



Research Article

# Effectiveness of a Care-Based Harm Reduction Program, Take Kare Safe Space, on Reducing Alcohol-Related Harm in Sydney, Australia

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Citation: Shakeshaft A, Doran CM, Wadds P, Tran DA (2023) Effectiveness of a Care-Based Harm Reduction Program, Take Kare Safe Space, on Reducing Alcohol-Related Harm in Sydney, Australia. J Community Med Public Health 7: 295. DOI: 10.29011/2577-2228.100295

Received Date: 03 March, 2023; Accepted Date: 15 March, 2023; Published Date: 20 March, 2023

## Abstract

**Objectives:** Take Kare Safe Space (TKSS) was implemented in three sites in Sydney, Australia, as part of a citywide plan to address alcohol-related violence. This study aimed to evaluate the impact of TKSS on the number of non-domestic incidents, Emergency Department (ED) admissions, and ambulances dispatches. **Methods:** Time series data was collected for the period January 2009-December 2018 from the NSW Bureau of Crime Statistics and Research, NSW Ambulance Service, and a major trauma hospital. Generalized linear models were used to specify segmented regression for each outcome. **Results:** From December 2014 to April 2019, 66,455 people received support across the three safe spaces. Program users were mostly male (62%) and aged 18-25-years (66%). Following implementation of TKSS, there was a relative increase in non-domestic related assaults within all TKSS site boundaries compared to sites outside of TKSS boundaries ( $p=0.082$ ,  $p=0.01$  and  $p=0.012$ ). There was a non-significant increase in the number of assault-related ambulance dispatches (2.5%,  $p=0.617$ ), and non-significant decreases in the number of drug and alcohol-related ambulance dispatches (0.52%,  $p=0.876$ ), head injury-related ED admissions (1.92%,  $p=0.561$ ) and alcohol-related ED admissions (1.8%  $p=0.561$ ). **Conclusions:** Further rigorous evaluations of the impact of safe space interventions on alcohol related harm are needed.

**Keywords:** Alcohol-related harm; Harm reduction; Entertainment precinct

## Introduction

Night time Entertainment Precincts (NEPs) are small geographical areas that contain a high density of licensed premises (bars, pubs, nightclubs and taverns) that typically operate in the 'night-time economy', generally from 6pm onwards [1,2]. NEPs are synonymous with socializing and entertainment. While NEPs have been celebrated for their role in revitalizing inner-city areas and stimulating economic benefit [3], they have also been

associated with increases in alcohol-related problems [4]. Studies have consistently shown higher rates of alcohol intoxication, aggression, assaults, violence, and crime in NEPs [2,5-10]. Higher rates of harm are associated with certain 'risk characteristics' including prominence of alcohol promotion [11], later venue closing times [12,13], poor alcohol-serving practices [14,15], and high density of venues that serve alcohol [16-18].

Increased community concern about high rates of alcohol-related harms in NEPs [19] has resulted in significant research, policy development and law enforcement efforts directed at reducing harms over the past two decades. Developing policies to

effectively influence alcohol consumption is challenging because of the complex array of individual, cultural and social factors that influence alcohol use [20], particularly in social settings where there is widespread acceptance of excessive alcohol consumption. There is some evidence that the health and social harms of alcohol use can be decreased by implementing a combination of regulatory, early-intervention, and harm-reduction approaches, such as legislative changes to restrict trading hours and alcohol availability and price restrictions [21,22]. A harm-reduction strategy that has received comparatively less attention is the establishment of care-based ‘safe spaces’, or rest and recovery spaces, in night-time entertainment precincts.

Safe spaces are dedicated services that provide support to patrons who are often alcohol or drug affected in NEPs. Frequently operated as a collaboration between health, community, emergency and welfare services, safe spaces provide a range of support including (but not limited to) medical assessment, first-aid, counselling or support, hydration, supervised recovery, and other practical supports. Safe spaces have been implemented in parts of the UK [23] and Australia [24-28] usually as part of a multi-pronged policy interventions. Although there is increasing implementation of safe spaces as a harm reduction approach [23], to date there has been little independent evaluation of their impacts. There is some evidence to suggest that safe space programs and similar interventions (e.g., street pastors, sobering centres, chill out zones) are seen as valuable to program users and frontline staff [23,24,29] and deliver economic benefits [26,29] largely due to savings attributed to the cost of police, ambulance and additional medical services. However, there is less evidence about whether such programs contribute to a reduction in alcohol-related assaults and injuries within NEPs. A recent evaluation examined the impact of a care-based street service program provided by street Chaplains in Cairns, Australia, found that assaults during high-alcohol hours significantly declined after the introduction of the support service with a one-month lagged impact ( $B=-1.66$ , 95% confidence interval-3.02,-0.30) [27]. However, the intervention had no significant impact on common assaults, emergency department injury presentations or ambulance attendances. Further rigorous evaluation of the impact of safe spaces on outcomes including assaults, injuries, and use of frontline health resources are needed.

In 2014, as a result of several high-profile deaths in Sydney linked with heavy alcohol and other drug use, the Liquor Amendment Act (LAA) [30] was introduced into law in New South Wales (NSW), Australia. The LAA introduced a range of policy interventions in an attempt to reduce the impact of alcohol

related violence, including “lock outs” (restrictions to entry to venues after 1:30 am), cessation of alcohol service after 3:00 am, a freeze on new venue licenses, increased powers for police, restrictions on takeaway alcohol sales and harsher sentencing for alcohol-related violence [2]. At the same time as the introduction of the LAA, a safe space program (Take Kare Safe Space (TKSS)) was implemented in three NEPs with the goal of improving public safety and reducing alcohol-related harm, violence, and crime. Previous analyses of the impact of TKSS found that program users and key stakeholders perceived TKSS had significant benefits in improving the safety and amenity of Sydney NEPs and contributed to deescalating risk-prone behaviour and violent incidents. Analysis of the impact and return on investment of the program found it delivered AUD\$2.67 in benefits for every AUD\$1 invested [26]. The impact of TKSS on outcomes including assaults, injuries, and use of frontline health resources remains unknown.

This study aimed to determine the impact of the TKSS program during the period January 2009-December 2018 on the:

1. Number of non-domestic incidents each month occurring within TKSS operating hours;
2. Number of ED admissions with diagnosis of interest listed as head injury or as alcohol related; and
3. Number of ambulances dispatched to geo-locations within the TKSS boundaries for drug and alcohol-related and assault-related incidents.

## Methods

### Design

Evaluation methodology was guided by the NSW Government’s Program Evaluation Guidelines and combined both qualitative and quantitative methods to examine process, outcome, and economic impacts. This paper reports program outcomes. Return on investment outcomes have been published elsewhere [26].

### Setting

TKSS commenced operations in December 2014 in the Sydney Central Business District located at Town Hall. A second site at Kings Cross, a prominent entrainment precinct located approximately 2 kilometers east of the Sydney Central Business District, commenced operations in July 2015. A third site located at Darling Harbour, adjacent to the city centre of Sydney, commenced operations in February 2017. See Figure 1 for site boundaries.

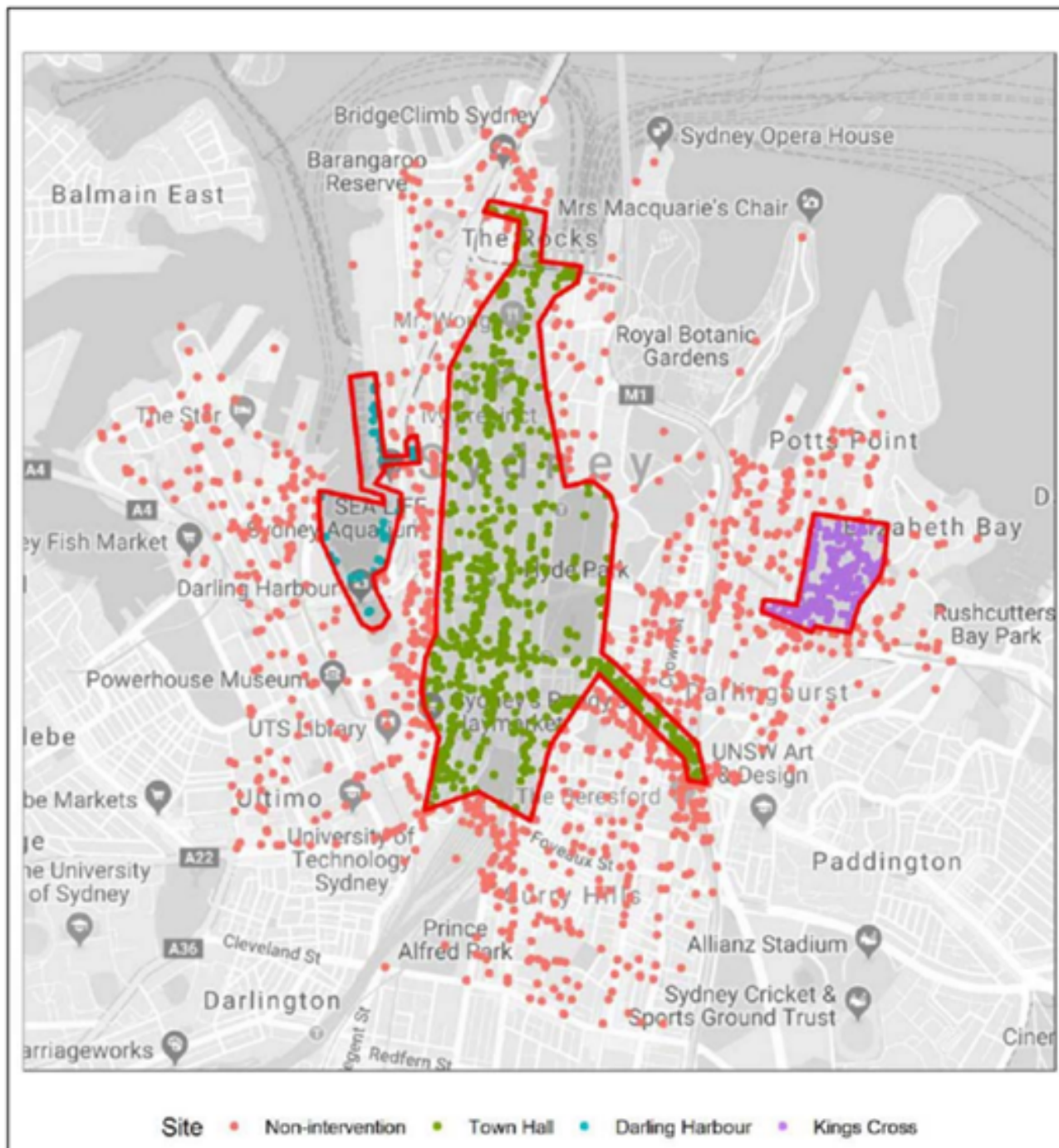


Figure 1: Site Boundaries.

## **TKSS program implementation**

Each TKSS site was staffed by 3-4 Ambassadors year-round from 10 pm to 4 am on Friday and Saturday nights. Ambassadors included both paid staff and volunteers drawn from the public and students from local universities (primarily drawn from Para medicine and social work degree programs). The TKSS program provided a variety of interventions at static safe spaces including first aid support, escort to accommodation, assistance with accessing transport, a phone charging station, help connecting with friends or family, and general assistance with directions and local information. Small teams also patrolled designated areas nearby to the static safe space to provide intervention to alcohol affected and other vulnerable people in unsafe situations. Key to implementation of the program was collaboration with other agencies and nightlife service providers including City Rangers, licensed premises, venue security, police, closed circuit-television operators, and transport staff. Ambassadors referred incidents to appropriate emergency or other services when the support required exceeded the program's scope and capacity.

## **Data collection**

Program utilization and user characteristics. As part of the implementation of TKSS, Ambassadors recorded information pertaining to client interactions with the program on either a paper-based form or via a mobile application. Data recorded included age and gender of the client, the time support was provided, the length of time each user was in contact with the service, and the perceived level of intoxication of the person/people receiving support based on the NSW Responsible Service of Alcohol intoxication guidelines [31]. The types of support provided to each person receiving assistance was also recorded, including spending time at the Safe Space, ambassador intervention to de-escalate or avert serious risk of harm, request for directions, phone charging, and receipt of first aid.

Routinely collected administrative data. Time series data was collected for the period January 2009-December 2018. Non-domestic assault data (total number of non-domestic incidents each month within TKSS operating hours) was obtained from the NSW Bureau of Crime Statistics and Research. Each record contained information on incident number, longitude, latitude, postcode, suburb, sub offence category, alcohol-related indicator, and a domestic violence relative indicator. Geographical boundaries that represented where the TKSS program was delivered were determined for each site, and a non-intervention site lying outside of the TKSS site boundaries was determined for comparison (Figure 1). ED admissions data (the number of either alcohol-related or head injury ED admissions in each month) was obtained from St Vincent's Hospital, the major trauma hospital in Sydney. Each record contained information on arrival time and date, discharge time and date, age, triage, gender, postcode, complaint,

diagnosis, ICD 10 Code and disposition. The monthly number of ambulances dispatched to the Sydney CBD during TKSS operating times was obtained from the NSW Ambulance Service. Each observation contained; case identifier, age of patient, time and day of ambulance response, a listed problem for dispatch, and pick-up location including postcode and geo-location.

## **Statistical Analysis**

All analyses were conducted using the R package *tscount* [32]. For all analyses, generalised linear models for time series counts were used to specify segmented regression for each outcome. Estimation was done using a quasi-likelihood approach based on the Poisson likelihood for the negative binomial distribution. As previous research has found that more criminal incidents occur in summer months amongst at-risk populations [33], seasonality was adjusted for in each model using three broad methods: 1) autoregressive monthly and yearly lags; 2) monthly factors (January to December); and 3) a cosine and sine term. To best understand how the data reacts to different seasonal adjustments a combination of seasonal adjustment was tested with the best model presented in the analysis. A total of 16 combinations of the seasonality adjustments were considered, with the best fitting models assessed by AIC reported. The time series segments allow for shocks and changes in trend and shift in level caused by exogenous events. For each analysis, the two main events of interest were the start date of the TKSS programs and the introduction of the LAA. Models were specified to account for these segments, by allowing a pre-lock-out law trend, a shift in level caused by the lock-out laws and a change in trend caused by lock out-laws. This was replicated to allow for a shift in level caused by the TKSS intervention and a change in trend cause by TKSS intervention. The model parameter estimates are multiplicative to the underlying rate assault, where an estimate greater than one suggests a multiplicative increase i.e., 1.05 suggest a 5% increase per month, conversely, an estimate less than 1 suggested a multiplicative reduction, i.e., 0.95 suggest a 5% reduction in the rate of ED admissions per month. The outcomes for the models were the total number of non-domestic incidents each month within TKSS operating hours (non-domestic related assaults); the number of either alcohol-related or head injury ED admissions in each month (ED admissions); and the number of drug and alcohol-related and assault-related ambulance dispatches in each month (ambulance dispatches). For analysis of ambulance dispatch data, the number of monthly counts stratified by each site was assessed as being too small, creating spurious conclusions. As a result, the data was analyzed as the collective monthly number of dispatched to geo-locations within the TKSS boundaries.

## **Ethics Approval**

Ethics approval was provided by the University of New South Wales Ethics Committee (HC17509). The research was performed in compliance with relevant laws and institutional

guidelines. Permission to access ED data was provided by St Vincent's Hospital (Sydney) (LNR/18/SVH/255).

## Results

### Program utilization and user characteristics

Over the period December 2014-April 2019 (inclusive), 66,455 people were supported by the TKSS program. Most users (66%) spent time at the safe space and 19% were supported in other ways (defined as incidents). Most users were male (62%), aged between 18-25 years (66%), and were perceived by Ambassadors to be highly intoxicated (46%) or under the influence of drugs (8%).

### Non-domestic related assaults

Figure 2 shows the number of non-domestic related assaults between January 2009 and December 2018 by TKSS site, compared to sites outside of TKSS boundaries. Town Hall and Kings Cross show the higher number of assaults of the three sites, while Darling

Harbour has more zero monthly records of assaults. Town Hall shows a gradual decrease over the period prior to the introduction of LAA, where TKSS started at the bottom of the trend. A similar shape is observed in the Kings Cross data. The Darling Harbour trend is much closer to zero, meaning that the effect of LAA and TKSS is much harder to see. The results of the generalized linear modelling suggest there was a relative increase in the rate of non-domestic related assaults after the start of the TKSS program compared to the rates of non-domestic related assaults after the start of the lockout laws. At Town Hall there was an increase of 6.09% points (95%CI: -0.76% points, 13.41% points,  $p=0.082$ ), at Kings Cross an increase of 12.83% points (95%CI: 4.86% points, 21.41% points,  $p=0.01$ ) and at Darling Harbour an increase of 10.88% points (95%CI: 2.34% points, 20.41 % points,  $p=0.012$ ). While these results suggest an increasing trend compared to a segment of time when TKSS was not operating, it should be noted that this analysis has not accounted for any blunting or delay effects that might be associated with the introduction of the LAA.

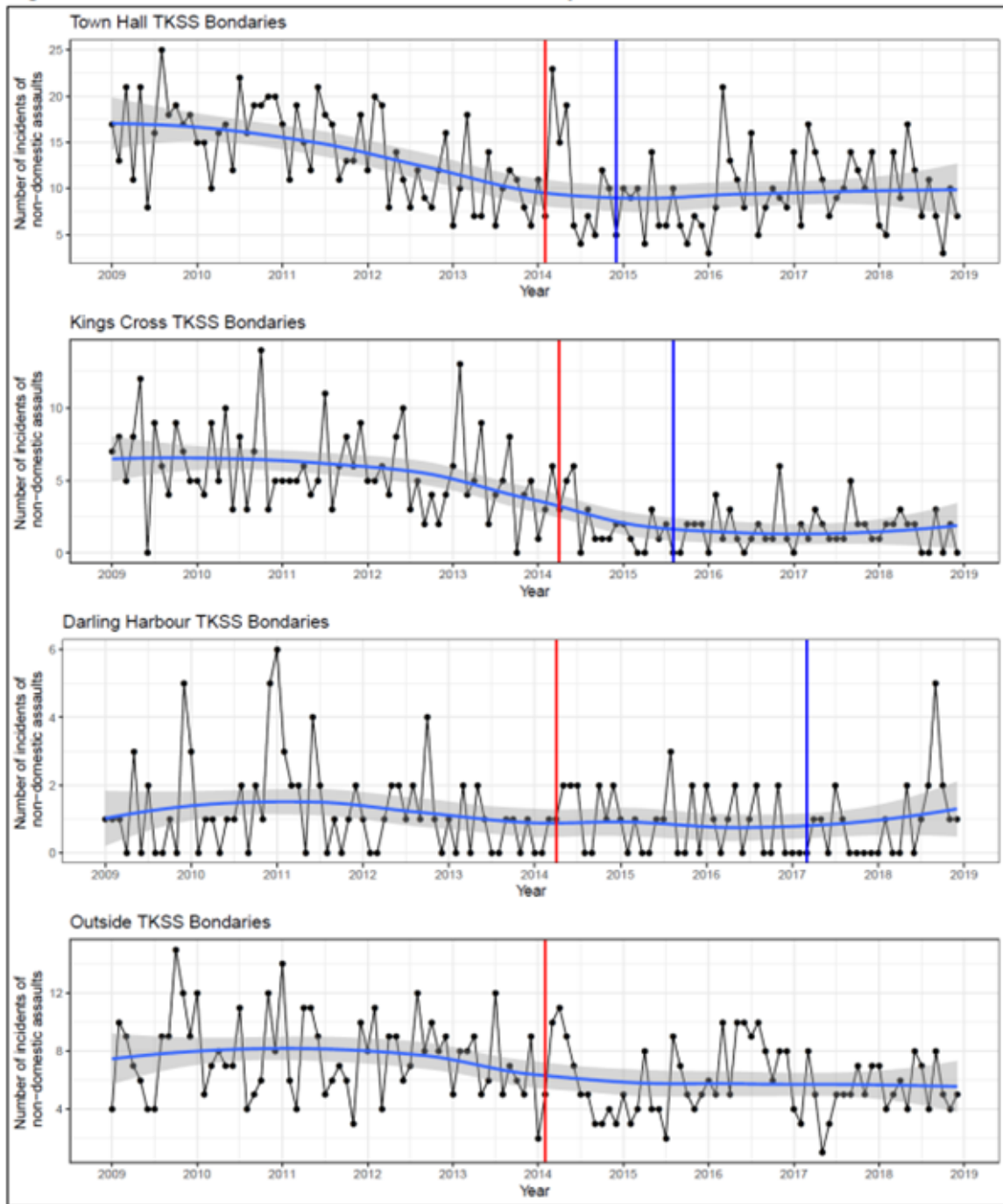
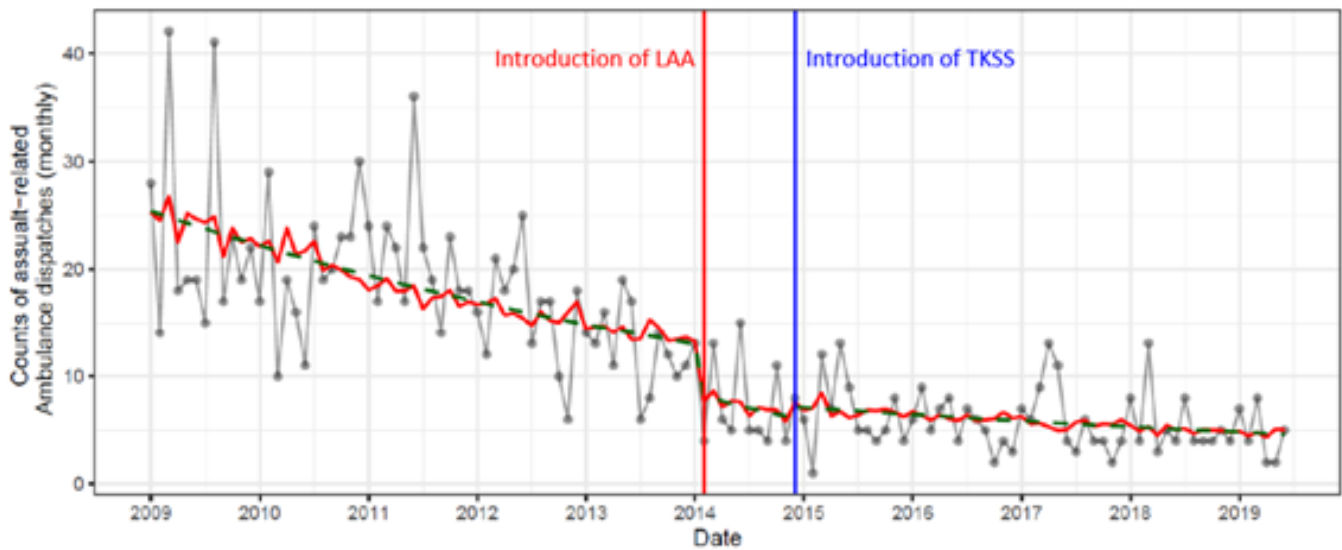


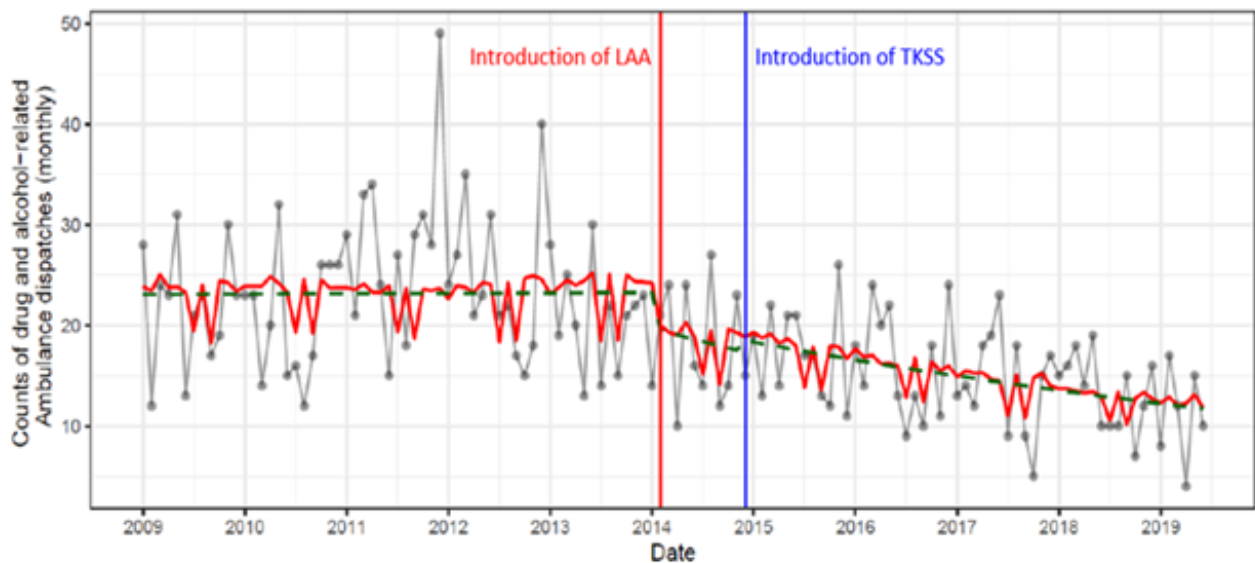
Figure 2: Non-domestic related assaults by TKSS site, compared to non-intervention sites, January 2009-December 2018. The red line indicates the start of the LAA and the blue line (to the right in figures 2a, 2b and 2c) shows the respective start of the TKSS program at each site.

### Ambulance dispatches

The segmented time-series model for assault-related ambulance dispatches shows a relative increase of 2.5 percentage points (1.025, 95%CI: 0.930, 1.130,  $p=0.617$ ) in the monthly number of dispatches after the start of the TKSS program (see Figure 3). Prior to the start of the program, it was estimated the trend of monthly dispatches was decreasing at a rate of 3.34% per month, this trend increased to -0.84% per month after the start of the TKSS program. These findings were not statistically significant. The model for drug and alcohol-related dispatches suggests that after the start of the TKSS program there was a relative decrease of 0.52 percentage points (0.995, 95%CI: 0.932, 1.062,  $p=0.876$ ) in the trend of dispatches (Figure 4). Prior to the start of the program, it was estimated that there was a downward trend of monthly dispatches of -0.40% per month, this decreased to -0.92% per month after the start of TKSS. These findings were not statistically significant.



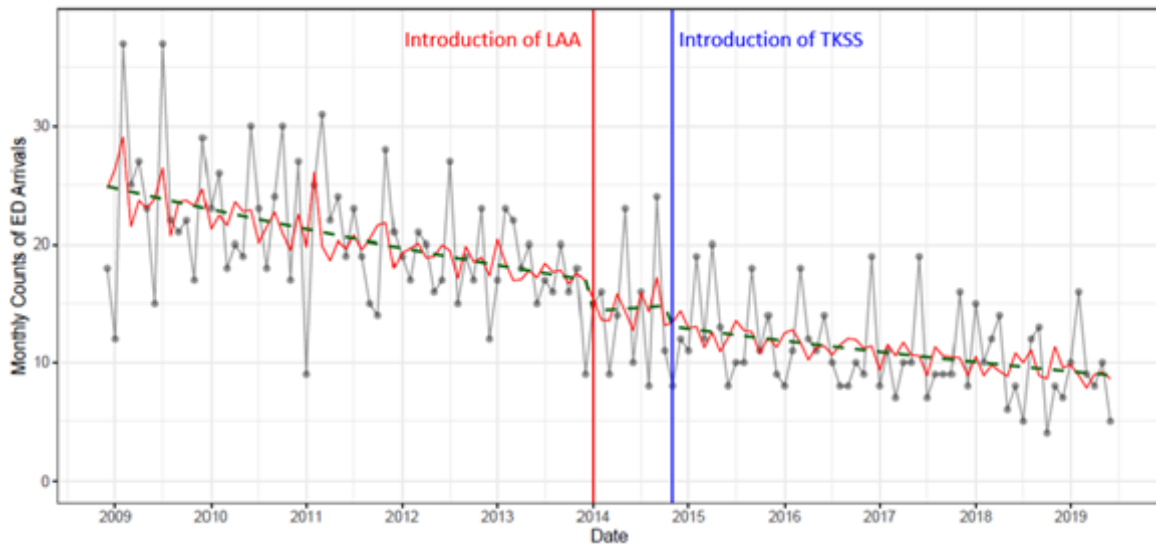
**Figure 3:** Assault related ambulance dispatches to TKSS sites within TKSS operating times, January 2009- December 2018.



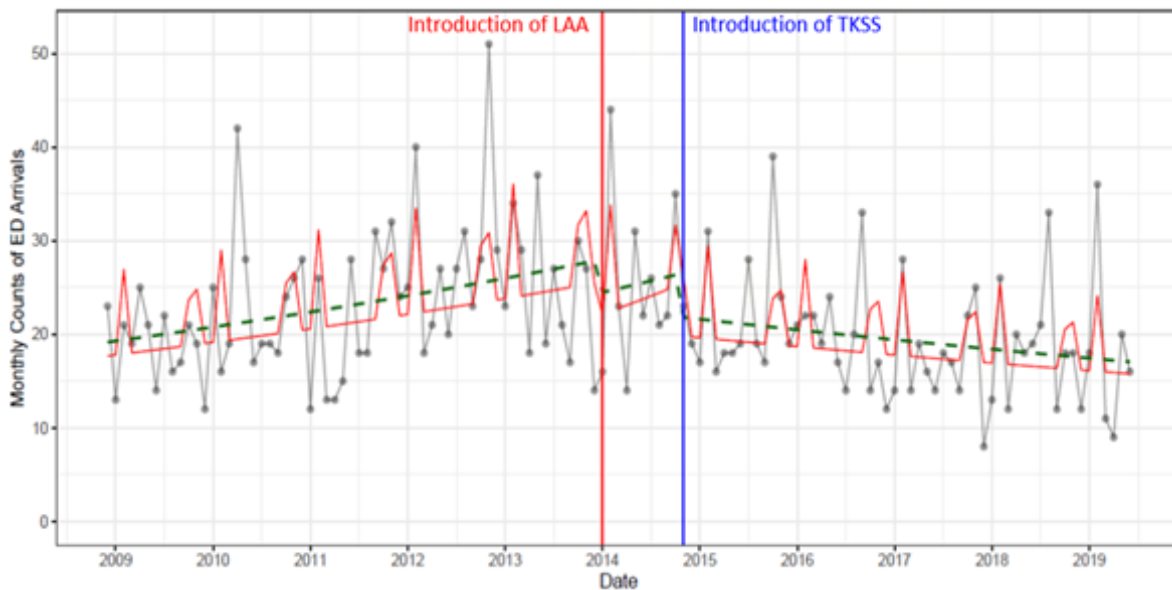
**Figure 4:** Drug & alcohol-related ambulance dispatches to TKSS sites within TKSS operating times, January 2009- December 2018.

### ED admissions

Head injury-related ED admissions reduced by 1.92 percentage points (0.982,95%CI: 0.924, 1.044,  $p=0.561$ ) after the introduction of the TKSS program (Figure 5). The trend prior to the start of TKSS was an increase of 1.11% per month to a reduction of 0.81%. This effect was not statistically significant. After the start of TKSS, the trend in alcohol-related ED admissions was reduced by 1.8 percentage points (0.982, 95%CI: 0.924, 1.044,  $p=0.561$ ) compared to the rate of admissions prior to the start of TKSS (Figure 6). Before the start of the program, it was estimated that the trend of alcohol-related admissions was increasing by 1.41% per month and after the start of the program it was expected that the trend in admissions was reducing by -3.9% per month. This effect was not statistically significant.



**Figure 5:** Head injury-related ED admissions within TKSS operating times, January 2009-December 2018.



**Figure 6:** Alcohol-related ED admissions within TKSS operating times, January 2009-December 2018.



## Discussion

This study aimed to examine the impact of safe spaces in the NEPs in Sydney on alcohol-related harms by measuring changes in non-domestic related assaults, ambulance dispatches and ED admissions. Routinely collected data showed consistent patterns of declining head injury-related and alcohol-related ED admissions and drug and alcohol-related ambulance dispatches post implementation of the TKSS program. However, none of these changes were statistically significant. Patterns of decreasing harms are consistent with an overall decline in alcohol-related incidents from 2009 onwards, both before and after the introduction of the LAA and the introduction of Safe Spaces. This prevailing trend may have masked any intervention effects.

Examination of trends in non-domestic assault data suggest a possible increase in non-domestic assaults following TKSS program implementation. This contrasts with findings from an evaluation of a street service care program in a night-time entertainment precinct in Queensland, Australia, which found an average reduction of 1.6 serious police-recorded assaults per month following program implementation [27]. These inconsistent findings may be partially attributed to the fact that our analysis was not able to account for any blunting or delay effects that might be associated with the introduction of the LAA. The TKSS program and the LAA were implemented within a maximum of two years of each other, and so the effects attributed to each intervention are difficult to discern given complex interactions between interventions over time, and with dynamic population movements. Analyses of the impact of the LAA on its own estimated an overall decline in non-domestic assaults of 13.3% in the 62 months post introduction of the LAA [34]. This attribution limitation is common in evaluations of alcohol interventions, which often comprise multiple measures that are usually introduced simultaneously [27,28]. Future research is necessary to assess the impact of safe spaces on alcohol-related assaults without the confounding of the legislative changes that occurred in this study.

There were no statistically significant reductions in ED presentations or ambulance dispatches within the boundaries of the TKSS areas post introduction of Safe Spaces. This finding is consistent with previous research that has shown little to no impact of various community-level interventions on ED presentations for injury during high alcohol hours following implementation in Australian cities [24,27,35]. There is an established body of literature that shows that most alcohol harms are not recorded because they do not come to the attention of relevant authorities (for example, ambulance, hospitals, and the police) [36]. This is likely to be especially true for ED presentations and ambulance dispatches, with many injuries likely self-treated. This outcome means that actual occurrences of alcohol-related harm in collected data are likely to be significantly underrepresented. A previous

examination of the impact of TKSS using data collected by Ambassadors found the program averted serious risk of harm in 735 cases out of 3,633 interventions (20% of all interventions) made in the NEPs in which it operated [26]. It should be noted that ED presentations and ambulance dispatches remained flat following introduction of TKSS, suggesting a possible dampening effect of safe spaces on these outcomes.

## Limitations

The outcomes of this study should be considered with regard to several limitations. Firstly, by focusing only on alcohol harms captured in routinely collected data, this analysis may have under-estimated the impact of TKSS by not capturing impacts on alcohol harms that are not recorded in routinely collected data sets. Secondly, while we examined both alcohol-related and head injury-related ED admissions, data was obtained only from one hospital located closest to the NEPs where safe spaces operated. This may have underestimated the true number of admissions. This data also relied on accurate coding at the hospital about the cause of admission, and previous studies have highlighted the significant underestimate in the recording of alcohol-related injuries in hospital datasets [37,38].

## Conclusion

The introduction of safe spaces in NEPs in Sydney, Australia, resulted in consistent patterns of declining alcohol-related ED presentations and alcohol-related ambulance dispatches, however these were not statistically significant. Further rigorous evaluations of the impact of safe space interventions on reducing alcohol related harm are needed.

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