

## ARTICLE

# Mine closure, social disruption, and crime in South Africa

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## Abstract

The international literature links mining booms with social disruption. The rapid economic and population growth that mining brings increases urban crime and social problems. But insufficient attention has been paid to the reverse situation: the social disruption that can accompany the closure of a mine. We compare crime statistics for four categories of small city, known in South Africa as “intermediate city municipalities,” from 2009 to 2018. Contrary to the findings of international studies, we find that those where mining was in decline had some of the highest crime rates, particularly in the category of sexual offences, whereas those where mining was growing had the lowest. Our research shows that mine decline and closure can contribute to social disruption. We argue that South African government policy has exacerbated this problem in the context of mine decline and that several dependencies created by mining further contribute to the problem. We challenge the assumption that fast population growth and an increase in the male population are prerequisites for social disruption. Our paper suggests the need for modifications to social disruption theory.

## KEYWORDS

Crime, intermediate city municipality, Mine closure, Mining boom, Social disruption

## 1 | INTRODUCTION

South Africa has seen plenty of examples of mining town booms and busts over more than 150 years. For the past three decades, most new mining developments have been in the smaller cities rather than the metros. These small cities' municipalities struggle with the resulting population and economic growth and the increased demand for public services. Social disruption is the result. This effect of mining is well known. Less well known, or studied, is the social disruption that occurs when mining declines. Social disruption theory has had little to say about the consequences of mine decline or closure.

Boomtown research originated in the 1960s. In the 1970s and early 1980s, the research focused on how the influx of people into small communities changes local behaviour, puts pressure on social services and increases crime (England & Albrecht, 1984). This phenomenon has been much studied (Jones & Mayzer, 2021; Ruddell, 2017), but the reverse picture is hardly considered. Little evidence has been produced to link mine decline and closure with social disruption. O'Connor

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and Ruddell (2021), for example, found that decline and closure in gas and oil mining in Canada did not increase crime levels. This paper challenges the commonly held view that mine closure does not bring new social disruption.

Many of South Africa's gold mining areas have experienced decline and closure since the boom period of 1950–1990, mainly because of resource depletion, increased mining costs and the health and safety risks of deep mining (Crankshaw, 2002). Jobs in gold mining dropped from about 560,000–100,000 between 1987 and 2020. However, coal, iron ore and platinum mining buffered the declining employment trends, which meant that mine employment between 1996 and 2019 dropped only from 570,000 to 460,000 (Global Insight, 2020). Gold mining, however, suffered heavily, with gold production falling from 700,000 to 150,000 kg between 1972 and 2017 (Sesele et al., 2021a). The economic decline in the gold mining areas has had severe social and economic consequences. Several case studies (Marais, 2013; Marais & De Lange, 2021; Marais et al., 2017; Sesele et al., 2021a) point to social disruption associated with mine decline, but they lack comparative and longitudinal indicators.

We conducted this study to investigate whether small mining cities in South Africa, growing or declining, are experiencing higher crime levels than other small cities and larger cities. To do this, we compared crime data from 2009 to 2018 for the small cities (called “intermediate city municipalities,” or ICMs, in South Africa), both mining and non-mining, and the large cities (referred to as “metros”). We found that the crime figures for ICMs where mining is in decline were substantially higher than for ICMs where mining is growing or where there is little or no mining, or for the metros. Our paper fills an overlooked research gap. It brings to light something that has been little realised: that crime rates can soar after an economic downturn in a resource-based community (O'Connor & Ruddell, 2021, p. 281). It supports the findings of a study by Axbard et al. (2016), using statistics of crimes reported at police stations across South Africa, that, contrary to the prevailing belief, the crime rate fell as mining grew. Our paper differs by focusing specifically on the small city category and relating the findings to social disruption theory.

## 2 | LITERATURE

We distinguish between two sets of literature: on boom towns and on the social effects of mine closure and the local responses.

### 2.1 | Boomtowns, social disruption, and crime

Jones and Mayzer (2021) define a boomtown as a rapid growth community, often rural and often associated with a natural resource such as coal, gold, oil, or gas. Ruddell (2017) sees boomtowns as having four main components: high population growth, outmigration of existing residents, increased demand for and supply of short-term housing, and dominance by young men.

Boomtown research has seen four distinct phases of development (Finsterbusch & Freudenburg, 2002), with Jones and Mayzer recently adding a fifth. In the 1960s the focus was on the economic value of a boom for a small town. The 1970s research questioned the naïve acceptance of the economic benefits of a boom and overemphasised its negative aspects. The early 1980s research challenged the previous simplistic negative conclusions about social disruption and pointed out various methodological concerns with boomtown studies. The mid-1980s brought a more balanced assessment of the possible adverse effects of a boom on nearby communities. Since the 2000s, research has emphasised the complex relationships in boomtown communities and paid increased attention to local community issues. Research from this latest phase re-emphasises social disruption and questions whether rapid population and economic growth are the main reasons for the disruption (Jones & Mayzer, 2021). Other studies have focused on housing concerns (Ennis et al., 2014; Haslam McKenzie, 2020) and the effect on indigenous communities (Argent, 2014).

According to Stretesky and Grimmer (2020), the term “social disorganisation” was first used in Shaw & McKay's, 1942 book, *Juvenile delinquency and urban areas*, a study of juvenile delinquency in Chicago and the association between crime rates and the socio-economic characteristics of a place. By the 1970s the term “social disruption” was being used to explain social change in small or rural places where rapid economic change was occurring (Freudenburg, 1984; Wilkinson, 1984). Rapid growth might lead to the loss of local traditions and attitudes, increased mental health problems, increased crime and community disorganisation (Park & Stokowski, 2009). However, the research evidence to support the social disruption thesis is not always clear. Wilkinson (1984) noted that comparative studies were not available and the research did not acknowledge the broader range of possible influences. Lack of reliable

data, questionable interpretation of the data, and over-generalisation have been common problems (Wilkinson et al., 1982). The 1980s saw a call for more longitudinal work (Jones & Mayzer, 2021). Understanding place and context became important in these studies and accounted for contradictory findings (Park & Stokowski, 2009). For example, Smith et al. (2001) found that many signs of social disruption diminish over time and disrupted communities stabilise. More recent work, focusing on gender, indigenous communities and public health concerns, has shown periods of rebound of social disruption (Jones & Mayzer, 2021). Concern has been expressed that mining companies are denying responsibility for social harms and transferring the burden of dealing with them to mining communities and households (Carrington et al., 2011). However, researchers seldom ask whether mine closure could lead to new forms of social disruption, even if the initial disruption does not continue. Research that did pose the question found limited evidence to support such a hypothesis (O'Connor & Ruddell, 2021).

Boomtown research commonly assumes a relationship between social disruption created by booms and crime. A systematic review of the literature (Stretesky & Grimmer, 2020) found that, overall, shale gas development was likely to increase crime. It found that commonly used theoretical frameworks were masculine dominance, the Dutch disease and resource curse theory. Ruddell (2017) found that masculine dominance and social disruption were related to an influx of young men. Jones and Mayzer (2021, p. 4) concluded that although the findings were not as bad as in previous eras, “studies continued to report increasing rates of crime, victimization, and suicide ensuing from boomtown social disruptions.” Various other studies from the US (Ruddell et al., 2014), Canada (O'Connor & Ruddell, 2021), Australia (Carrington et al., 2010; Scott et al., 2012), and Chile (Corvalana & Pazzona, 2019) came to the same conclusion. We note, however, that of the 25 shale gas studies reviewed by Stretesky and Grimmer (2020), only one was from outside the US. Research from the Global South on boomtowns and crime seems scarce. We found a study from Chile (Corvalana & Pazzona, 2019), which showed that commodity booms increased crime, and the above-mentioned working paper on South Africa, Axbard et al. (2016), which showed, unusually, that a decline rather than a boom increased crime.

Research commonly distinguishes between violent or serious crimes, property crimes and crimes associated with social disorder. These last include violence against women and crimes like drunken driving, drug abuse, and gangsterism (Ruddell, 2017). Crimes specifically associated with mining include carjacking, theft of mining equipment and tools, illegal mining, oil theft, and smuggling, and a rise in property crimes and violent crimes (Fan et al., 2021; Gourley & Madonia, 2018; Jones, 2016; Ruddell, 2017; Stewart et al., 2020). However, crime research has some methodological shortcomings, such as lack of long-term data, single case studies rather than comparative studies, and little innovation (Ruddell, 2017).

South African research has produced case studies of mine decline (Binns & Nel, 2001; Marais, 2013; Marais & De Lange, 2021; Marais et al., 2017) and the effect of mining on host communities (Cole & Broadhurst, 2021). However, our paper is the first to use the categories of the South African urban system to analyse the effect of mine decline on crime.

## 2.2 | The social effects of mine closure and the local responses

We identified two bodies of research: one on the social effects of closure, and one on planning and governance responses to closure.

The mine closure literature tends to focus on environmental factors (Vivoda et al., 2019) and mining companies. The work on the social effects, though growing, remains small (Bainton & Holcombe, 2018). Vivoda et al. (2019) identify 14 social aspects and 30 related indicators of mine closure. The 13 aspects are economic, business, employment, security, education and training infrastructure, amenities, livelihoods, land, housing and health, environment, demography, participation, inclusion, and general social aspects. Two books on mine closure describe how mine closures affect nearby towns (Chaloping-March, 2017; Neil et al., 1992). Several case studies have been performed worldwide (Haney & Shkaratan, 2003; McDonald et al., 2012; Van Assche et al., 2021a). Research has also been carried out on cross-cutting issues such as the gender implications of mine closure (Sesele et al., 2021a, 2021b) and mining companies' transparency on the closure process (Crous et al., 2020).

The second body of work relates to how towns govern mining volatility, although not usually specifically on our topic — closure — but rather on governing booms and busts (Van Assche et al., 2020). This research links with the literature on boom towns but focuses more on the governance responses than the social consequences of booms and busts. For example, it emphasises how places and their people develop strategies to cope with booms and busts. The cases from Canada are important as open mining towns have been the norm there for more than a century, making local governments responsible for managing both growth and closure (Marais et al., 2018). We highlight the following six points from this literature.

There is an emphasis on the complexities of booms and busts and the strategic responses (Van Assche et al., 2021c). Linear answers such as economic diversification or plans to mitigate decline are not easy to implement. Often strategy development comes with a large degree of uncertainty and requires much maintenance (Van Assche et al., 2021b). Strategy needs to take uncertainties into account. Cycles of booms and busts further complicate matters (Van Assche et al., 2020) and growth or decline is seldom linear.

The research emphasises the importance of strategy, but Van Assche et al. (2020) argue that boom-bust cycles tend to erode local institutional capacities. They state that “the ‘real’ cause of the various observable problems is the set of factors undermining institutional capacity” (Van Assche et al., 2020, p. 1). Consequently, communities lose their ability to build on historical responses to booms and busts.

Mining booms and busts create dependencies of various kinds. Economic growth during a boom blinds strategy developers to the need to accept decline (Marais & De Lange, 2021). Developing alternative understandings of reality is difficult when economic dependency dominates. Material dependencies could be infrastructure or even the mine dumps created during mining booms that make strategies for decline difficult to implement. Yet not all booms or busts necessarily create these dependencies (Haikola & Anshelm, 2020).

The speed of change (whether boom or bust) is an important variable (Van Assche et al., 2020). Mining booms and busts are not always quick; they can be slow, and local responses to the change can be even slower. The speed at which change takes place probably determines the nature and scale of social disruption. The long-term consequences of slow change are an important consideration.

The work also reflects on the psychology and memory of people living in mining areas (McDonald et al., 2012; Perez-Sindin & Van Assche, 2020, 2021; Pini et al., 2010; Van Assche et al., 2021b). There is an emphasis on how mine decline causes trauma and contributes to resistance, and how people and local communities develop memories about mining booms and busts. These memories are important because boom and bust cycles often repeat themselves and remembering historical responses could sometimes be helpful.

Although there is an expectation that long-term planning should address many of the concerns of booms and busts, the literature identifies problems associated with long-term planning (Van Assche et al., 2020). The growth and decline of mining creates social identities and governance features that severely hamper imagining alternatives (Van Assche et al., 2021a). The literature nevertheless emphasises the value of strategy, saying that “local strategy can make a difference,” and “strategy is better than uncoordinated response” (Van Assche et al., 2020, p. 2). The point is made that assessment of booms, busts and their strategies requires a localised understanding of these factors and their influences (Van Assche et al., 2021a).

## 2.3 | Relevance of the literature

The literature discussed above has three main applications to our paper. First, the literature on social disruption argued that the consequences of mining booms and busts are linear, occurring in a series of phases. But the more recent literature shows that mining booms and busts create several long-term dependencies and are often the result of more than one cycle and can happen quickly or slowly. We take care not to view booms and busts linearly but to understand the long-term consequences. Secondly, the literature shows that local strategies require local institutional capacity and memory. We have taken this into account in analysing social disruption and crime. Accounts of historical approaches to dealing with such disruption provide valuable insights. Thirdly, the literature makes it clear that strategic responses should be grounded in local realities, so we base our arguments on large quantities of local data.

## 3 | METHODS

Our paper addresses many of the shortcomings in the research. We use data for more than ten years, we take a comparative approach, and we focus on a specific urban category, the smaller cities known as ICMs in South Africa. We look at data for crime in four settlement categories in South Africa: small mining areas growing or declining, and small and large areas with little or no mining influence. We use crime data from 2009 to 2018, classified into main categories and subcategories. We acknowledge one limitation of our data: our mine decline sample consisted of only four cities, so the comparison with the more numerous cities in the other categories was not perfect.

### 3.1 | Categorisation of cities

The Municipal Structure Act (1998) provides for three types of municipality, or settlement categories, in South Africa. There are eight metropolitan municipalities, 44 district municipalities, and 226 local municipalities (each made up of several local municipalities). Small cities are known as intermediate city municipalities, or ICMs, but they are not legally defined as such. The ICM Support Programme identified 39 ICMs, broken down into five subcategories: large and semi-diverse, mining, manufacturing, service centres, and high population, low gross value added (GVA) (see Table 1).

For this paper, we made three changes to the above categorisation. We divided the mining ICMs into two subcategories: *ICMs: mining decline* (×4) and *ICMs: mining growth* (×7) (see Table 2). We included Matlosana, which is listed as a service centre in Table 1, in the *ICMs: mining decline* category, as it has experienced a rapid decline in mining over the past 30 years (Marais et al., 2017). Its current categorisation as a service centre is because it has lost its dominant mining function. Finally, we put all the other ICMs into the *ICMs: other* category. The *ICMs: other* and the *metro* settlement categories are effectively a control group to compare with the “intervention group” (*ICMs: mining decline* and *ICMs: mining growth*) (see Table 2 and Figure 1).

The four cities in the *ICMs: mining decline* category are all former gold mining areas. The *ICMs: mining growth* are coal, copper, and platinum mining areas. Table 3 provides a more detailed assessment of the economic and population characteristics of the four settlement categories. It shows the distinct nature of the *ICMs: mining decline* category. In this settlement category, mining as a share of the GVA dropped from 64% in 1996 to 29% in 2018. Overall, the economies of these ICMs were 33% smaller in 2018 than in 1996. Between 1996 and 2018, their economies declined by 1.8% per annum and between 2009 and 2018 (the period for which we have crime data) by 0.7% per annum. Mine decline has resulted in slow population growth and the evening-out of the sex ratio (ratio of males to females in a population), despite males remaining in the majority. Although there was no decline in these four cities' overall numbers from 2009 to 2018, Matjhabeng, one of the four cities in the *ICMs: mining decline* category, lost about 60,000 people between 1996 and 2011 (Marais, 2013).

In contrast, those in the category *ICMs: mining growth* have all remained predominantly mining cities, with mining contributing 53.5% in 2018 (down 1.3% from 1996). Although their economic growth between 2009 and 2018 was only 0.4% per annum, from 1996 to 2018 it rose to 1.9% per annum. Rapid population growth occurred at 2.8% per annum between 2009 and 2018. The sex ratio increased slightly, from 50.3% to 53.5%, evidence of an influx of men to these cities.

### 3.2 | Crime data

Working with crime data supplied by the South African Police Service (SAPS) in South Africa is difficult. There are three main problems: manipulation of crime data, changing definitions of crimes, and under-reporting (because of mistrust of the police). Burger et al. (2010) note that, despite these concerns, the researcher is obliged to use these SAPS statistics

TABLE 1 Categorisation of ICMs in South Africa

Large and semi-diverse	Mining	Manufacturing	Service centres	High population, low GVA
Emfuleni	Ba-Phalaborwa	Alfred Duma	George	Bushbuckridge
Mbombela	Emalahleni	Drakenstein	Giyani	Enoch Mgijima
Msundusi	Fetakgomo Tubatse	Govan Mbeki	JB Marks	Tzaneen
Polokwane	Lephalale	KwaDukuza	Maluti-a-Phofung	King Sabata Dalindyebo
	Matjhabeng	Metsimaholo	Matlosana	Mahikeng
	Madibeng	Mogale City	Mogalakwena	Makhado
	Merafong	Newcastle	Nkomazi	
	Rand West	Stellenbosch	Ray Nkonyeni	
	Rustenburg	uMhlathuze	Sol Plaatje	
	Steve Tshwete		Thulamela	

TABLE 2 Categorisation of ICMs and metros for this study

Intervention group		Control group	
ICMs: mining decline	ICMs: mining growth	ICMs: other	Metros
Matjhabeng (gold)	Ba-Phalaborwa (copper)	All ICMs except those in the mining category in Table 1	Buffalo City
Matlosana (gold)	Emalahleni (coal)		Cape Town
Merafong (gold)	Fetakgomo Tubatse (platinum)		Ekurhuleni
Rand West (gold)	Lephalale (coal)		eThekweni
	Madibeng (platinum)		Johannesburg
	Rustenburg (platinum)		Mangaung
	Steve Tshwete (coal)		Nelson Mandela Bay
			Tshwane

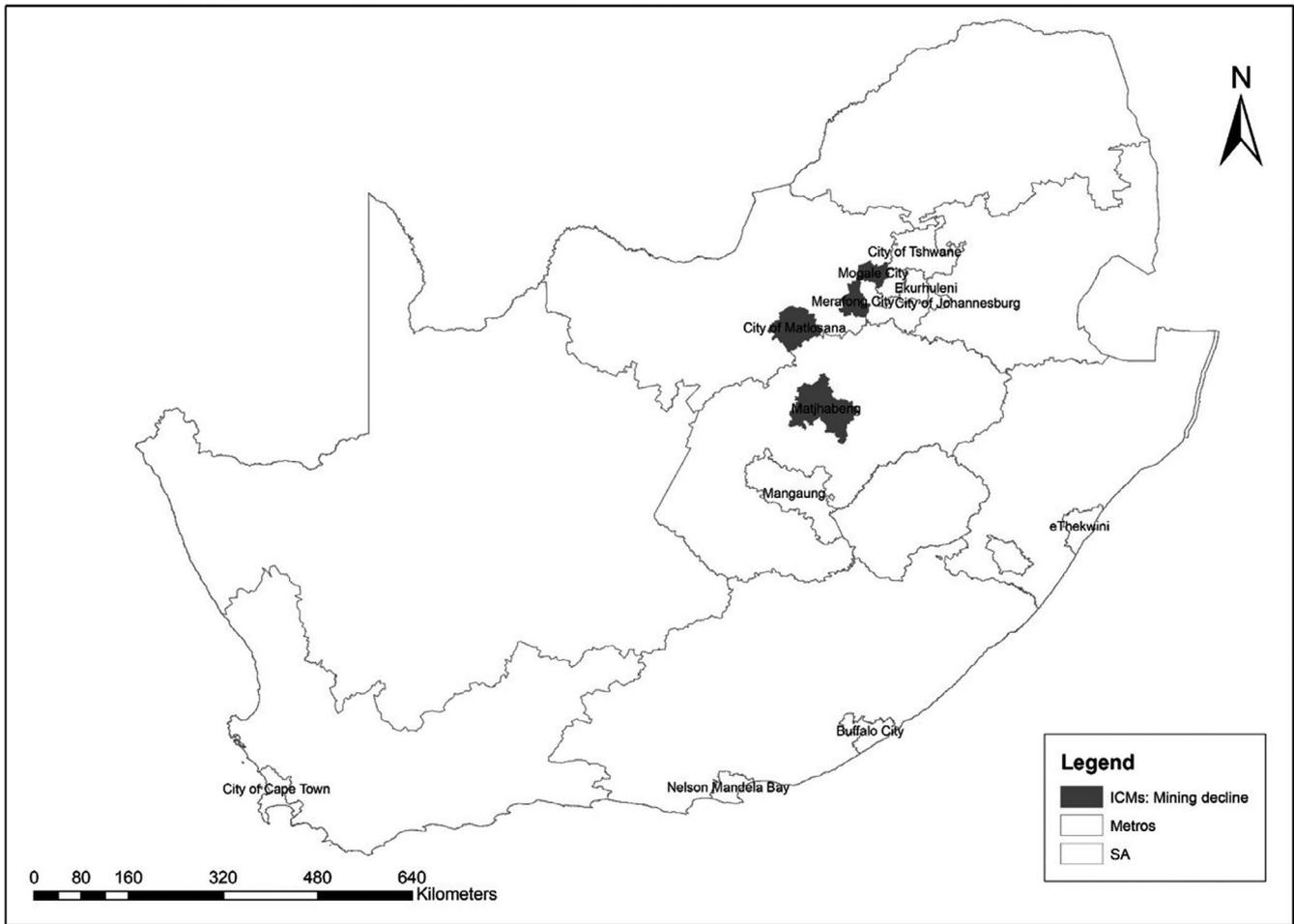


FIGURE 1 Location of ICMs and metros in South Africa

as they are the only official indicators of crime trends in South Africa. A particular difficulty for us was that the SAPS captures crime data not per municipality but per police station. We were thus obliged to allocate the 2009–2018 data from each police station to the relevant municipality. We then calculated the crime rates per 100,000 of the population for each municipality and for each settlement category (see Section 3.1). We used the country’s own crime categories, subdividing crime according to the SAPS’s main categories and subcategories (see Table 4). We assembled these categories from SAPS (2012), with the help of definitions from Burger et al. (2010) and Brodie (2015). Table 4 also distinguishes crimes that are detected by police action from all the other crime categories, which are reported by the public.

Despite our criticism of the data, it does have the advantage of covering all municipalities and all provinces. Although some manipulation might occur at the police station or provincial level (where oversight takes place), it is unlikely that

TABLE 3 Main economic and population differences for the urban categories

Economic and demographic indicators	ICMs: mining decline	ICMs: mining growth	ICMs: other	Metros
GDP 1996 (constant 2010 prices ×R1000)	98,780,493	102,269,145	328,572,919	952,706,479
GDP 2009 (constant 2010 prices ×R1000)	76,268,702	144,301,285	451,625,369	1,512,609,807
GDP 2018 (constant 2010 prices ×R1000)	65,904,620	157,643,975	525,920,348	1,837,359,117
GDP annual growth, 1996–2018	−1.8	1.9	2.1	3.0
GDP annual growth, 2009–18	−0.7	0.4	0.7	0.9
% share of the economy in mining 1996	64	54.8	12.0	3.2
% share of the economy in mining 2009	40.2	53.5	9.0	1.5
% share of the economy in mining 2018	28.7	53.5	8.0	1.2
Total population 2009 <sup>a</sup>	1,216,494	2,222,332	10,084,316	19,720,610
Total population 2018 <sup>a</sup>	1,301,124	2,849,234	11,268,956	22,964,674
Average population size per category	325,281	407,033	402,462	2,870,584
Annual population growth, 2009–18	0.59	2.80	0.90	1.71
Percentage of the population male, 1996	57.2	50.3	52.9	49.2
Percentage of the population male, 2016	51.0	52.5	48.2	49.7

<sup>a</sup>Population data for 2009 and 2018 are estimates based on the annual growth rates between 2011 (Census data) and 2016 (Community Survey data).

Sources: Global Insight (2020); Stats SA (2013, 2018).

consistent manipulation occurs across the country. And if it did, it would not affect our study, as the study is about comparing changes at local, not national, level. We do not, therefore, consider the less-than-ideal data quality a serious limitation.

We assessed the data for all six main crime categories and two subcategories of each main category (see Table 4). We selected the subcategories on the basis of evidence from the literature review. We conducted three analyses. First, we compared the number of cases per 100,000 of the population for these main categories and subcategories, to identify trends from 2009 to 2018 for the four settlement categories (see Figures 2–8). Second, we did a similar analysis to identify growth or decline in each type of crime per 100,000 of the population. Third, we ranked the four settlement categories for each subcategory of crime, for both the number of cases per 100,000 of the population and the growth or decline in cases. We gave the settlement category with the lowest average number of cases per 100,000 of the population per crime subcategory a rating of 1 and the one with the highest a rating of 4. We then calculated the average for each main category of crime. We present this analysis in the form of comparative hexagon charts (Figures 9 and 10).

## 4 | RESULTS

There are four main findings:

- *ICMs: mining decline* had generally higher levels of crime than the other three settlement categories.
- *ICMs: mining growth* had generally the lowest crime levels.
- The growth of crime in *ICMs: mining decline* was generally higher than in the other settlement categories and, where there was decrease, it was at a lower rate than in *ICMs: mining decline*.
- The comparative analysis in the hexagon charts shows that the most significant difference between *ICMs: mining decline* and the other three categories was in sexual offences, supporting the argument that mine decline contributes to social disruption.

### 4.1 | Crime rates and mining decline

On average, the *ICMs: mining decline* category had the highest crime rates for contact crimes and sexual offences (Figure 3a,c,e). This includes the crime subcategories murder, rape, and sexual assault. In 2013, murder in the settlement category *ICMs: mining decline* reached a high of 51.5 per 100,000 of the population. The *ICMs: mining decline* had an average

TABLE 4 Main and subcategories of crime in South Africa

Main category	Subcategory	Definition <sup>b</sup>
Contact crimes (crimes against the person)	Murder <sup>a</sup>	A crime is generally referred to as a “contact crime” where a person or people are injured/harmed or threatened with injury/harm during the commission of a crime. Brodie (2015) calls these “social fabric crimes”, as they are often the result of socio-economic conditions and are the type of crime commonly associated with social disruption
	Sexual offences <sup>a</sup>	
	Attempted murder	
	Assault with intent to inflict grievous bodily harm	
	Common assault	
	Common robbery	
	Robbery with aggravating circumstances <sup>a</sup>	
Sexual offences	Rape <sup>a</sup>	The main category of sexual offences is a subcategory of the contact crimes above with four subcategories. Detailed definitions are available in SAPS (2012)
	Sexual assault <sup>a</sup>	
	Attempted sexual offences	
	Contact sexual offences	
Contact-related property crimes	Robbery at residential premises <sup>a</sup>	These are violent crimes committed against property with the intention of causing damage to a person, for example, arson or malicious damage to property
	Robbery at non-residential premises <sup>a</sup>	
	Carjacking	
	Robbery of cash in transit	
	Bank robbery	
	Truck hijacking	
	Arson	
Malicious damage to property		
Property-related crimes	Burglary at non-residential premises <sup>a</sup>	These are crimes that occur in the absence of a victim or where the victim is unaware of the crime at the time (i.e., where no person is directly or immediately harmed or threatened during the commission of a crime), for example, theft of or from an unattended vehicle
	Burglary at residential premises <sup>a</sup>	
	Theft of motor vehicle or motorcycle	
	Theft out of or from motor vehicle	
	Stock theft	
Other serious crimes	Commercial crime <sup>a</sup>	These include commercial and financial crimes, ranging from small-scale incidents like shoplifting to large-scale fraud and corruption
	Shoplifting <sup>a</sup>	
	All theft not mentioned elsewhere	
Crimes detected by police action	Drug-related crime <sup>a</sup>	These are crimes not reported by the public but detected through direct police action such as roadblocks and SAPS intelligence operations. They include illegal possession of firearms, driving under the influence (of drugs or alcohol), and use, possession or trade of illegal drugs. Increases in the latter two categories (which have been notable over preceding reporting periods) can be directly attributed to intensified police activity rather than an actual increase
	Driving under the influence of alcohol or drugs <sup>a</sup>	
	Sexual offences detected as a result of police action	
	Illegal possession of firearms and ammunition	

Note: The SAPS (2012) provides definitions of these main and subcategories. We do not have space to provide all the definitions and so provide only those for the main categories.

<sup>a</sup>Indicates crimes that the paper assesses in more detail.

<sup>b</sup>Definitions taken from Brodie (2015), Burger et al. (2010) and SAPS (2012).

of 44.5 murder cases from 2009 to 2018, while the corresponding figure for the *metros* was 38.2. The *ICMs: mining decline* had 272 contact crimes, while the *metros* had 316, and the *ICMs: mining decline* had 153 cases of sexual offence, while the *metros* had 105. All these figures are per 100,000 of population. The *ICMs: mining decline* had more sexual offences than the other three settlement categories. This evidence corroborates the findings of recent work on women’s experiences in Matjhabeng (one of the cities in the *ICMs: mining decline* category) (Sesele et al., 2021b).

The *ICMs: mining decline* were less prominent in the other crime categories. For example, they were in second position for the subcategories of robberies at residential premises and robberies at non-residential premises and for the main

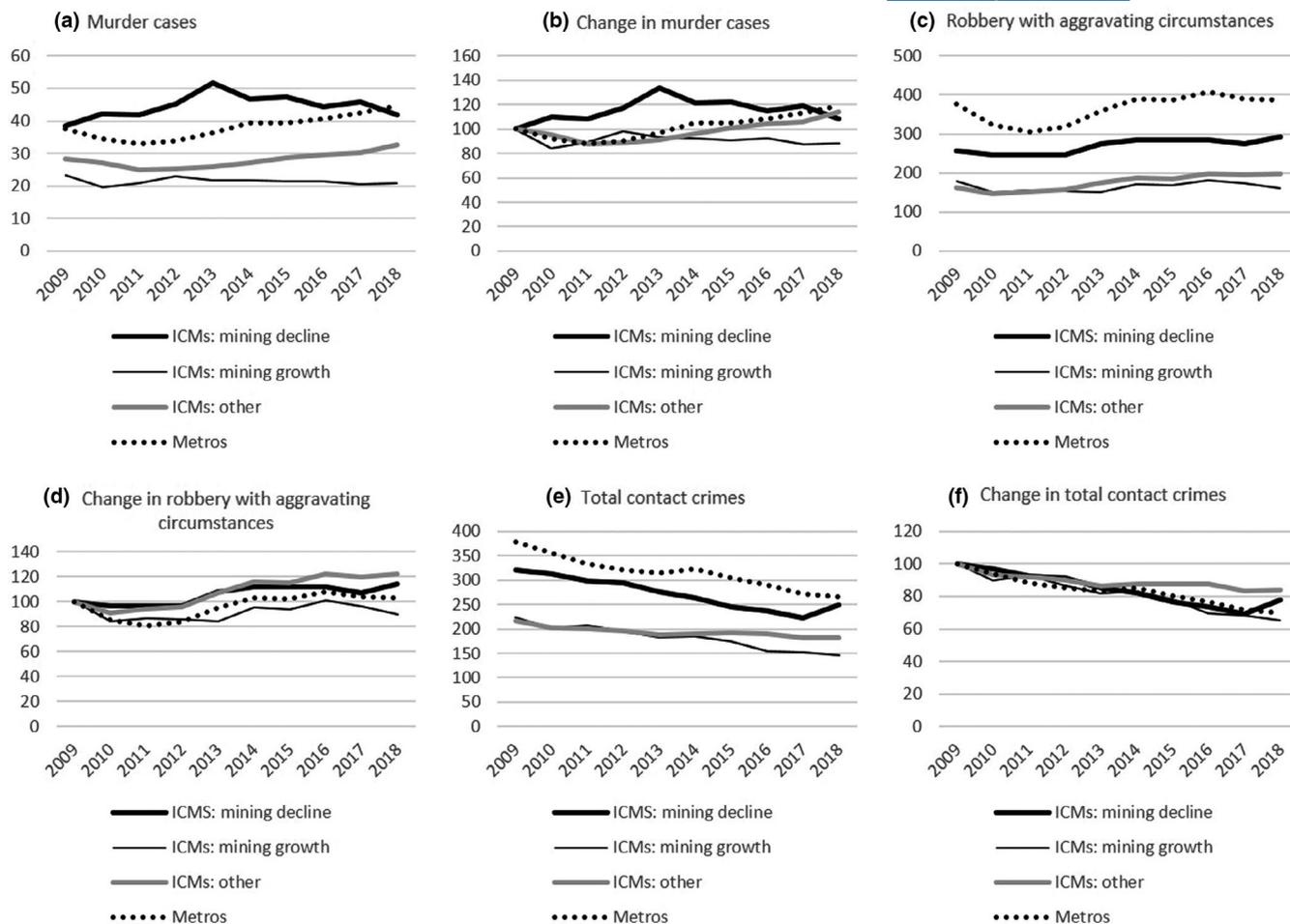


FIGURE 2 Murder, robbery with aggravating circumstances and total contact crimes, per 100,00 of population, 2009–18

category of contact-related property crimes (Figure 4a,c,e) and for total property crimes (Figure 5a,c,e). They were also not prominent in the main crime category “other serious crimes” (6a,c,e). They had some of the lowest rates for crimes detected by police action (Figure 7). This might indicate police inefficiency, staff shortages or the burden of the other crimes on the police service’s functionality. This trend requires more research. Considering the total number of crimes, *ICMS: mining decline* had the second-highest rates, after the *metros* (Figure 8).

## 4.2 | Crime rates and mining growth

Across most indicators, the crime rates for the *ICMS: mining growth* category were the lowest of the four settlement categories. This was especially true for contact crimes and sexual offences. For example, *ICMS: mining growth* had 22 murder cases per 100,000 of the population compared with 45 for the *ICMS: mining decline*. The same trend could be seen for contact-related property crimes, property crimes and other serious crimes. The *ICMS: mining growth* had the lowest crime levels for crimes reported by the public and were in second place for crimes detected by police action. These findings contradict those of the international research.

## 4.3 | Crime growth rates

Here we look at growth or decline for the main and subcategories of crime (Figures 2–8). Once again, we calculated this growth using the number of cases per 100,000 of the population. Here the *ICMS: mining decline* are less dominant, but still prominent. For example, although sexual offences decreased for all the settlement categories, the *ICMS: mining*

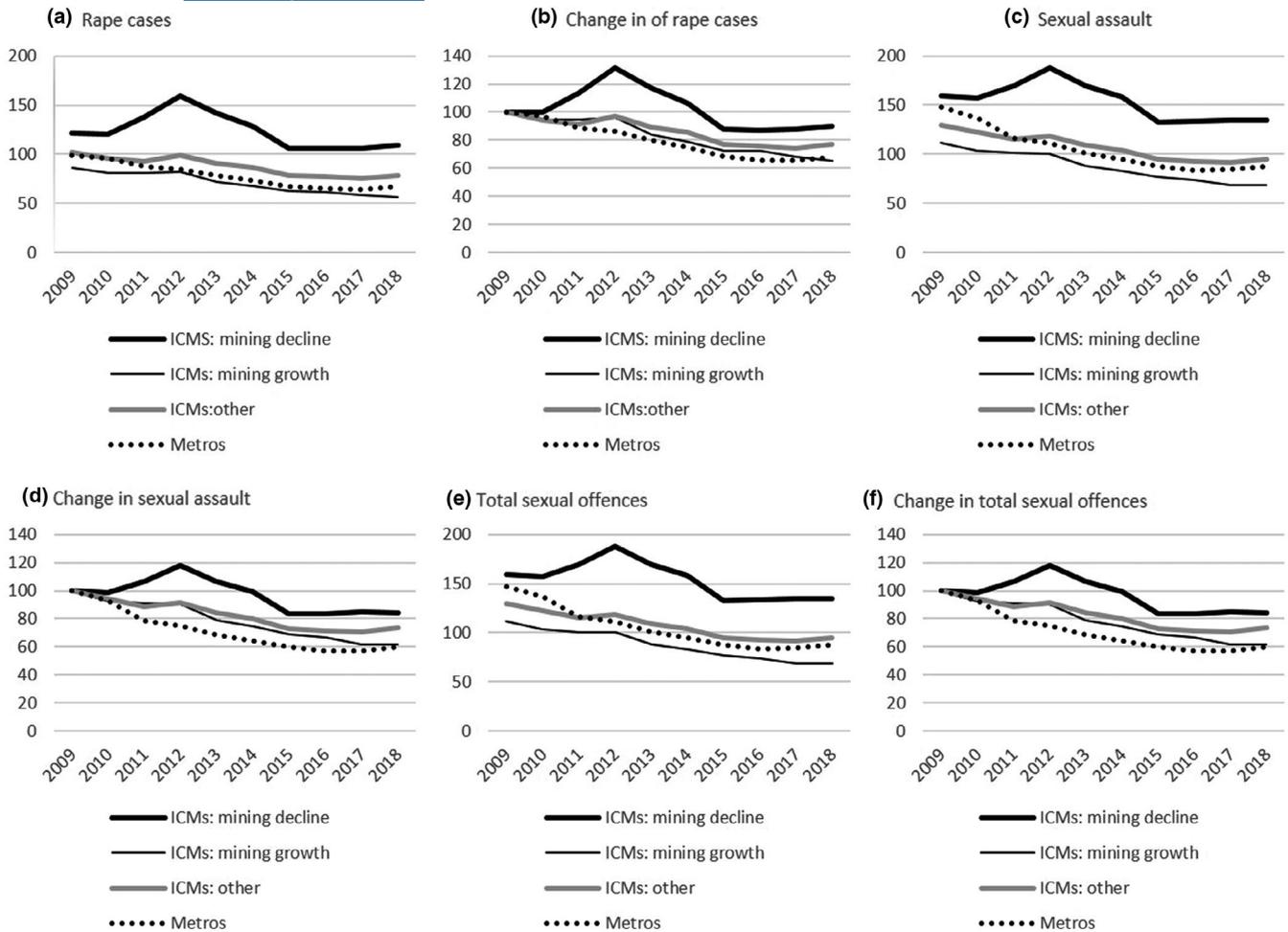


FIGURE 3 Rape, sexual assault and total sexual offences per 100,000 of population, 2009–18

decline category decreased the least, by 16%. The decrease for *ICMs: mining growth* was 38%, for *ICMs: other* 27% and for *metros* 40%. For all contact crimes, the decrease for *ICMs: mining decline* was the second-smallest, with *ICMs: other* decreasing the least. For property-related contact crimes, *ICMs: mining decline* again had the smallest decrease and the second-smallest for property crimes.

The category *ICMs: mining growth* generally saw a low growth of crime or experienced a sharper decrease than the *ICMs: mining decline*. The category *ICMs: mining growth* had the largest decrease for contact crimes, and the second-largest decrease for sexual offences, contact-related property crimes, and property crimes. We found no indication that *ICMs: mining growth* saw a substantial increase in specific crimes, despite consistent economic growth, an influx of new people and the highest sex ratio (largest proportion of men) in their populations in 2016. The only crime category where the *ICMs: mining growth* saw a more rapid increase than other settlement categories was in crimes detected by police action. This statistic might point to more effective policing in these cities.

#### 4.4 | Mining decline and sexual offences

We used a hexagon chart to compare the crime levels and growth or decrease for each crime subcategory by ranking the four settlement categories (see Figures 9 and 10). The results confirm the findings above, but three more points are important. First, in four of the six main crime categories, the settlement category *ICMs: mining decline* was ranked first (and in property-related crimes joint first with the *metros*). Secondly, the largest difference between *ICMs: mining decline* and any other settlement category was for sexual offences, a clear indication of social disruption. On a scale where 4 was highest and 1 lowest, the *ICMs: mining decline* category had an average of 4 and *ICMs: other* had 1.5. The difference

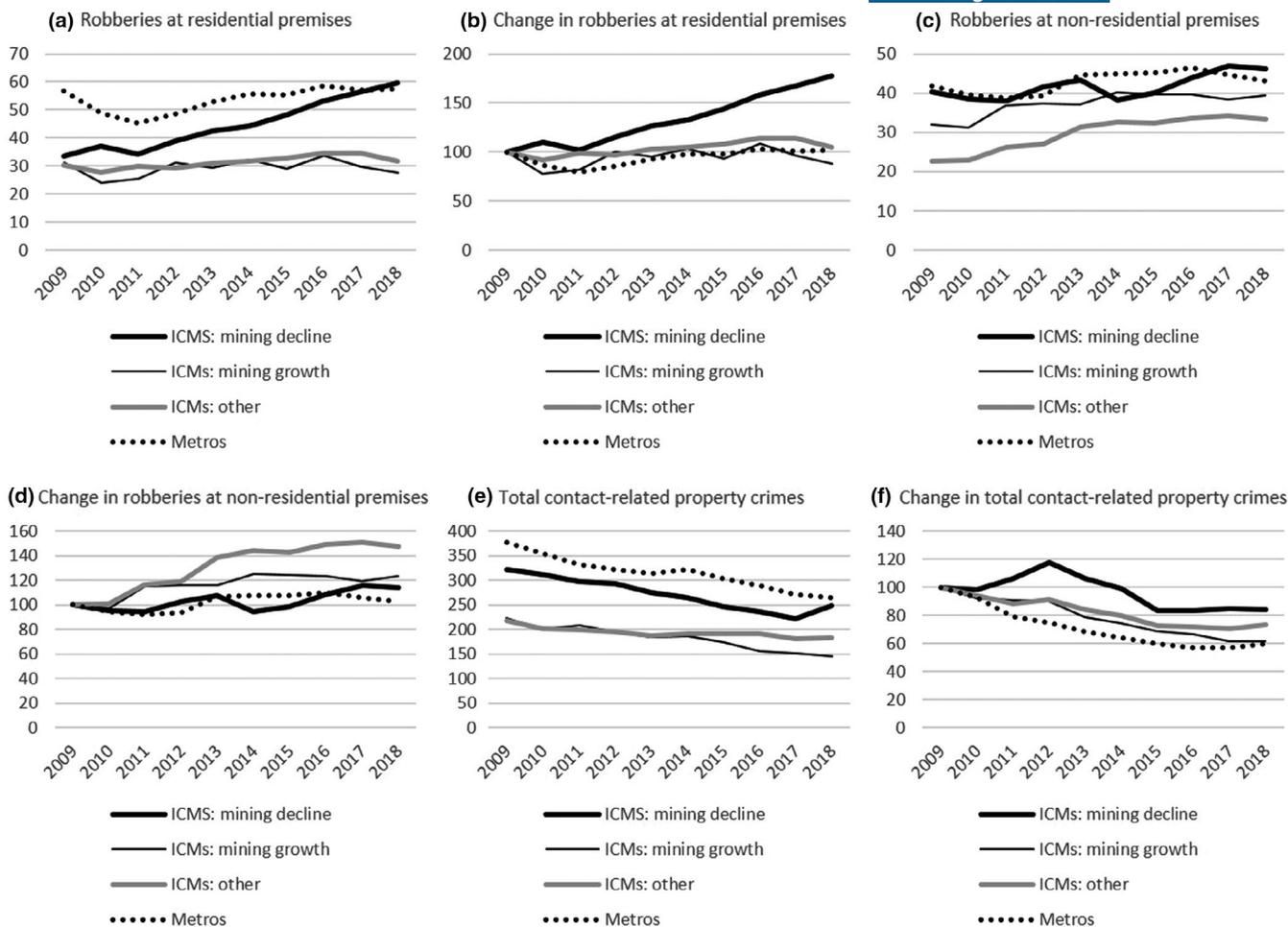


FIGURE 4 Contact-related property crimes, per 100,000 of population, 2009–18

between these ratings is 2.5, which is more than any other difference between the highest-ranking and the second-place ranking. This points to a specific relationship with sexual offences in the *ICMS: mining decline* category. The hexagon for the growth in these crimes shows that the other *ICMs* were far less affected.

## 5 | DISCUSSION

Our results show that the small cities where mining is declining have been experiencing the highest crime rates for most of the main and subcategories of crime. For half of these crime categories, the rates in these towns are generally higher than in the large metropolitan cities. This finding stands in contrast to global research that posits that large cities have higher crime levels than small cities. The results also show that the small cities where mining is growing generally have the lowest crime levels. These findings support research by Axbard et al. (2016), but contradict global research that points to higher-than-average crime rates in mining areas, especially those experiencing substantial mining growth. Below, we discuss the reasons for the trends we found.

We can think of various reasons why the small cities where mining is growing had lower crime levels than those where mining is in decline, in contrast to the findings of the international literature. The period for which we have crime data was not precisely a period of a new boom. Platinum boomed between 1996 and 2008 and coal between 2000 and 2012. And although mining remained a dominant feature of those small cities' economies and grew during those years, mining has not rapidly increased its share of their economies. For those two reasons, these communities may have stabilised, supporting the finding by Smith et al. (2001) that social disruption evens out over time, or the finding by Van Assche et al. (2020) that not all booms have adverse consequences. The lower crime levels may also indicate that the mines' social

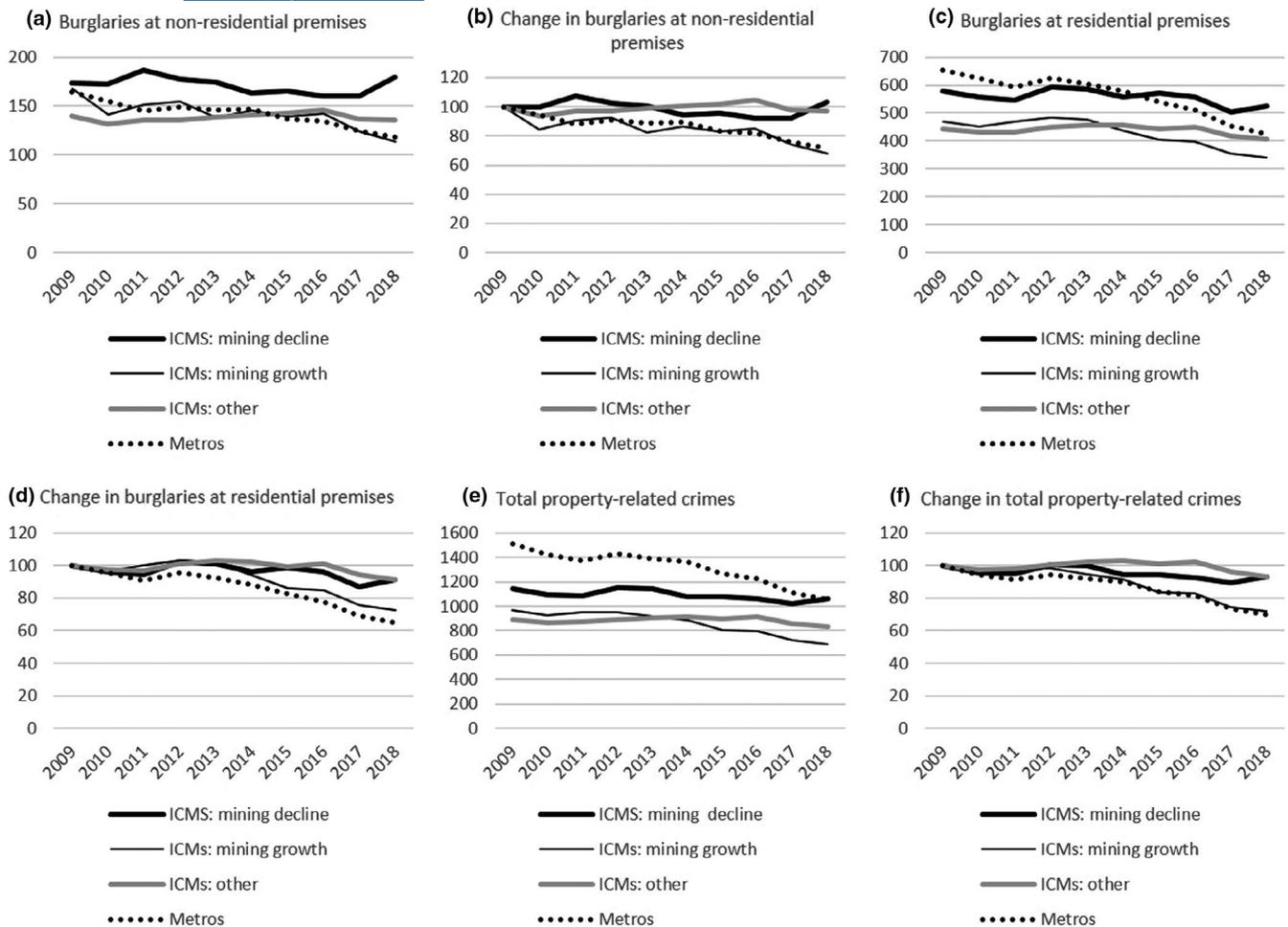


FIGURE 5 Property-related crimes, per 100,000 of population, 2009–18

programmes have borne fruit, though we would not want to make a firm statement about this without more detailed research. Maybe the more important point here is that most social programmes start when mining starts, but seldom continue when mines go into decline.

The high crime levels we found in the mining decline cities also contrasted with the international research. One of the main reasons for these crime patterns in South Africa has been government policy since the start of democracy in 1994. We think it is associated with a policy path dependency created by the national government. Apartheid policy enforced migrant labour and prevented black urbanisation. By the mid-1980s, the apartheid government had begun to make homeownership available to black people and the post-apartheid government continued the process, developing housing and settlement policies to make up for the previous unfair arrangements (Cloete & Marais, 2021). Two major steps it took were to dismantle the single-sex compounds and integrate mining and non-mining communities. Encouraging homeownership seemed the right way to repair the historical damage. The result has been rapid expansion of urban settlement in both mining growth and mining decline areas (Marais & De Lange, 2021; Marais et al., 2020). These policies have had the unfortunate effect of increasing people's attachment to homes in cities whose long-term economic prospects are slim. Mine closures since the mid-1990s have made place attachment a mistake. The shock of mine closure has been extensive. Non-mining jobs are hard to come by in these cities as mining seldom encourages the development of related industries (another form of path dependency). South Africa's policies for mine housing contrast strongly with international practice in countries like Australia, for example, where fly-in-fly-out arrangements mitigate the effects of local booms and busts (Haslam McKenzie, 2020).

The crime patterns we identified are also related to government and mining company unwillingness to think carefully about mine decline and closure (Sesele et al., 2021a). Growing the mining economy was at the heart of the original White Paper on minerals and mining. This White Paper did not pay sufficient attention to the implications of mine closure,

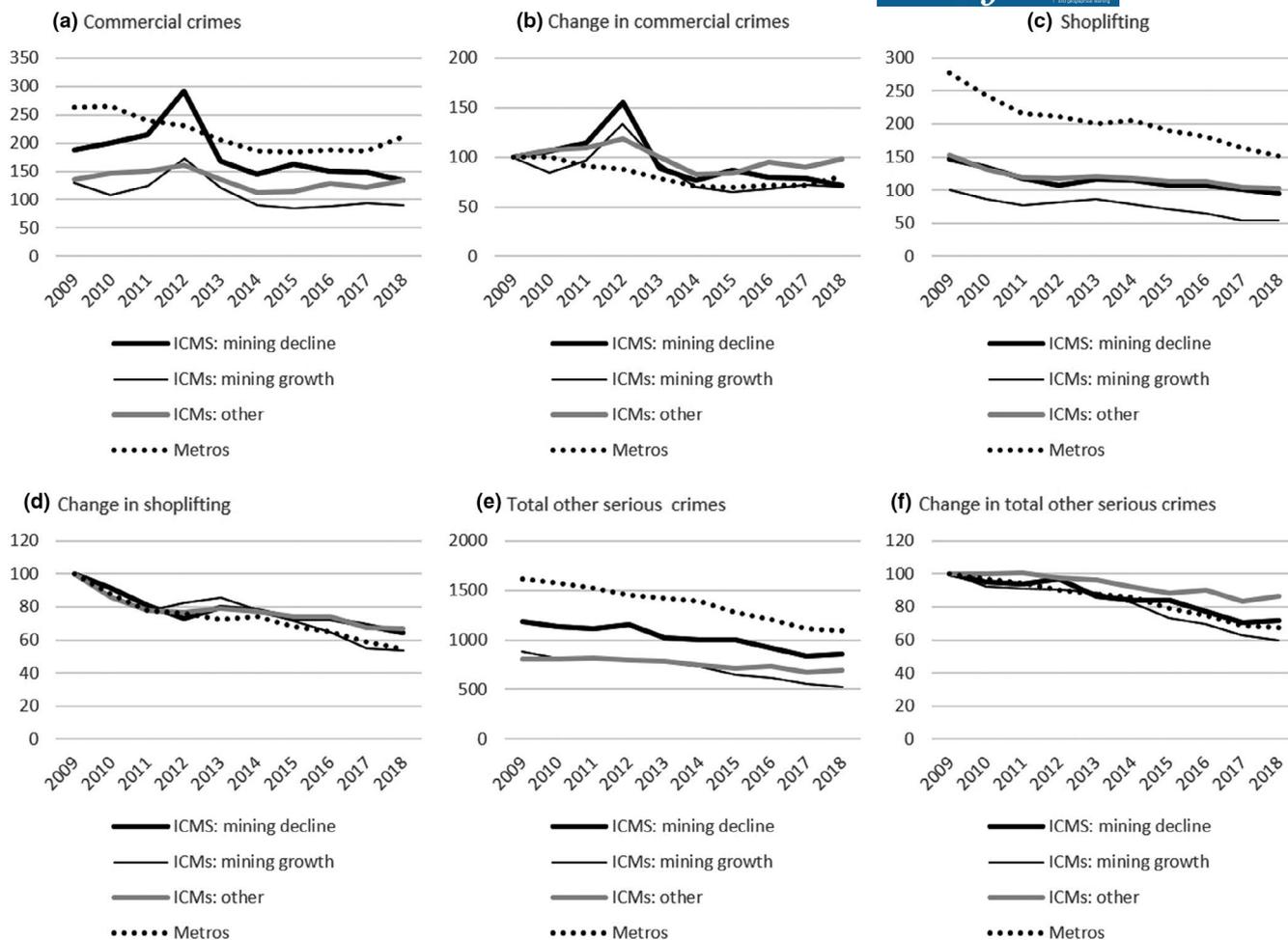


FIGURE 6 Other serious crimes, per 100,000, 2009–18

despite the rapid decline in gold production. Although it mentions possible mine closure and the potential regional effects, and says the government will “ameliorate the social consequences of sizeable downscaling and mine closure” (DME, 1998, p. 48), its general assumption is that local strategic planning by the mines and the municipalities can deal with concerns like finding alternative employment, retraining mine workers, and providing counselling services. Yet local strategies in South Africa seldom accept the reality of decline (Marais & De Lange, 2021) or take into account the relationship between mine decline and crime.

Like the White Paper, the Mineral and Petroleum Resources Development Act 28 of 2002 also did not pay much attention to the social aspects of mine closure but focused mainly on the environmental and financial concerns. It did, however, propose a mechanism to encourage collaborative planning when a mine closes: mining companies must draw up Social and Labour Plans, one of the components of which is a plan to save jobs and manage downscaling. In general, the guidelines focus on workers, but there is some reference to dealing with the adverse social and economic consequences of closure. The guidelines say little about the likely effects of mining closure or crime as a specific consequence. Although many municipal plans focus on economic diversification, Marais et al. (2021) are sceptical about the ability of South Africa’s smaller cities to find an alternative economic path beyond mining. Van der Watt and Marais (2021) are also concerned about whether local municipalities can manage mine decline by dovetailing local strategic plans with Social and Labour Plans.

The mining decline cities in our study were all former gold mining areas. It is unlikely that similar consequences will be applicable in other mining subsectors when closure does occur. There are three reasons why there is a relationship between gold mining and increased crime after closure. First, all four cities in the mining decline category came into being when the minefields developed after the Second World War and boomed in the 1980s. The period 1950–1990, under colonialism and apartheid, was a time of migrant labour, single-sex hostels, low-skilled workers and cheap labour. All four of these cities experienced mine decline from the mid-1990s. It is not easy to upskill low-skilled workers, and we think

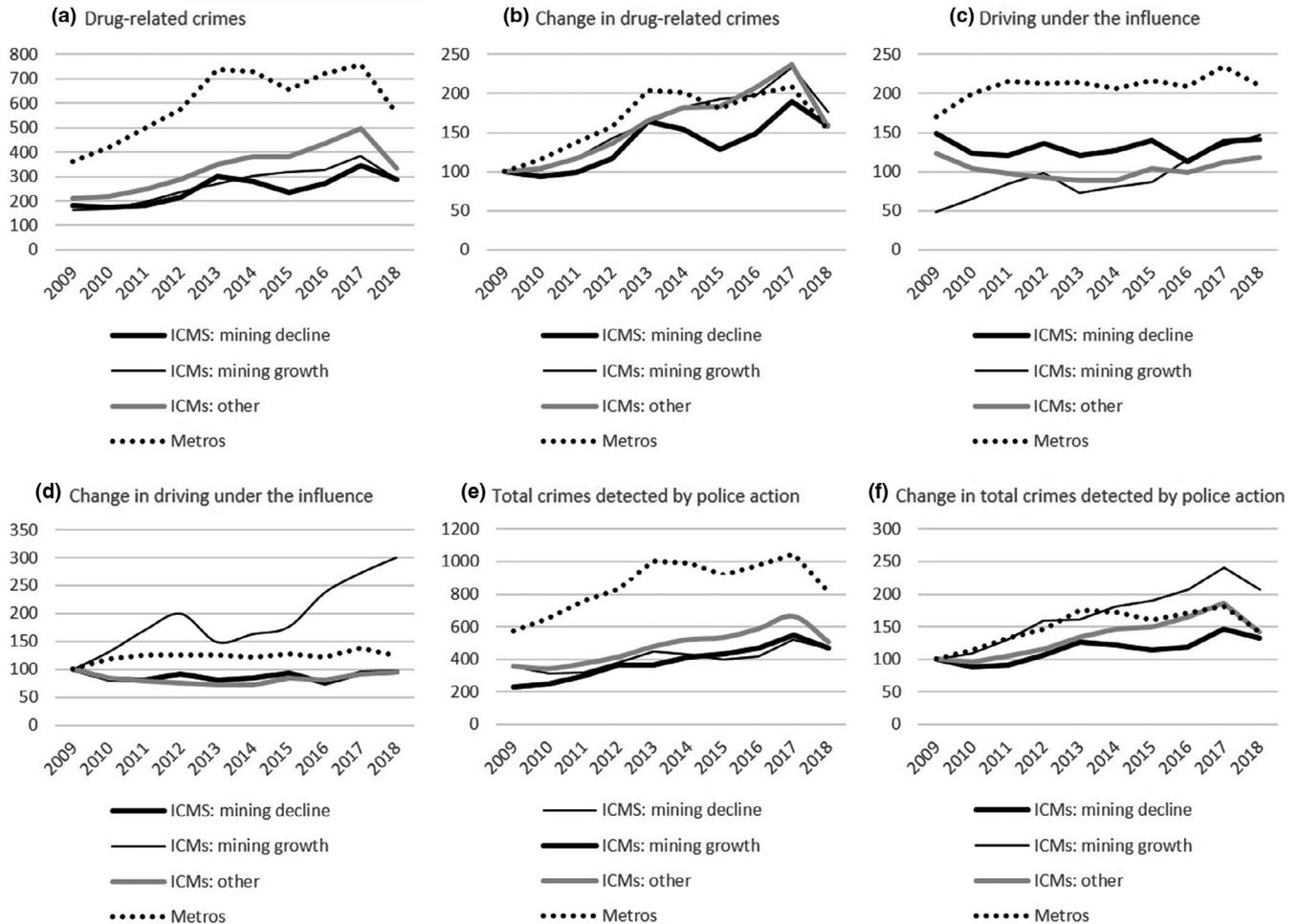


FIGURE 7 Crime detected as a result of police action, per 100,000 of population, 2009–18

the lack of skills makes it extremely difficult to find effective economic alternatives (see our argument made earlier about relatedness and path dependency). That is also why we think closure in other mining subsectors might be less disruptive as there has been substantial improvement in workers' skills recently. Platinum might follow the gold mining pattern, but the post-mining environment could be very different for coal, iron ore, and copper. It should not be assumed that what we found in the gold mining industry will automatically apply to other sectors. Nevertheless, the reality in gold mining areas requires adequate local responses. Secondly, mine closure has also resulted in extensive informal and illegal gold mining (Nhlengetwa & Hein, 2015). This illegal industry is one example of the long-term liabilities (path dependencies) created by mining. The illegal miners' presence contributes to crimes like property destruction, robbery and sexual offences. This is evidence of the disruption created by a mining boom continuing in a period of mine decline. Thirdly, our data hints at police inefficiency in the cities where mining is in decline: the figures for crimes detected by police action are lowest in these cities. We draw no firm conclusions about this—we have mentioned possible reasons such as understaffing — but it remains something that future research should investigate.

Two of the mining decline cities (Merafong and Mogale) are in the Gauteng province (South Africa's economic heartland, which includes Johannesburg, Pretoria and three metros), where crime rates are generally higher than in the rest of the country. The argument can easily be made that our results are not mining related but more clearly associated with the crime rates in Gauteng. We think this is not the case, for two reasons. Firstly, the proximity of the metros cannot be blamed, as the crime rates for these two small cities are generally higher than those for the metros. Secondly, the two cities in the mining decline category that are outside Gauteng (Matlosana and Matjhabeng) have higher crime rates. This shows that the influence of Gauteng on the crime figures in general is small.

Finally, the question is how our findings relate to current theoretical thinking about boomtowns and social disruption. We make three main points. First, the crime data we analysed shows very little evidence of social disruption in the small

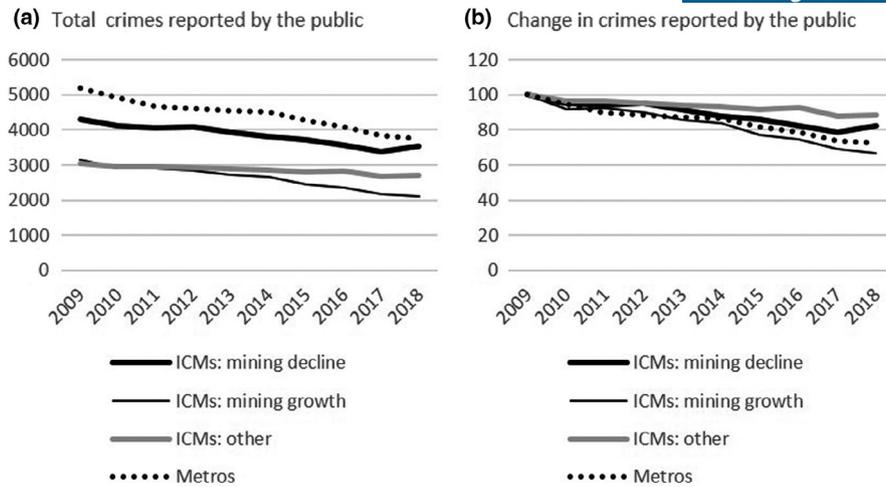


FIGURE 8 Total crimes reported by members of the public, per 100,000 of population, 2009–18



FIGURE 9 Comparison of ranking of cases per settlement type based on cases per 100,000 of the population, 2009–18 (scores from 1 lowest to 4 highest)

cities where mining is growing. The assumption in the international literature that mining booms encourage crime seems not to be valid. The data show that not all booms have negative social effects, and confirm the need for localised responses to mining booms and busts. Second, we found ample evidence that mine decline brings social disruption. This is also in contrast to findings of the international literature. And third, we dispute Ruddell’s (2017) claim that social disruption results from in-migration, the dominance of young men, an outmigration of existing residents and increased demand for housing. Our study shows, on the contrary, that social disruption can occur where population growth is low (or even negative in the case of Matjhabeng) and where the sex ratio has normalised.

## 6 | CONCLUSION

The global literature usually relates social disruption to mining growth rather than decline. Social disruption theory states that disruption results from rapid population and economic growth, an influx of young males, and pressure on social services. The social disruption literature uses crime statistics (and others) as proof of social disruption. Substantial evidence has been produced to show a link between growth in mining and an increase in crime. Where

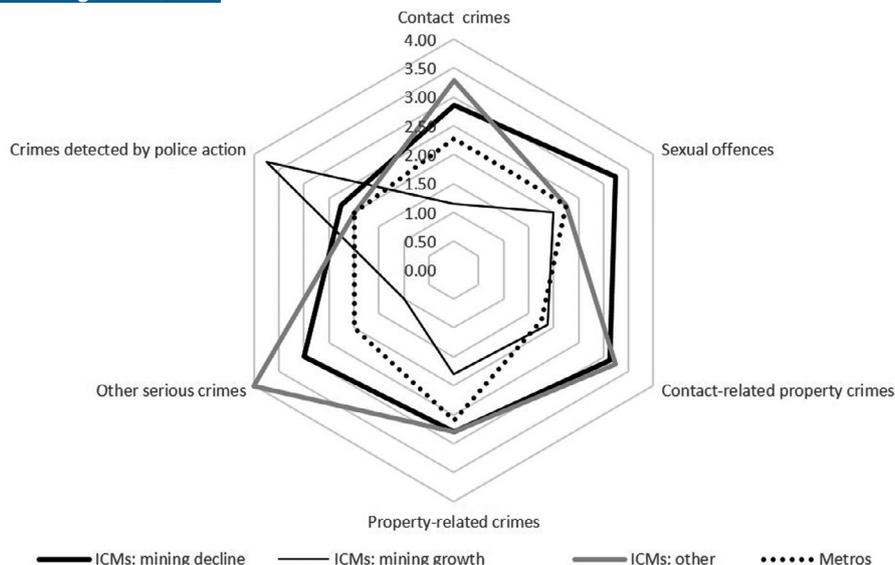


FIGURE 10 Comparison of ranking of growth of crime based on 100,000 of the population, 2009–18 (scores from 1 lowest to 4 highest)

research did attempt to link mine decline with crime, the empirical evidence did not support the connection (e.g., O'Connor & Ruddell, 2021). Our paper is the first to point to the role of mining decline in increasing social disruption and crime. We suggest that a focus on the consequences of decline could introduce the sixth phase of boomtown research.

We focused on South African small cities, known as “intermediate cities,” and compared the crime rates in those where mining is growing and those where mining is in decline with small cities not dominated by mining and with the eight metros. We looked at the main and subcategories of crime in South Africa in these four settlement categories from 2009 to 2018. The comparative approach, rather than a single case study, and the ten years of data fill notable gaps in social disruption research. Our paper makes three contributions. First, our evidence shows that mining decline contributes to social disruption. This has been happening in South Africa’s gold mining industry, where local organisations and institutions are not strong. We think that the Global South context of our study should encourage reconsideration of theoretical claims usually made in the Global North. We also think that our paper reveals only the tip of the iceberg and that more research will add to our discoveries and help in understanding these patterns. Secondly, our finding that crime levels are higher in areas that experience mine decline than in those where mining is growing — a contradiction of international research findings — points to the need for social disruption theory to include more empirical evidence and cover a much broader geographical scale. Thirdly, our evidence points to the complex causes of the relationship between mine decline and crime. These are rooted in post-apartheid policies that promote mining to create development and are responsible for the illegal mining industry continuing. We provide ample evidence of these dynamics in their local context, but we could find very little evidence of these dynamics being adequately responded to in local or national strategies for managing mine decline.

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## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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