain respect in the OC group. This criminal behavioural pattern leads one to postulate a difference between OC members and common offenders in emotion recognition competencies, which may be used to build criminal social networks and exert control over others. Here, we have tested this hypothesis by showing that OC members were more likely than NOC individuals to recognise the expression of fear in others.

One could postulate that better facial emotion recognition – even of one specific emotion (i.e. fear) – would allow greater adaptation to structured organisations like the mafia. For instance, Corden and colleagues (2006) have shown that healthy individuals who performed worse at recognising fear were also less accurate in attributing independent mental states to others. At the lowest extreme of the range of social abilities, the Integrated Emotion Systems model postulates that poorer performance in recognising emotions (fear in particular) is associated with reduced social skills in psychopaths and people with antisocial attitudes (Blair, 2005a, 2005b; Marsh & Blair, 2008). Paralleling this evidence, Marsh and colleagues (2007) demonstrated that subjects from the general population who scored higher in recognising fearful emotions were more likely to engage in prosocial behaviours. The authors speculated that since low fear sensitivity is associated with reduced empathy, high sensitivity to fear-indicating cues may be associated with increased prosocial conduct. Our speculation also aligns with previous comparisons of mafia members and a sample of non-organised inmates, demonstrating enhanced social skills among the former (Schimmenti et al., 2014b). OC members presented with a higher capacity to empathise with others, lower levels of dysfunction in the affective and interpersonal dimensions, and a preserved capacity to form affective bonds. The authors proposed that these results could be attributable to the adhesion and sense of belonging to a specific social group, a fundamental characteristic of OC members. The peculiar culture and social organisation within the mafia communities push for the diffusion of their shared ideals and values to other people, especially those inside the family. Thus, the mafia's standards are extended to members' other social relationships, making these standards pervasive in OC members' lives (Lo Verso & Lo Coco, 2004; Maria, 1997). Hence, social interactions and a collective sense of belonging and participation can be considered some of the most relevant aspects of the OC community, distinguishing OC from other offenders. Therefore, it might be that these social norms and values are introjected very early on by mafia associates, creating stable social bonds related to particular kinds of attitudes that allow for successful interaction with other group members.

It is also important noticing that, to some extent, all emotions favour social interactions. Thus, contrary to our findings, one might expect that recognising other emotions may also be crucial for OC members. For instance, the perception of facial expressions of disgust may warn of harmful social contact (Gan et al., 2022). Furthermore, recognition of facial expressions of happiness may be crucial to boosting the ingroup social identity (Calder, 2011). Notably, in the context of criminal behaviour, one might

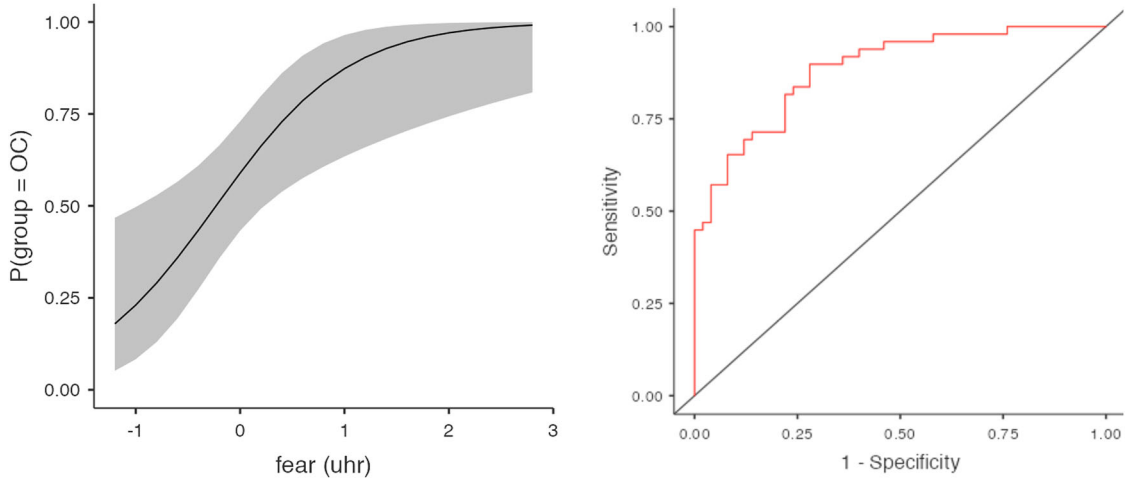

Figure 1. The left panel shows the estimated marginal means of the z-scores at fear recognition against the probability of being part of the OC group. The right panel shows the Receiver Operating Characteristic (ROC).

suppose that anger plays a major role among other emotions as its expression signals agonistic dominance. We speculate that our results did not highlight the importance of anger as our study has focussed on the recognition and not the expression of basic emotions. Nevertheless, our findings may indirectly indicate its involvement in specific OC behaviour. Indeed, the expression of anger evokes fear (Dimberg & Öhman, 1996), facilitating avoidance-related behaviours in perceivers (Marsh et al., 2005). Thus, accuracy in recognising the facial expression of fear may be interpreted as a proxy for the successful communication of dominant behaviour through anger. OC members may need particular emotional competencies to exert power over targeted individuals to control territories and gain respect in their group. Indeed, prompting fear in others can be used as an illicit social strategy to reach their goals, such as in the case of extortion. This behavioural pattern generates *omertà* (Antolisei, 2008; Sergi, 2014; Turone, 2008), which has been considered a by-product of the induced fear (Andriyenko, 2019). According to a large body of evidence, criminal organisation control is mainly guaranteed by a generalised system of extortion, which is common to all Italian mafia organisations (Berlusconi, 2014; Paoli, 2014a). Interestingly, OC groups may also take advantage of the use of fear to reinforce their members' adherence. It is known that if a member breaks the rigid rules regulating the group, those higher in the hierarchy may

Table 3. Logistic regression results.

						95% Confidence Interval	
Predictor	Estimate	*SE*	*Z*	*P*	Odds ratio	Lower	Upper
Intercept	−2.79613	0.678503	−4.12103	<.001	0.061046	0.016148	0.23078
Emotion recognition							
Anger	−0.39165	0.456115	−0.85867	.391	0.675940	0.276479	1.65255
Disgust	−0.59960	0.386785	−1.55021	.121	0.549032	0.257256	1.17174
Fear	**1.56888**	**0.573674**	**2.73480**	**.006**	**4.801279**	**1.559714**	**14.77981**
Happiness	0.24323	0.248700	0.97802	.328	1.275365	0.783323	2.07648
Sadness	−0.66118	0.352347	−1.87649	.061	0.516243	0.258783	1.02985
Surprise	−0.38572	0.358448	−1.07608	.282	0.679962	0.336801	1.37276
Psychological variables							
Level of depression	0.39416	0.277760	1.41908	.156	1.483143	0.860506	2.55630
State Anxiety	−0.26597	0.257720	−1.03202	.302	0.766461	0.462508	1.27017
Trait Anxiety	0.27427	0.409175	0.67031	.503	1.315574	0.589963	2.93363
Psychopathic traits	−0.22977	0.227392	−1.01045	.312	0.794717	0.508927	1.24099
Time spent in prison	**0.28597**	**0.069611**	**4.10814**	**<.001**	**1.331056**	**1.161296**	**1.52563**

Note. Estimates represent the log odds of "group = OC" vs. "group = NOC".

retaliate against them and their families. Thus, if the criminal attitude of OC members is mainly based on inducing experiences of fear in others with the goal of controlling them, they may be better able to detect its facial connotations. To test our latter hypothesis, future studies could explore the correlation between inducing emotion and the ability to recognise it in non-clinical, clinical, and forensic samples of individuals.

Intriguingly, our results were not influenced by the levels of state and trait anxiety, depression, or psychopathic traits. Previous evidence has been conflicting regarding the effect of high levels of trait anxiety on facial emotion recognition (Cooper et al., 2008; Surcinelli et al., 2006). Nevertheless, results from a meta-analysis have provided evidence for a moderate impairment of emotion recognition due to anxiety disorders and depression (Demenescu et al., 2010). More recently, it has been shown that artificially enhancing state anxiety via controlled quantities of carbon dioxide (CO_2) reduced global emotion recognition accuracy (Attwood et al., 2017). Furthermore, a recent meta-analysis has found evidence of pervasive impairments across modalities (facial and vocal) with significant deficits evident for several emotions (i.e. not only fear and sadness) in both adults and children/adolescents with psychopathic traits (Dawel et al., 2012). In the case of the present study, these mood and personality variables did not affect the prediction of criminal membership by fear recognition, reinforcing the specificity of our findings.

In summary, better accuracy in recognising fear in others is more likely to be associated with the OC than the NOC individual profiles, suggesting a difference in social skills between those offenders whose activities are firmly rooted in a group and those who act as single individuals. These results shed new light on the fundamental differences in cognition that characterise OC members. They provide unique insight into the affective profile of different criminal categories and further data concerning the interaction between emotion recognition and social behaviours.

5. Limitations

This study has some limitations. Even if the research on the ability to recognise facial expressions of the six basic emotions has a long-lasting and still flourishing tradition (Ekman et al., 1969; Ekman & Friesen, 1971; Ko, 2018), criticisms about some methodologies have been raised, especially concerning the inadequacy of still photos, decontextualisation, and absence of mixed emotions to provide sufficient ecological validity (Isaacowitz & Stanley, 2011; Phillips & Slessor, 2011). Future studies may overcome these limitations by proposing more ecological stimuli and expressing emotions more frequently in real-life situations.

Furthermore, our results may not be generalisable to other OC groups. The Italian mafia is a complex system involving various affiliations, such as *cosa nostra*, '*ndrangheta*, and *camorra*, which originate from different Italian regions and traditions (Paoli, 2004, 2014a). In this study, our participants had a wide range of affiliations, but there are different types of mafias in the world, for example, the Chinese and Russian mafias and the Mexican cartel (Paoli, 2004, 2014b; Shanty & Mishra, 2008), whose internal cultures and social organisations could differ profoundly from one another. We suggest that it is essential for further research to study differences in emotion recognition in diverse types of OC groups to further our understanding of the complexity of this global phenomenon.

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Disclosure statement

No potential conflict of interest was reported by the author(s).

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Data availability statement

The data that support the findings of this study are available on request from the corresponding author (GS). The data are not publicly available as they contain information that could compromise research participant privacy.

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