The Mongrel Mob or Head Hunters? The association between neighbourhood-level factors on different types of gang membership in Aotearoa/New Zealand

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Abstract

Previous research has shown that gang members typically emerge from more socially disorganised neighbourhoods. What is less known however is whether members of different types of gangs emerge from the same types of neighbourhoods. In this study we use the social disorganisation theory as a framework to examine the spatial risk factors associated with two different types of gangs in New Zealand: outlaw motorcycle gangs (OMCGs), and New Zealand Adult Gangs (NZAGs). Overall, we found some consistency in spatial risk factors associated with gang membership by type in New Zealand however certain variables were significantly predictive of one type of gang membership but not of the other. The overall performance of our models also differed marginally depending on the type of gang being examined. In fact, our findings suggest some non-uniformity in the extent to which the various social disorganisation factors impact gang membership rates by type. The implications of this finding are discussed in the context of an ever-changing gang landscape in the country.

Keywords: gang membership; New Zealand; spatial regression; neighbourhood; gang

Introduction

Understanding the relationship between neighbourhood-level factors and the presence of gangs can help inform policy and policing responses to the problem of gangs, and gang-related crime and harm. Researching these relationships can shed light on the mechanisms by which gangs emerge, and enable police and partner organisations to identify where future gang activity could be expected based on changes in neighbourhood factors. A growing body of literature has sought to identify the spatial risk factors associated with gang membership (i.e., where gang members reside; Curry & Spergel, 1988; Pyrooz et al., 2010; Rosenfeld et al., 1999). However, most prior gang research has been concentrated in a relatively small number of countries (e.g., United States, Brazil and South Africa) (Curry & Spergel, 1988; Pinnock, 2016; Pyrooz et al., 2010; Rodgers & Jones, 2009; Rosenfeld et al., 1999) with much less known about gangs and their spatial aetiology outside these contexts.

Moreover, previous studies have tended to study gang membership as a single phenomenon, not disaggregating gangs by type. Gangs have different forms, structures, and functions unique to each type of gang which could have different neighbourhood-level drivers. Research by Weisel (2002) has found that different types of gangs have different identities and capacities for adaptation and transformation. Further, different gangs have different historical antecedents and their organisation and structure can vary considerably. As one of the first gang researchers, Frederic Thrasher (1927), observed almost a century ago: “no two gangs are just alike; [there is] an endless variety of forms.” So just as gangs emerge and evolve from different ethnic and cultural ties, it could be that they emerge from different types of neighbourhoods. Previous research has found how different types of gangs differ in terms of their risk to correctional systems (Ruddell & Gottschall, 2011), proclivity to violence (Pinnock, 2016) and organisational structure

(Von Lampe, 2016), among others. It could therefore be that the spatial risk factors predicting gang membership for one type of gang may also be different than the neighbourhood factors predicting the presence of another type of gang.

According to Maxson and Klein (1995; 2001) different types of gangs provide an indication of the area in which they exist; we therefore ask, could the opposite be true? A related but as yet unresearched question is what factors are associated with the presence of multiple different gangs at the neighbourhood-level? The present study addresses these issues by examining the spatial risk factors associated with different types of gang membership in the relatively under-researched context of New Zealand. Decker et al. (2013) argues that in order for macro-level gang research to 'move forward' researchers need to identify macro-level correlates of gang membership in contexts outside the United States. This paper represents a small step in this regard. The rest of the paper proceeds as follows. We first provide an overview of the literature on spatial risk factors for gang membership and the heterogeneity of gangs, followed by a history of gang types in New Zealand to provide context for the study.

Spatial risk factors for gang membership

Previous literature has identified a range of neighbourhood level factors associated with elevated levels of gang membership. Neighbourhoods that are economically disadvantaged (Dupéré et al., 2007; Pyrooz, 2014), highly mobile (Katz & Schnebly, 2011), racially and ethnically diverse (Pyrooz et al., 2010), and have low attachment/involvement (Glesman et al., 2009) have all been found to exhibit higher rates of gang membership. The general notion here is that the socio-structural conditions of neighbourhoods may encourage the formation and proliferation of gang activity. Tita et al. (2005) identified, what they termed, gang 'set space' in a study on violent urban

gangs in Pittsburgh, PA. According to the researchers, a gang 'set space' refers to micro-areas in neighbourhoods where a gang comes together to hang out. By interviewing gang members and having them identify the places where they come together the researchers were able to identify certain characteristics of micro-places that lead to increased gang involvement. Variables contained with the social control proxies of 'guardianship' (percent renting) and 'abandonment' (percent vacant properties) were among the most important in the development of set space. Relatedly, a study in the District of Columbia by Blasko et al. (2015) found that residents living in closer proximity to gang 'set spaces', within and beyond their neighbourhood, also reported more problems with unsupervised teen groups even after controlling for social integration.

Importantly, both these macro- and micro-level explanations of gang membership and location are often embedded within a theoretical perspective that emphasizes either structural control (Sampson et al., 1997; Shaw & McKay, 1942; Thrasher, 1927) and/or structural adaptation (Anderson, 1999; Fagan & Wilkinson, 1998). The former perspective, most often represented by the seminal social disorganisation theory (Shaw & McKay, 1942), posits that various macro-structural constructs (such as deprivation and neighborhood instability) creates a breakdown of informal social controls resulting in a social reorganisation, of which gangs are a product (Pyrooz et al., 2010). Previous research has found the social disorganisation theory to adequately explain the prevalence of gang membership in a variety of contexts. For example, Tita et al. (2005) found that increases in neighbourhood disadvantage (a central tenet of social disorganisation) corresponded to greater probabilities of gang members in Pittsburgh, PA while Katz and Schnebly (2011) found that neighbourhoods with higher levels of economic deprivation and social disadvantage also exhibited higher rates of gang members in Meza, Arizona. Research outside the US has been less forthcoming but includes Katz and Fox (2010) who found increased residential

mobility (another key tenet of social disorganisation) to be associated with gang membership in Trinidad and Tobago, while Breetzke et al. (2022) found higher deprivation and higher diversity to be associated with gang membership in New Zealand. Finally, a systematic review of youth gang membership in low- and middle-income countries by Higginson et al. (2014) found poverty and a lack of social capital to be among the most important community-level factors associated with gang membership.

The latter structural adaptation perspective argues that gangs are simply an adaptation to prevailing social and economic conditions that limit legitimate opportunities in the pursuit and competition for status and economic resources. Gangs, therefore, emerge in response to the underlying environmental conditions. Despite their differences, both perspectives have social and economic disadvantage at their heart with individuals residing in more deprived and disadvantaged neighbourhoods being more exposed and less able to adapt to resident networks that propagate gang behaviours. In their most recent work Decker and colleagues (2022) argue that regardless of the underlying neighbourhood conditions the key to understanding gang membership is to place gang members within the broader context of the social institutions within which they interact; these include their families, schools, the labour market, the political system and their religion. So, while gangs may inherently be 'neighbourhood-based entities' (Lopez-Aguado & Walker, 2021), the key to understanding the lives of gang members is to place them in the broader context of social institutions within which they interact. It is, therefore, not only the underlying socio-economics alone that can be used to explain the unequal distribution of gang members in space but a combination of broad dimensional domains of which macro-level factors (the focus of this research) are but one.

Gangs in New Zealand: types and origins

For a country rated as the second most peaceful in the world (Institute for Economics and Peace, 2019), New Zealand has a large and growing number of gangs and gang members[1]. Recent statistics from New Zealand Police report that the number of gang members has increased in the country by almost 30% from 4975 in 2017, to 6375 in 2019[2] driven largely by large-scale recruitment into the two largest gangs in the country - the Mongrel Mob and Black Power. If consistent with international research (see Pyrooz & Sweeten, 2015), the number of gang members are, however, most likely under-representative of the true prevalence of gangs in the country. There is also a diverse range of gangs in New Zealand, from outlaw motorcycle clubs to Los Angeles (LA)-style street gangs to white power or skinhead gangs.

The history of gangs in New Zealand begins with the establishment of the Auckland chapter of Hells Angels in 1960. The chapter was just the fourth anywhere in the world (Newbold, 1992) with the other three chapters all forming in California (Lavigne, 1987). This occurred due to an American Hells Angels associate migrating with his parents to New Zealand, and fundamentally changed New Zealand's nascent youth gang scene. The style and structure provided by the Hells Angels was soon copied by other groups of the motorcycle riding 'milk bar cowboy' subculture in New Zealand, and as a result by the late 1960s most of the mainstays of the outlaw motorcycle club scene in New Zealand were established.

Initially these outlaw clubs were dominated by Pākehā (New Zealanders of European heritage) (Gilbert, 2013), and while some groups – particularly in the more populated and multi-cultural North Island -welcomed other ethnicities and at least one was formed predominantly by Māori in the 1980s (the Tribesmen). These outlaw motorcycle club gangs (OMCGs) had a presence throughout the country, and most major urban centres had at least one. The outlaw motorcycle

clubs were soon to be dwarfed in membership numbers by a new form of street gang that formed in the late 1960s and early 1970s dominated by youths of New Zealand's indigenous people, Māori. These groups adopted the back patch as well as the hierarchical structure of the outlaw clubs – or 'bikies' as they were then known – however there were often significant hostilities between these outlaw clubs and the new patched street gangs. Indeed, because the 'bikies' were seen as the enemy, some of the patched street gangs deliberately changed some of the groups' common terms to disassociate themselves; for example, presidents were called captains and prospects (prospective gang members) were called initiates. The largest of the patched street gangs were the Mongrel Mob and Black Power, with Mongrel Mob being the larger of the two. These two rival groups – that were near constantly in conflict – established footholds most often in socio-economically deprived ethnic enclave communities around the country and used this position to recruit disadvantaged young men in vast numbers, quickly becoming by far the largest gang type in New Zealand, something that remains the case today (Gilbert, 2013).

Following economic reforms initiated in 1984, that hit many small communities hard, the problems of gangs began to impact rural communities too. Gangs, often seen as an urban phenomenon, became intrenched in small town communities. Until the mid-1990s, the issues with these gangs were primarily related to intergang violence and sexual offending ('blocking'), but since then the concern has been around organised crime, almost exclusively in the drug trade. Initially this focused on the production and distribution of cannabis. Rural areas produced the crops for distribution in the cities, which was often by way of 'tinnie houses' where small amounts of cannabis were sold in wrapped in tinfoil. By the early 2000s, what had hitherto been a march of evolutionary development began to reverse. Membership of most of the outlaw clubs began to shrink, with some losing clubhouses and others folding entirely. Generational barriers became

important, and rebellious youth began to seek new outlets. Many youths took to the streets in heavily modified Japanese cars instead of the Harley Davidson motorcycle, as the outlaw clubs began to look old and outdated, no longer relevant or appealing to younger people. Similarly, many of the patched street gangs aged with limited renewal. The age, sartorial style, and music choices were suddenly out of touch with hip-hop focused youth. New youth gangs in the style of Los Angeles's infamous Bloods and Crips began to form in significant number in the main centres of the country, particularly in the North Island. While many flared and faded away, some gained significant longevity – such as the Killer Beez – and have become mainstays of the transforming New Zealand gang scene.

While the first decade of the 2000s were a time of great retraction in the traditional patched gang scene – particularly the outlaw clubs – this downturn was only temporary. The signal of a resurgence was the establishment of the Rebels, Australia's largest outlaw club. The groups used a number of Tribesmen from Northland and Auckland who patched over to become Rebels, who in turn established a number of chapters through New Zealand. The injection of the Rebels shocked a number of the existing gangs into life and they began to recruit more actively. The Hells Angels, the Head Hunters, and the Mongrel Mob all grew substantially. A further swelling of the ranks stemmed from internal political maturations in neighbouring Australia. In the 2010s Australia began using section 501 of its *Migration Act* to cancel the visas of resident New Zealand citizens who were deemed to fail a 'character test', which resulted in many gang members being deported to New Zealand (Gilbert & Martin, 2019). This had a significant effect on the country's gang scene, with an influx of members who had been hardened to Australia's more violent and profit-driven gang scene returning to establish local chapters of gangs such as the Comancheros and the Mongols. These groups have been involved in a number of high profile organised criminal activity

in the drug trade – particularly methamphetamine – something that existing gangs of all types had become synonymous with in the 2000s (Gilbert, 2013). The resurgence in the patched gang has revitalised the scene with the growth in gang numbers creating significant concern both for New Zealand Police and for the country in general.

Despite much anecdotal evidence, the spatial risk factors associated with gang membership in New Zealand – and indeed, across much of the developed world - are largely unknown although there have been past indications that gangs are located in more socially disorganised neighbourhoods of the country (Bradley, 2020; Nakhid, 2012). The New Zealand Ministry of Social Development (2006) have also noted that gangs are more likely to grow in socio-economically depressed communities. Much less is known about whether different neighbourhood-level factors predict different gang types.

The current study

In this national level study, we identify the spatial risk factors for the presence of different types of gangs in New Zealand. We do this by first identifying a number of variables that have previously been found to be associated with gang membership in other contexts, and then running a series of spatial regression models. Previous research in New Zealand has shown how certain risk factors, notably higher deprivation and higher diversity, predict neighbourhood-level gang membership in general (see Breetzke et al., 2022) however this work does not consider the fact that different gangs may emerge from different types of neighbourhoods. Indeed, not all gangs are the same; a finding that Thrasher (1927) found almost a century ago in his landmark study of 1,313 gangs in Chicago. To our knowledge this is the first study ever to examine the association between various neighbourhood-level factors on *different types* of gang membership. The residential-identifiable

national data on gang members obtained from New Zealand Police (outlined below) is unique and allowed for a more detailed examination of gang membership than what has previously occurred in other contexts. Indeed, these data also allowed for a greater exploration into the spatial aetiology of gangs than what could be obtained using aggregated gang data most commonly employed in previous studies. At the neighbourhood level it is well-known that gangs as a whole are more likely to emanate from certain types of neighbourhoods (Glesman et al., 2009; Hill et al., 1999; Dupéré et al., 2007; Pyrooz, 2014) however what is up until now largely unknown is whether certain neighbourhood-level factors uniformly reflect different types of gang membership. These data allow us to fill this gap and in doing so, further disentangle the nature of the relationship between 'the neighbourhood' and gang membership.

Data and methods

Gang membership

Data on gang members used in this study were obtained from two sources: the National Gang List (NGL), and the National Intelligence Application (NIA) crime database. The NGL is maintained by the Gang Intelligence Centre (GIC) which is a multi-agency body that brings together information held by a number of governmental institutions in New Zealand including Corrections, Internal Affairs, Immigration and Police. The GIC draws on information from these various government agencies in order to build detailed intelligence about harm being caused by, to, and within the gang environment. Among the information held by the GIC is a list of individuals confirmed to be gang members or prospects. This list of known gang members is verified via a multi-step verification process. First, when police officers identify an individual as being a possible gang member or associate, they create a notification in the National Intelligence Application (NIA)

crime database. Among other data, the NIA database contains information about crimes reported to New Zealand Police, the individuals involved, and information about those individuals such as addresses and demographic details. For the NGL version extracted for this study, notifications were passed on to the GIC which sought to verify gang membership/association.[3] The information sources used for verification include photos provided to New Zealand Police staff by gang members. In accordance with the relevant legislation (*Prohibition of Insignia Act 2013*), gang membership is positively verified by the wearing of gang colours or paraphernalia.[4] Usually this involves a leather vest and gang patch or displaying gang membership via a tattoo although not exclusively. Furthermore, New Zealand Police would assume gang membership because the individual in question:

1. Admits gang membership or association
2. Has tattoos indicating gang membership
3. Wears gang symbols to identify with a specific gang
4. Name is on a gang document, hit list, or gang-related graffiti
5. Is identified as a gang member by a reliable source

New Zealand Police would not assume membership where the individual:

1. Is observed to associate on a regular basis with known gang members
2. Is in a photograph with known gang members and/or using gang-related hand signs
3. Arrested in the company of identified gang members or associates
4. Corresponds with known gang members or writes and/or receives correspondence about gang activities
5. Writes about gangs (graffiti) on walls, books, and paper

The verification process also involves the use of demographic information for each individual, including their date of birth, and name. As of 22 January 2019, there were 6336 gang members recorded in the NGL.[5] The current primary addresses of these gang members were then extracted from NIA. Where the address was identified as a prison, a pre-imprisonment address was identified through manual searches in NIA. If there was no pre-imprisonment address provided, the gang member was excluded from the analysis. Addresses entered as 'no fixed abode' were also excluded. The final sample included 6097 gang member addresses.

These 6097 gang members were initially divided into three separate groups based on the type of gang of which they were a member: outlaw motorcycle gangs (OMCGs), New Zealand Adult Gangs (NZAGs) and the so-called 'Early Gangs'. These categories are not formally used by New Zealand Police per se but are a taxonomy created by Tibby (2018) in his research on gangs in the country. Tibby's taxonomy was constructed based on internal New Zealand Police (NZP) expertise regarding the make-up and behaviour of different gangs in the country. This involved consultation with NZP-internal experts including frontline specialists, and comparison of the size of different gangs to their 'recorded activity' in terms of rates of offending. As outlined previously, OMCGs (n = 808) are considered to be traditional-style, structured motorcycle gangs with a wide reach across the country. They are most often part of associated international chapters and have previously been found to be heavily involved in organised crime, especially in New Zealand (Gilbert, 2013). Examples in New Zealand include the Head Hunters, Hells Angels and Bandidos, among others. In contrast, NZAGs (n = 5159) are extremely location-based, and typically form around familial and friendship groups, and tend to be predominantly Māori or Pasifika. Among the more prominent are Black Power, and the Mongrel Mob. The activities of NZAGs are likely to be similarly structured as OMCGs (i.e., drugs, violence, and market-control behaviours), but

NZAGs act differently from OMCG members operating in the same neighbourhood (Gilbert, 2013). They also lack the international organisation that characterizes the OMCGs. Finally, the 'Early Gangs' (n = 130) have been around since the mid-1950s and are similar to OMCGs and NZAGs but aging membership means they are not as large or effective and are generally less active. A large number of these gangs have also been 'patched over' by larger OMCGs in the past few years and are slowly ebbing away (Gilbert, 2013). Historical examples of this type of gang include the Hu Hus, Lone Legion, Epitaph Riders, and the 45s, among numerous others. This group was excluded in the final statistical analysis due to its low prevalence (approximately two percent of the total number of gang members). No gang member was noted as being in more than one gang.

The distribution of gangs by region in New Zealand is shown in Table 1 below. Regions in the country with the highest rates of all gang members are located in the North Island of the country and include Hawke's Bay and Bay of Plenty. In fact, almost 90% of gang members in New Zealand are located in the North Island. In terms of the distribution of different types of gangs, the spatial trends vary with Gisborne exhibiting the highest rate for NZAGs followed by Hawke's Bay and Bay of Plenty while for OMCGs, the highest region is Bay of Plenty followed by Northland and Waikato.

Table 1: The rate of gang members by region in New Zealand per 100,000 population

Region	Overall rate per 100,000 pop	OMCG rate per 100,000 pop	NZAG rate per 100,000 pop
Auckland (NI)	52,40	19,81	72,21
Bay of Plenty (NI)	305,00	34,73	339,73
Canterbury (SI)	46,70	17,73	64,43
Gisborne (NI)*	-	S	501,99
Hawke's Bay (NI)	353,92	9,15	363,06
Manawatu-Wanganui (NI)	117,72	23,94	141,66
Marlborough (SI)	60,85	8,11	68,97
Nelson (SI)	54,31	16,85	71,16
Northland (NI)	137,49	33,32	170,81
Otago (SI)	32,58	8,77	41,35
Southland (SI)	31,50	8,86	40,35
Taranaki (NI)	107,23	13,81	121,04
Tasman (SI)	29,14	9,11	38,25
Waikato (NI)	130,74	24,50	155,24
Wellington (NI)	83,93	11,64	95,57
West Coast (SI)*	-	S	40,00

S Data is suppressed due to small counts (<4) of gang members in the region
* Given the suppression of data for Gisborne and the West Coast it is not possible to calculate the overall rate for these regions
NI: North Island; SI: South Island

The physical addresses of the remaining 5967 known gang members were subsequently address-matched to Census Area Units (CAUs) and the rate of members of each gang type per 1000 population per neighbourhood was calculated. CAUs approximate neighbourhoods in New Zealand and have residential populations of between 3000 to 5000. There were a total of 2004 CAUs covering the whole country, but 155 neighborhoods had a low number of residents (<50) and these were excluded in subsequent analysis. Statistics New Zealand prohibits the dissemination of census data in CAUs with low population numbers. No gang members were located in any of these 155 neighbourhoods. Of the remaining 1849 CAUs, almost two thirds (n = 1192) had at least one type of gang member residing in them. The rate of gang members by type acted as the outcome variable in the analysis.

We also examined another outcome variable – a gang diversity index – which provides a measure of gang diversity (of specific gangs) at the neighbourhood level.[6] The index was created

using Simpson's Diversity Index ($D = 1 - \sum p^2$) (Simpson, 1949) where p_i is the proportion of neighbourhoods with each gang type. The index considers the number of underlying phenomenon present (in this instance, gangs), as well as the relative abundance of each phenomenon. A neighbourhood dominated by one gang is considered to be less diverse than one in which several different gangs are present. The value of D ranges between 0 and 1 with 1 representing infinite diversity and 0, no diversity. The index has been commonly employed in the criminological literature to examine a range of topics ranging from the impacts of diversity on burglary crime (Gulma et al., 2019) to ethnic diversity in policing (Guajardo, 2016). Morris and Worrall (2014) also developed a gang composition index reflecting the diversity of prison gangs in their research examining the effect of prison architecture on inmate misconduct in prisons in Texas. Given the dataset at our disposal, we were also interested in examining whether any of the spatial risk factors associated with individual gang types in New Zealand also exhibited a relationship with gang diversity.

Neighbourhood level factors

We were largely informed by the social disorganisation theory of Shaw and McKay (1942) when operationalising our predictor variables. The well-known theory motivates that social disorganisation within neighbourhoods affects family structures and stability which eliminates the conventional controls that regulate criminal behaviour. Neighbourhood-level crime activity is largely dependent on a number of central tenets of the theory including socioeconomic deprivation, ethnic heterogeneity, family disruption, and residential mobility. Data representing these tenets were collected at the CAU level of aggregation, which prior research has consistently used as an operationalisation of neighbourhood in the country (Breetzke & Pearson, 2015; Lovasi et al.,

2014). The general notion here is that the presence of these socio-structural variables may increase the likelihood of various types of gangs emerging within a neighbourhood. We were also interested in determining whether the same variables predict the same types of gangs at the neighbourhood level.

We measured socio-economic deprivation using percent unemployed and NZDep, a standardised deprivation index commonly used in New Zealand comprising nine variables including income, access to transport and communication services, home characteristics, and education among others (see Atkinson et al., 2014 for details of its construction) - the higher the score the higher the deprivation. The NZDep has been a frequent inclusion in past research of spatial crime-related distributions in New Zealand (Breetzke, 2020; Day et al., 2012). The remaining variables representing social disorganisation theory include ethnic heterogeneity: measured using percent foreign born, and a diversity index (DI) (see Meyer & McIntosh, 1992) calculated as follows:

$$\text{Diversity Index} = 1 - (E^2 + M^2 + A^2 + P^2 + MELAA^2)$$

Where E is the proportion European, M is the proportion Māori, A is the proportion Asian, P is the proportion Pacific people, and MELAA is the proportion Middle Eastern/Latin American/African populations. The value of the index after this initial calculation ranged from 0 (when the neighbourhood consists of a single racial group) to 0.80 when the neighbourhood has equal proportion among the five groups. In the final calculation we normalised the index (using 0.80 as the normalisation factor) so that it ranged between 0 and 1. The closer the value is to 1, the more diverse the neighbourhood. The DI was then multiplied by 100 in order to deal in whole numbers (ranging from 0 to 100), rather than decimals.

Residential mobility was the percent renting; the young male population was measured as the percent of persons that are male, and percent aged between the ages of 15 and 29 (Gruenewald & Remer, 2006; Phillips, 2006). Young males were included as these sub-populations have both found to be targeted by gangs for recruitment both internationally (Decker & Van Winkle, 1996; Windle & Briggs, 2015) and in New Zealand (Ministry of Social Development, 2006).

Finally, we supplemented the social disorganisation variables with the rate of on- and off-site alcohol outlets per 1,000 residents in the neighbourhood. Previous scholarship, both internationally and in New Zealand, has found an association between the density of alcohol outlets and various crime outcomes, suggesting that the presence of alcohol outlets in neighbourhoods may encourage social disorder and crime (Day et al., 2012; Grubesic & Pridemore, 2011; Nielsen & Martinez, 2003). We are unaware of any macro-level studies that have specifically examined the relationship between alcohol access and gang membership. The descriptive statistics for the outcome and predictor variables used in the analysis are presented in Table 2.

Table 2: Descriptive statistics

	Min	Mean	Max	SD	Moran's I
Dependent variables					
OMCG rate (per 1000 population)	0	.42	74.71	2.17	.02*
NZAG rate (per 1000 population)	0	5.08	316.67	15.82	.09*
Gang Diversity index	0	.09	.67	.18	.09*
Independent variables					
% Unemployed	0	4.29	17.36	2.35	.336**
NZDep	850	995.07	1350	78.57	.281**
% Renting	0	31.74	95.35	13.29	.247**
Diversity index (DI)	0	38.13	76.39	16.42	.564**
% Foreign born	0	19.7	68.08	11.38	.746**
% Males	38.94	49.05	71.26	2.75	.138**
% Aged 15-29	3.85	18.49	95.51	7.52	.329**
Alcohol on-site rate (per 1000 population)	0	2.34	435.13	13.13	.033*
Alcohol off-site rate (per 1000 population)	0	1.25	89.82	3.69	.059*

* Significant at 5%
** Significant at 1%

Analytical approach

Spatial regression models were used to explore associations between the predictor variables described above and the outcome variables reflecting each gang type and gang diversity. A spatial regression model was preferred in this study due to the problems that arise when using traditional OLS regression with spatial data (see Chainey & Ratcliffe, 2005). These relate mainly to the lack of independence of observations in a spatial context (see Steenbeek & Ruiter (2021) for the theoretical reasons for using this type of regression in spatial criminology). Similar studies employing this technique include Katz and Schnebly (2011); Huebner et al. (2016); and Laurin (2011). Exploratory spatial data analysis (ESDA) performed on the data including global indicators of spatial clustering (i.e., Moran's I), which showed significant spatial dependence in the distribution of gang membership across all gang types (see Table 2). This evidence of significant spatial clustering motivated model estimation using spatial regression. Finally, because the analysis includes a number of possibly multicollinear covariates, a correlation matrix was constructed for the predictor variables (see Table 3). Whilst a number of correlations were high and do pose a risk of collinearity in the spatial statistical modelling process, only two of the correlation coefficients were greater than 0.70 - a common threshold for concern - while all variance inflation factors were below 4. The general functional form of the spatial regression (lag) model used is:

$$y = pWy + X\mathrm{B} + \varepsilon$$

where y represents the number of gang members by type per 1000 population, Wy is the weighted mean of the local values of y in neighbouring areas, p is the parameter, X is the set of motivators, B is a vector of coefficients to be estimated and ε is the error term. Spatial autocorrelation is

Table 3: Correlations for the predictor variables

	x1	x2	x3	x4	x5	x6	x7	x8	x9
x1: % Unemployed	1								
x2: NZDep	.81	1							
x3: % Renting	.53	.60	1						
x4: Diversity index (DI)	.67	.58	.58	1					
x5: % Foreign born	.11	-.13	.24	.43	1				
x6: % Males	-.15	-.12	.02	-.16	-.15	1			
x7: % Aged 15-29	.40	.25	.03	.48	.39	.03	1		
x8: Alcohol on-site rate (per 1000)	.04	.06	.02	.03	.15	.09	.14	1	
x9: Alcohol off-site rate (per 1000)	.01	.10	-.02	-.06	.15	.16	.06	.80	1

Table 4: Results of spatial regression analysis

Variable	Model 1: OMGC	Model 2: NZAG	Model 3: Gang Diversity
Lag	.154 (.040)**	.284 (.039)**	.231 (.041)**
% Unemployed	-.042 (.032)	.256 (.247)	-.001 (.004)
NZDep	.003 (.001)*	.024 (.001)	-.001 (.000)**
% Renting	-.013 (.005)*	-.006 (.039)	.000 (.001)
Diversity index (DI)	.011 (.003)	.109 (.029)	-.002 (.001)**
% Foreign born	.003 (.001)	-.1.09 (.035)**	.001 (.001)
% Males	-.007 (.005)	.202 (.109)**	.004 (.002)*
% Aged 15-29	-.003 (.001)	.008 (.059)	-.000 (.001)
Alcohol on-site rate (per 1000)	.103 (.005)**	.181 (.037)**	-.001 (.001)
Alcohol off-site rate (per 1000)	.046 (.017)**	1.728 (.135)**	.007 (.002)**
Pseudo R^2	.472	.400	.226

Standard errors in parenthesis
Coefficients are unstandardized
* Significant at 5%
** Significant at 1%

modeled using second-order rook's movement for neighbourhood adjacency definitions in construction of the weights-standardised w_{ij} matrix.

Results

Table 4 shows the spatial regression results for the analyses of gang membership by type for New Zealand. A total of three spatial regression models are estimated. The first two models present the results from analysis estimating the impact of the identified socio-structural explanations of gang membership on the two different types of gang membership rates across New Zealand while the third model examined the impact of the same risk factors on Gang Diversity.

In model 1 (OMCG) two of the social disorganisation measures were supported with deprivation and percentage renting being statistically significantly associated with OMCG membership, although the latter was in the opposite direction of what was expected. Thus, consistent with social disorganisation theory, neighbourhoods with greater levels of deprivation tend to have greater OMCG gang membership rates. On the other hand, greater mobility was associated with decreased rates. Statistically significant relationships were also found for both measures of alcohol availability. In model 2 (NZAG), of the variables representing social disorganisation theory, the percent male was found to be positively significant, as expected, but percent foreign born was significant but in a negative direction. Significant positive relationships were again found for measures of alcohol availability. Finally, in model 3 (Gang Diversity) deprivation and diversity were found to be negatively significant while the percentage of males and the off-site alcohol outlet rate were positively significant.

Three final results are worth noting. First, the performance of the gang type membership models suggests that the nine selected predictor variables do a satisfactory job in modelling the variance of OMCG and NZAG gang membership in neighbourhoods, although less so with Gang Diversity. Second, there is some consistency in spatial risk factors predicting gang membership across the gang type membership models but also some notable differences too. Access to alcohol was also positive and significant in models 1 and 2 however the remaining significant variables differed by gang type. This suggests that different spatial risk factors may play a role in the facilitation of gang membership by type in New Zealand. Third, the spatial lag variable was significant across all three models which suggests that spatial dependencies exist, confirming the clustering of gang membership and gang diversity across the country.

Discussion

Our results are consistent with the research considering gangs in general which has similarly found that an increase in deprivation (model 1) (Katz & Schnebly, 2011; Breetzke et al., 2022) for example, has been associated with higher rates of gang membership at the neighbourhood level. Other results were, however, mixed, with certain variables significant in one model (e.g., percent renting in model 1) but not significant in model 2 and vice versa. Different types of gangs are known to have different group processes (Lauger, 2019), income generating opportunities (Pedersen, 2018), propensities to engage in violent acts (Klein, 1995). They have also been found to exhibit different individual-level risk factors (Pedersen, 2018). The results of this research indicate these two different types of gangs have some different spatial risk factors, at least in a New Zealand context.

The findings of the models also indicate that the social disorganisation theory itself was not applicable in explaining gang presence in New Zealand. Only one of the seven social disorganisation variables were significant and in the expected direction in models 1 and 2. These were the measure of deprivation in model 1 and the percentage males in model 2. In both instances, however, the effect sizes were small. An explanation for the lack of association found for the theory is the fact that just because a gang member resides in a neighbourhood does not mean that they necessarily operate there. Indeed, gang members may be 'operating' (i.e., conducting criminal enterprise) in areas distinct and distant from where they live and may have a more visible presence in other neighbourhoods. The social disorganisation factors may explain the presence of those activities (i.e., less social control means more able to conduct illicit business and commit crime) but not of their origin.

Overall, more significant results were found for the variables representing alcohol availability. The finding of a positive association between gang membership across both types and the availability of alcohol is not surprising. A large body of literature has examined the complex relationship between alcohol and gangs (Suh et al., 2016; Swahn et al., 2010). Indeed, alcohol is considered endemic in the lives of gang members. Hunt and Laidler (2001) found that not only is alcohol an integral and regular part of socialising within gang life, but consuming alcohol works as a social lubricant, or social glue, that maintains the cohesion and social solidarity of gangs as well as affirms members' masculinity and male togetherness. The results of this research indicate that access to alcohol may not only contribute to a range of other societal harms in New Zealand including crime (Day et al., 2012), antisocial behaviour (Kypri et al., 2008) and vehicular accidents (Mathieson, 2005) but may also play a pivotal role in the development of gangs themselves. Of course, it could be that the causal arrow goes both ways and that gang members may gravitate to

neighbourhoods with easier access to alcohol. Future research could aim to investigate whether this reciprocal relationship between alcohol access and gang presence exists.

Whilst the overall results indicate that an explanation for gang membership trends in New Zealand could potentially include measures of social disorganisation, the evidence indicates that the effects of the socio-structural explanations do not traverse gang membership lines. Rather the findings suggest non-uniformity in the extent to which the various social disorganisation factors impact gang membership rates by type, if they even influence them at all. Of course, it is important to note that the gang data derived from the NGL and NIA databases on gang membership is cross-sectional, representing a snapshot in time of current police records. As a result, we are unable to make any inferences regarding longitudinal trends with respect to these spatial risk factors. Nor do we make any assertions regarding the impact that these risk factors have on gang involvement across the life course. The gang data was also collected for operational not research purposes and are therefore subject to human error in entering data. However, care is taken with the NGL in particular to ensure records are accurate and up to date.

Policy implications and future research

The variation in spatial risk factors found by type of gang raises an important issue in gang-related research: that is, the aggregation of gangs into a one-size-fits-all category. This practice is done for a number of reasons that range from low gang type membership counts (as occurred in this study for the 'Early Gangs'), to confidentiality, to the form of data provided to researchers undertaking analysis. Despite the quality of gang data improving over time, this practice is ongoing with implications for policy. Indeed, the results of this research indicate that a policy prescription for addressing motor cycle gangs needs to be different from a policy prescription for street gangs for example. While much of this is known, our study represents the first empirical evidence, to our

knowledge, to motivate for the use of different policy measures to address the emergence of different gang types at the neighbourhood level. Historically community responses to gang presence in neighbourhoods in New Zealand have been largely monolithic focussing on gangs as a whole. From the Polynesian Youth Forum in the 1970s (1972) to the New Zealand Department of Corrections' Gang Strategy (2017) almost forty years later, reports and strategies that have been released and implemented most often view gangs as a single entity. The results of this research indicate that the typical strategies highlighted in these documents and outlined by previous researchers (see Spergel & Curry, 1993) including suppression, organisational change, and community mobilisation among others need to be tailored to suit a particular type of gang.

Finally, a number of avenues for future research have emerged in this study. We believe that the role of the built environment (more broadly) could play a role in gang membership. In this research we highlighted the importance of alcohol outlets in engendering gang presence but the presence of other facilities such as marae, community centres, and churches among others could also have a role to play. We also believe that would be some value in examining resilience to particular types of gangs since there are different predictors for different types. It could be that some neighbourhoods 'overachieve' in terms of gang membership rates given the underlying socio-demographics of the neighbourhood. Further, adding some qualitative research components to the existing approach (i.e., focus groups, interviews) may provide greater elucidation of the underlying ways in which the neighbourhood factors impact gang membership. As previously mentioned, the social institutions that are inherently part of neighbourhoods, may also play an important role in gang membership and this would more likely be highlighted using qualitative methods.

In summary, gangs are not a homogenous phenomenon and cannot be considered in isolation from the neighbourhoods in which they reside. In many ways they are a product of their neighbourhood. By identifying a range of spatial risk factors for gang membership stratified by gang type we believe that we have made a contribution that could be fed into existing and new policies aimed reducing this growing problem in the country.

Notes

1. According to the *Prohibition of Gang Insignia in Government Premises Act 2013* an organisation, association or group can be identified as a gang if the following characteristics are present; first, a common name or common identifying symbols, or representations; and its members, associates, or supporters individually or collectively promote, encourage, or engage in criminal activity. It is important to note that this was accurate at the time of data extraction for this research but this is no longer the way in which an organisation, association or group can be identified as a gang.
2. This increase is also partially attributable to changes in how the Gang Intelligence Centre records and reports this data.
3. This method of gang verification has since been decentralised to New Zealand Police Districts.
4. This method of gang verification is no longer used but was employed at the time of the extraction of the data for this study
5. The Gang Intelligence Centre (GIC) established the National Gang List (NGL) in 2016 and is comprised of information held by the Gang Intelligence Centre (GIC) agencies about patched or prospect New Zealand Adult Gang (NZAG) members and does not record gang associates or those who may be affiliated. The NGL was created for intelligence purposes, not for the

purpose of counting gang membership numbers or to act as a reporting tool. The information is collected for the purpose of maintaining oversight of the gang environment, to enhance the understanding of the scale of social harm caused by gangs, and to support the identification of prevention and intervention opportunities.

6. The Gang Diversity Index was created using all three categories of gangs as we were interested in gauging the diversity of gangs at the neighbourhood level and not their magnitude of presence per neighbourhood.

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