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Those who counter match-fixing fraudsters: voices from a multistakeholder ecosystem

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Abstract

This study sheds light on the match-fixing ecosystem, with particular focus on those entities engaged in protecting the integrity of competitions. It analyzes the characteristics of match-fixers, as perceived by some anti-match-fixing stakeholders; the known processes of match-fixing and their evolution; and the interactions among stakeholders in the match-fixing ecosystem. Results show that while anti-match-fixing actors seem to have only a fuzzy idea of match-fixers' characteristics, they appear to know quite well how fraudsters manipulate games. Meanwhile, fixers seem to have adapted their processes across time in response to harsher countermeasures according to two main strategies: layering, in which mules are used to place bets on multiple operators to conceal suspicious betting pattern algorithms, and diversification/displacement, in which fixers decide to pursue new betting options or to target minor leagues or other, less monitored sports. Some fixers did not have to adapt since in many countries police investigations remain rare and criminal sanction mild. Further research should encourage comparative perspectives beyond the European dimension, develop a more systematic effort to establish a sport fraudsters typology, and focus on non-betting-related sports manipulations.

Keywords Match-fixing · Organized crime · Ecosystem · Corruption · Sporting integrity · Online betting

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Introduction

Despite betting having a long history within modern sport, betting-related match manipulations (also known as “match-fixing”) first became a global threat at the start of the twenty-first century [1]. Within a few years, all major disciplines became affected, and the integrity issue quickly appeared to undermine the credibility and viability of the modern sports industry [2]. It became clear that private sports organizations could not address this emerging issue on their own. The implication of transnational organized crime and the role played by a global and ill-regulated betting market obliged the sports movement to ask states to contribute to the protection of sports integrity [3]. Opened to signature in 2014, the Council of Europe Convention on the Manipulation of Sports Competitions (or the “Macolin Convention,” see [4]) represents a landmark step as it bestows responsibilities to each of the main stakeholders involved in the fight against match-fixing: states, private sports organizations, and betting operators [5].

The Macolin Convention also distinguishes itself by proposing a broad definition of “manipulation of sports competitions”: “an intentional arrangement, act or omission aimed at an improper alteration of the result or the course of a sports competition in order to remove all or part of the unpredictable nature of the aforementioned sports competition with a view to obtaining an undue advantage for oneself or for others” ([4], Art. 3.4). One can make several distinctions between the forms of manipulation used [6, 7]. Usually, manipulation may be divided into two main typologies: betting-related (to make profits and/or launder money on the betting market) and non-betting-related match-fixing (e.g., to ensure a win to avoid relegation or qualify for a higher level of competition). Moreover, it can be instigated by the players or referees themselves or by external actors (e.g., by organized crime through bribery or coercion or by a club president).

Match manipulation linked to betting

The first signs of widespread match manipulation in the early 2000s were spotted by researchers, who scrutinized the betting market to detect suspicious odds variation ([8, 9]). Some of the first narratives emerged from economists. They proposed a utility gain equation to illustrate fixing as the result of a rational choice for athletes or criminal outsiders [10–14]. The literature then rapidly shifted to focus on the institutional conditions that help to explain match-fixing [15–18]. A number of reports underlined the global impact of the ill-regulated worldwide betting market, the gaps in the disciplinary and penal frameworks to counter the phenomenon, and the conflicts of interests and inadequacies within sports governance and economy [3, 19–23].

However, despite the strong transnational dimension of modern manipulation schemes [15], the academic literature focused mostly on the national level, highlighting Greece [24], Malta [25], the Netherlands [26], the Czech Republic [27], Spain and Portugal [28], Taiwan [29], Italy [30, 31], South Korea [32], and Belgium [7]. Other works investigated a limited number of countries [33, 34]. As Spapens and Olfers [26] argue, there remains a lack of a global approach from academic researchers on sports competition manipulation. Likewise, the current literature on match-fixing adopts a static view of the phenomenon and does not yet consider the evolution of stakeholders

and how match-fixers themselves may adapt their strategies to the anti-match-fixing framework. In addition, there is still a dearth of research about the main stakeholders, that is, private sports organizations, public authorities (law enforcement and betting regulations), and the betting sector, involved in the fight against manipulation. A number of researchers have underlined the role of the betting sector with regard to match-fixing [12, 32, 35], but no analysis has taken into account the three main groups and their respective roles and views in tackling the manipulation of sports competitions.

Understanding match-fixing through the concept of an ecosystem

To provide a comprehensive framework and to emphasize the dynamic nature of match-fixing, the authors propose viewing the phenomenon and its countering activities through the concept of an ecosystem. Ecosystems have already been used in several fields of research, including criminology, economy, and biology. In biology, an ecosystem is “a dynamic complex of plant, animal and microorganism communities and their nonliving environment interacting as a functional unit” ([36], p. 19). In criminology, the definition of an ecosystem also includes social interactions between individuals. According to Felson [37], “a given crime’s ecosystem considers its interactions with other crimes and the surrounding non-crime environment.” In the ecosystem, activities are performed through processes; these lead to results (expected or not), which are also called services [38]. These services represent “the benefits people or things can obtain from the ecosystems” ([39]: p.1). In our case, in the larger ecosystem of sports exists a match-fixing (sub)ecosystem. This specific ecosystem hosts multiple living actors (such as individuals—e.g., players, referees, coaches, integrity officers, and criminals—or legal actors—e.g., sports federations, clubs, anti-doping bodies, betting industries or their departments, and states) and nonliving actors (e.g., bots on a computer, algorithms aimed at detecting match-fixing on a betting platform, and online social networks). Actors perform processes (e.g., monitoring online betting or bribing a player) to provide services (e.g., assuring match integrity or fixing a match). Legitimate entities and criminals cohabit an ecosystem. Each participant develops skills to circumvent measures taken by the other participant to immobilize and limit them. Moreover, due to the relationships within the ecosystem, each entity is able to profit from the behaviors of others. For example, fully understanding that match manipulation exists to some extent, other fraudsters may open online websites selling false tips on allegedly fixed matches [40]. “In a sense, these two communities have a shared fate, as if participating in a game of innovation leapfrogging as one set of actors in the ecosystem attempts to counter the advances and responses of another set of actors” ([41]: 542). Some studies have already detailed criminal activities as being part of a crime ecosystem. Among others, some of them concern cybercrimes (e.g., [41]; [42]; [43]). According to Kraemer-Mbula et al. [41], cybercrime, which evolves through the Internet, works as a business ecosystem. Entities of this business model “have different interests but are interconnected through cooperation and competition, for their mutual survival and effectiveness” ([41], p. 542). In the manuscript, we consider it fruitful to adopt the same theoretical construct: match manipulation—in the context of sports—has been facilitated by cyberspace; it is often driven by a business model linked to online betting. In this sense, we could consider match-fixing a form of cyber-enabled crime [44], a deviant behavior magnified by the digital revolution. In our study we assume that since 2000, the match-fixing ecosystem

has been shaken by the spread of online betting and by the escalating activity of criminal groups. These entities exploited the new opportunities presented by a combination of regulative flaws and digital innovation.

Research aim

The study proposes an inclusive approach to the stakeholders involved in fighting sports manipulation. Through the concept of the match-fixing ecosystem, this manuscript focuses on three main groups of integrity stakeholders: the sports organizations, the betting industry and related services, and the regulatory and law enforcement authorities. The authors will explore how those who fight against match-fixing perceive the opposing entity (the fixers' characteristics), what they have found about the processes of manipulating football matches, and how anti-match-fixing actors have cooperated over time.

Data and method

This study adopted a qualitative strategy, and it collected primary data through interviews.

Following our ecosystem model, we identified three groups of relevant institutional actors (sports institutions, regulatory and law enforcement agencies, and the betting industries and related services): "sports institutions" are agencies directly involved in sports and sporting events (e.g., sports federations, associations, and clubs); "regulatory and law enforcement agencies" are public agencies that have a stake in the fight against match-fixing (e.g., ministries of sport; betting regulating authorities; law enforcement such as national police or Europol or Interpol; and international public organizations such as the Council of Europe, the United Nations Office on Drugs and Crime, and the European Commission); and "betting industry and related services" are agencies directly involved in managing and monitoring betting activities related to sports events (e.g., betting companies and associated companies and betting monitoring services).

Then we established contact with one or more representatives of each group. During February–June 2019, we conducted 11 semistructured interviews (with six representatives from regulatory and law enforcement agencies based in Western Europe, three representatives of global betting industries and related services, and two international sports federations representatives). The interviews were conducted either by conference call or face to face in four countries in Western Europe. The length of the interviews varied from 45 to 90 min. The interviews had to be anonymized for confidentiality reasons (Table 1). Due to the sensitivity of the topic, the interviewees' fieldwork contexts are not presented/detailed here. For each interview, the representatives had the opportunity to talk about specific topics if they wanted to provide in-depth answers or add some more relevant facts.

Regarding the interview, we developed a semistructured questionnaire divided into five blocks (Table 2). Some blocks were not taken into consideration depending on the interviewees' backgrounds.

Table 1 Interviewees per anti-match-fixing actors' type

Code of the interviewed	Anti-match-fixing actors' type	Date of the interview
#RLEA1	Regulatory and Law enforcement agencies	March 2019
#RLEA2	Regulatory and Law enforcement agencies	March 2019
#RLEA3	Regulatory and Law enforcement agencies	April 2019
#RLEA4	Regulatory and Law enforcement agencies	Avril 2019
#RLEA5	Regulatory and Law enforcement agencies	May 2019
#RLEA6	Regulatory and Law enforcement agencies	May 2019
#BI1	Betting industries and related services	February 2019
#BI2	Betting industries and related services	March 2019
#BI3	Betting industries and related services	March 2019
#SI1	Sports institutions	April 2019
#SI2	Sports institutions	May 2019

Results

The match-fixing ecosystem was analyzed from the perspective of those who act to protect the fairness of the game (sports institutions, regulatory and law enforcement agencies, and betting industries and related services). The interviewees' answers were grouped according three main topics: (a) the perceived characteristics of match-fixers, (b) the known processes of match-fixing and their evolution; and (c) the interaction among entities in the match-fixing ecosystem.

Perceived characteristics of match-fixers

Based on all the interviews, there appears to be a lack of systematic knowledge about match-fixers. All representatives agreed that fixers' have various profiles. There are on-field fixers and off-field ones. They can be sportsmen, referees, or officials but also criminal groups and even international gambling syndicates. Particularly important is the role of brokers who are able to establish connections between on-field fixers and

Table 2 Blocks of semi-structured interviews

Block	Subject	Description
1	Introduction	Perception of the phenomenon: global view
2	Actors of match-manipulation	Characteristics of the actors involved in match-manipulation issues and their role
3	Modus operandi used by fixers	Presentation of the modus operandi and new trends (if any)
4	Investigating match fixing	Role and the challenges of investigation in match-fixing cases
5	The sport environment, betting regulation and match-fixing	Strengths and vulnerabilities of the current anti-match-fixing framework

criminal groups. Concerning “the profile of these intermediaries: sometimes it’s top players, retired, but normally they are secondary players” (#RLEA5). Most of the interviewees agreed that complex criminal organizations are involved in the match-fixing processes. However, interviewee #RLEA6 stressed the need to not confuse the term “criminal organizations” with mafia-type organizations. Some of these organizations are internal sports networks that use match-fixing as an opportunity to make money without easily being caught. For example, when a club owner approaches his “football coach and he convinces him that he has to convince his three players (...) to lose the next three games, this situation could also be considered as criminal group activity” (#RLEA6). In other cases, when involved, mafia-type organizations see match-fixing as an opportunity to diversify, reinvest, or launder dirty money. Most of these groups are portrayed as comprising members from the same geographic area. These groups predominantly come from the Balkans, Italy, Russia, China, and sometimes Singapore (#RLEA2, #RLEA4, #RLEA5, #BI3). Interviewee #RLEA2 explained that “we have mafias from Eastern Europe, Albanian or even Russian mafias. It happened since the success of online betting markets. A lot of Chinese mafias took control of football clubs [after these clubs herein had financial troubles]. ... Concerning other profiles, Armenian are apparently good with match manipulation in tennis. Why Armenia? They manage many Future Tournaments in tennis, so, maybe, they realized that manipulate a match can be quite easy to make.”

Match-fixing occurs for either financial or purely sporting reasons. Nevertheless, the interviewees disagreed about the proportion of matches fixed for sporting or betting purposes. Most of the interviewees reported that the number of matches manipulated for betting purposes has increased over recent years, while interviewee #RLE3 explained that if we only focus on betting-related match-fixing in sport, we are missing the big picture. “The trend is for me a little shocking. It is something that most partners do not always understand, not yet. For the general public, the issue of fixed matches is linked to betting environment, but it is not always the case. ... Everyone is talking about betting, betting, betting but there is something else around sports manipulations.”

Known processes of match-fixing and their evolution

While anti-match-fixing actors seem to have only a fuzzy idea of match-fixers’ characteristics, they appear to know quite well how fixers try to manipulate games. It is a common perception that within recent years the opening of the sports betting market through the Internet has facilitated the crime commission process in match-fixing (#RLEA1, #RLEA4, #BI3). Regulation of the betting market has been hugely changed. For example, before, “it was only possible to bet on football directly in an office that was proposing sporting bets. Today, in some countries, it is possible to bet on more than 30 different sports and online as well. Again, in many countries, you have numerous betting options, including even live betting (e.g., on the first yellow card, red cards, corners, the first scorer, the final score, or the half-match score). The multiplication of betting options has affected the possibilities for manipulation. Fixers (both criminal organizations and individuals) implement processes (i.e., a *modus operandi* [MO]) to fix a match. These MOs can be qualified as “simple” or “complex.” The type of MO depends on the sport, the number of people involved in the criminal activity, and the nature of the fixers (e.g., whether they are players, referees, coaches, or outsiders).

Moreover, the MO used by fixers also depends on their main purpose: whether they are looking for financial gain or sports advantages.

Manipulating a match requires the participation of at least one individual on field who is the precursor of the fix or who is the one to contact to manipulate a game. Often, manipulation starts easily, with people already knowing each other. Either corrupt players establish new connections face to face with other players or they use the relationships they have already made during their lives or careers. This is especially true when it comes to retired sportsmen approaching new players.

The presence of the Internet and new technologies in the ecosystem has facilitated the contact exchanges and/or the contact making: fixers also communicate via chats and social networks, such as WhatsApp or Facebook (#RLEA1, #RLEA3, #RLEA4, #RLEA5, #BI2). Interviewee #BI2 captured this sentiment by saying, “if we go down to the spectrum it becomes less organized and we have local criminal groups who attempt to corrupt a number of players. .. and you start random approaches with people that they may know by person or by social media. The increase use of social media to approach and communicate to players and to corrupt is a definite trend.”

Moreover, the MOs used by fixers have proven to be adaptable to the obstacles established by the current anti-match-fixing framework. One strategy, similar to a money laundering step, is layering. To remain as discreet as possible when betting and keep the bet under certain monetary thresholds, some criminals use mules; they split their bet into many chunks, and they place it on multiple operators (#RLEA3, #RLEA4). As explained by interviewee #RLEA3, criminals may follow a risk reduction approach: “If you have a certain amount of money that you would like to place a bet on, you could be in an alert someday if you place the whole amount of money. But, if you spread the bet, the result is the same in terms of money but you decrease the risk to alert the algorithms.”

Another strategy is betting diversification, which can be split into three categories: (a) match-betting types diversification, (b) betting on minor leagues in the same disciplines, and (c) other sports diversification. Fixers try to control not only the final results of top-level competition but also parts of matches, and they will diversify the targeted sports and level of competition for betting (#RLEA1, #RLEA2, #RLEA4, #RLEA6, #BI2, #BI3). In fact, according to interviewee #BI2, “the fixers became. .. aware that some of the top-level competitions have been monitored and, to avoid detection, they tried to change the market and/or the type of bet. They are going away by the entire results that have been fixed (which still happens) and they shift to manipulate intermediate results. ... I am talking about first half of the match or perhaps of the last portion of the match. ... In tennis we see specific manipulation on first, second set, or even specific fraction of the matches that have been manipulated. ... This is not only true for football, this is darts, snooker, cricket, etc. It’s much more diversified. The diversification is also geographical.” Interviewee #RLEA2 also added that “We have seen manipulations on exact scores, or recently, on sports at more points, more ‘so many goals’. ... The fix is harder to detect because it’s easy to make sure that there are plenty of goals. ... Another evolution concerns the people who will program and place their money to make [a] sure bet. It will also have consequences on our monitoring because we are not sure of the manipulation. Another recent development is the tipsters, who give weekly tips, and who are hugely followed, and it also creates drops of odds.” According to interviewee #RLEA1, “there is little manipulation of the

game on the negative scores (red cards, yellow cards, etc.) but rather on scores at half-time. There are periods more favorable to a large number of betting than others (in particular in summer).” Indeed, the systems adopted have caused the displacement of match-fixing behaviors: “When you fight in one league, like let’s say in the top division of a member association, it gets better, but then the problem moves to the second division” (#SI2).

It appears that, in some way, the anti-match-fixing framework has generated a double-effect: the progressive expulsion of match-fixing amateurs and the progressive increase of professional criminals and criminal networks. A new trend about the MO of criminal groups that was revealed by the interviewees concerns the way in which criminal organizations collaborate with other groups. “They are betting mainly on illegal betting markets in Asia. This is one of the modus operandi we have seen in Europe. There are the big Asian fixers that are themselves in the Asian market with their local contact people. We have the big criminal syndicates doing the work themselves and there are situations of operations sharing where criminal groups work together. There is a big transfer of money that moves to arrive often in cash to the person who must rig the match” (#RLEA4). Some of them act from their own countries (working as closely as possible to their own territory) and delegate the remaining work to the criminal groups that are physically closest and agree to be involved in match-fixing activities. This eases the criminal commission process and limits expenses due to administrative issues (e.g., air ticket payments and accommodation). This work further stretches the international work of these organizations, and all of them make profits by placing bets on a specific match.

Interviewee #SI1 explained that “different groups cooperate with others to grow their economies. This way, they will save resources. They delegate work according to the geographical areas in which the other groups are. They are paying fees.” According to interviewee #RLEA1, preparing match-fixing also requires intermediaries. In fact, “you need intermediaries who are persuasive enough to convince players to join in, or people who are able to pick up the money when others come by plane to bring cash, it takes people that can ensure the fix will be executed, it is also necessary to ensure the commitment of corrupt players.” They all work together to increase their effectiveness.

Interaction among entities in the match-fixing ecosystem

In the 2000s, the functioning of the match-fixing ecosystem was disrupted by online betting and by the more evident presence of criminal groups, as seen through media scandals (e.g., the Bochum case in Germany). In response, sports bodies began including integrity units in their organizations, and betting companies developed monitoring systems to detect suspicious betting. Law enforcement was sporadically involved once investigations revealed organized crime participation in sports manipulation. However, the number of interactions between these three groups of actors has progressively grown due to the difficulty of investigating, for example, cross-national match-fixing. When the first scandals exploded, the three different organizations worked mostly on their own. Today, international cooperation is becoming more effective, although further steps have to be taken. Cooperation looks smoothest between sports bodies and betting companies. Legally, they interact at the same level and under the same negotiation schemes based on contracts. Conversely, interactions with

law enforcement may not be based on mutual consent. Public investigative powers may trigger forced interactions. Law enforcement may take initiative autonomously, with the other stakeholders being restless because they fear losing control of an inquiry's outcome. Some law enforcement representatives still acknowledge today that sports organizations hesitate to open their doors to investigations. Moreover, fighting match-fixing does not always appear to be a priority within police units. In fact, even if match-fixing potentially involves huge amounts of money, other serious crimes remain the top priority. For this reason, even for police units that specialize in sports, there is little room for additional resources (#RLEA4). Another consideration slowing down interactions between police and the other entities is public officers' prudence toward public-private partnerships. "The most difficult message to convey to police officers is public/private cooperation. There is this fear that it is better not to engage partnerships because, as long as you have contact with private companies, you may fall into a spiral of corruption. Thus, we keep a respectful distance. On the other hand, if we are able to overcome this fear, we can work together always respecting the legal basis of each other" (#RLEA4). The same thing seems to be happening between betting companies and sports federations. "Many international federations are in a transition period, there was a period that they thought that was a betting companies' fault, and that they needed to take the responsibility. Now we cooperate and they are collaborating with us. This is a big change" (#B11).

The general impression is that each actor is very careful not to invade another's responsibilities. According to a representative of the betting environment, they are not investigators. "We provide the alerts to sports federations and other entities. ... We are part of the ecosystem but we are not going to be the solution. In our ecosystem law enforcement is not the main actor (they are not interested, they do not have resources or they do not want to talk with betting operators). We decided to work with sports federations and national platforms. We are the beginning of the process and this is not enough information to set up a criminal case" (#B11). The separation of functions is also based on their specific reasons for fighting against criminals who fix matches. From the interviews, it was clear that the three anti-match-fixing groups have different interests in fighting these issues. Law enforcement wants to stop crime, sports institutions want to protect their standing, and betting industries want to protect their financial assets.

In general, through their investigations, law enforcement wants to arrest criminals involved in match-fixing. Even if the means (financial and investigative) have not evolved much over the last few years, they have changed their approach. "In the past, athletes were the first to be sanctioned. Now, we have decided to fight against the real sports manipulators, and this is the reason why we have developed a multisport alert system" (#RLEA2). Police officers face numerous difficulties with current laws and regulations. Some countries have entered sports corruption in their penal codes, but definitions of the crime differ. Moreover, it is not always possible to relate a specific behavior to a code infraction. The legal gap is the main issue for law enforcement. Secondly, contrary to disciplinary sanctions issued by sports bodies, the judiciary process takes time. In fact, on-field fixers (referees or players) can be sanctioned through a sports ban. These sanctions work because the consequence is direct and deeply impacts the sportsman's life. However, formal police investigations must confirm or deny the hypothetical roles of others involved in the match-fixing case. If

the investigation is successful, the off-field individuals will be arrested and sentenced. Nevertheless, sanctions are light (#RLEA6). In general, the interviewees agreed that the risks of being caught are low, while profits can be really high.

Sports organizations want to keep a clean image of sport. They publish action plans to make the public and states aware of their responses and practices. By doing so, they want to reassure these groups that they are taking match-fixing seriously. Beyond the whatever-it-takes rhetoric, the approach is more pragmatic, and it can be summarized with the motto “doing good enough to prevent the problem escalating” (#SI1). Interestingly, the feeling is almost that there is an unspoken agreement between the fixers and the sports organizations: they must not touch the top competition; otherwise, they will be in trouble (#SI2).

Betting operators, as companies on a competitive market, want to keep and gain market share. Moreover, knowing that results have been compromised could generate bad reactions from legitimate bettors, who will then claim the money (unfairly lost) that is due to them. Additionally, they also have to deal with the political wheel and reputational damages (#BI3). Interviewee #BI1 explained that “sports betting is becoming more political, a lot of institutions are looking around it. A lot of operators invested in social responsibility aspect, and they are using for promoting their brand. This is something that has changed compared to previous years. And also because of pressure, today to get a license you have to be part of the monitoring system.” Betting operators share suspicious betting information with sports institutions and law enforcement.

Discussion

The findings contribute to the understanding of how three main groups of entities engaged against match-fixing (sports institutions, regulatory and law enforcement agencies, and betting industries and related services) interact and perceive the fixers and their MO. In the 2000s, at the very beginning of this ecosystem, the relationships among actors appeared to be difficult both because they had never cooperated before and because of their mixed nature (public and private), which is often a source of skepticism. Historically, sports institutions have guarded their autonomy, and they tended to hold public authorities at arm's length. At the same time match-fixing has not always been a priority for law enforcement. Sports scandals, however, forced the three groups to cooperate, allowing the ecosystem to consolidate. The more sports scandals appeared, the more it became necessary to establish agreement and cooperation. Nevertheless, with regard to the effectiveness of the system, the attitudes of the respondents fluctuate between pragmatism and resignation. Some believe in the idea that a high-performing system could be achieved through a more coordinated effort when creating betting regulations and national legislation (tougher sanctions). Some argue that sports industrialization and its growing financial interests (also coveted by betting operators) have already degenerated the sports environment to a no-way-out situation. Looking at the functionality of the environment, the analysis reveals a cooperative framework in its infancy. Most of the actors are poorly connected to each other, and only recently have national platforms started to merge their anti-match-fixing efforts. Moreover, the three groups of entities have different interests in fighting match-

fixing, and they often use different processes (e.g., different investigative methods, awareness campaigns, or algorithms).

Regarding the fixers' characteristics, general knowledge appears to be anecdotal—probably in part for confidentiality reasons—and refers to facts already reported by the media. In a fragmented scenario where nobody seems really able to provide the big picture, the only common denominators recall the concept of opportunity-seeking offenders who are capable of displacing their activities as soon as they perceive costs that are greater than the benefits. Disagreements also exist concerning the size of the phenomenon. The majority of entities agree that economic profit remains the main purpose of match-fixing, but one interviewee warned us to remain careful about this statement. Match-fixing processes conducted by fixers only for sporting value are more difficult to detect and manage. A recent study [7] supports the claim that the rate of match-fixing related to sporting purposes is underestimated. Undoubtedly, a lack of consensus on offenders' characteristics represents a vulnerability of the ecosystem since it prevents anti-match-fixing actors from enabling ad hoc initiatives against a specific group of offenders.

Regarding the MO, countering entities are more comfortable with describing fixers' behaviors as they are planning a fix. The anti-match-fixing processes introduced, which are mainly inspired by situational crime prevention techniques (e.g., as seen with a suspicious betting pattern algorithm), seem to have forced fixers to adapt their strategy. Of course, adaptation may also be fueled by harsher regulative frameworks, although at the moment these still lack coordination. As is happening for other transnational crimes (e.g., money laundering), one could envisage that a global framework against match-fixing will progressively make it more difficult to manipulate sports events. This could lead to further professionalization and complexification of the match-fixing business, with the involvement of white-collar operators, and to processes such as the shopping of legislation in order to select the most advantageous jurisdictions (e.g., fiscal havens) for such activities.

Naturally, the study has its limitations. The qualitative research method allowed us to report and analyze the problem of match-fixing in depth, but our results do not necessarily reflect the views of other stakeholders. Our sample was selected on a voluntary basis among European contacts, and this may also be a source of potential geographic bias. Also, our ecosystem model simplifies the complexity of the actors involved, their roles, and their relationships with their partners.

Conclusion

Our study sheds light on the match-fixing ecosystem, with a particular focus on those entities engaged in protecting the integrity of competitions. It analyzed the characteristics of match-fixers, as perceived by anti-match-fixing organizations; the known processes of match-fixing and their evolution; and the interactions among entities in the match-fixing ecosystem. Results show that while anti-match-fixing actors seem to have only a fuzzy idea of match-fixers' characteristics, they appear to know quite well how fixers try to manipulate games. Meanwhile, fixers seem to have adapted their processes over time in response to harsher regulative and technological countermeasures. We have outlined two main adaptive strategies: (a) layering, in which mules are

used to place bets on multiple operators to deceive suspicious betting pattern algorithms, and (b) diversification/displacement, in which fixers decide on new betting options or seek to target minor leagues or other, less monitored sports. A population of fixers have not had to adapt since in many countries police investigations remain rare and criminal sanction mild.

In the 2000s, the functioning of the match-fixing ecosystem was disrupted by online betting, which escalated the betting market and drew the attention of criminal groups. This led to media scandals such as the Bochum case in Germany. Then sports bodies realized the seriousness of the match-fixing phenomenon while betting companies reacted through monitoring systems to detect suspicious betting. Law enforcement was sporadically involved, especially when an investigation identified the participation of organized crime in sports manipulation. The emergence of scandals was a push factor toward interagency cooperation.

Further research should try to conduct a similar study targeting non-European representatives in order to compare whether the state of knowledge about fixers, their MO, and the anti-match-fixing environment is the same as what exists for their European peers. The concept of a match-fixing ecosystem should be further developed to articulate the variety of entities on the scene. In this context, researchers should make a more systematic effort to establish a sport fraudsters typology. Additionally, further studies should try to focus on non-betting-related sports manipulations, and it would also be interesting to conduct interviews with match-fixers in order to survey their perceptions of the risks involved and of the anti-match-fixing actors.

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