

# Measuring the Impact of Alcohol-Related Crime Reduction Strategies for Restaurants and Nightlife in Arlington

A proposal submitted to Center for Peace Studies and Violence Prevention (CPSVP)

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## **ABSTRACT**

Arlington County features some of the most unique nightlife destinations in the D.C. metro region. Arlington County Police Department (ACPD) launched the Arlington Restaurant Initiative (ARI) in 2016 to reduce alcohol-related crimes. To sustain this program, ACPD must provide an evidence-based case that the program leads to decline in crime and has positive economic impacts. The objective of this project is to develop data-driven economic and social impact analysis for the program to understand the impact of ARI on local communities. The project will involve three critical components: (1) research will be conducted to understand the social and economic impacts of the ARI program using data collected from social media, Google, Census, local focus group meeting, and restaurants survey; (2) actively engage students at Virginia Tech and Georgia Mason University in real-world project-based learning process to expose students to innovative quantitative and qualitative data collection process and impact analysis research designs; and (3) outreach to local communities to collect research data, validate research results, and enhance public participation in the policy decision-making process. The outcomes from this project can better inform policy makers and community leaders regarding the best local community-based practices in preventing and reducing alcohol-related crime.

# 1 Statement of Problem and Proposed Solution

## 1.1 Identification of the Issue

Arlington County features some of the most unique restaurants and nightlife destinations in the Washington D.C. metro region. Areas such as Clarendon, however, with a large number of restaurants that serve alcohol, have become a difficult issue for police to manage due to **alcohol-related crimes** such as assault, malicious wounding, sexual assault, theft, public intoxication, assault on police, DUI, disorderly conduct, and rape. The mission of the Arlington County Police Department (ACPD) is to reduce the incidence of crime and improve quality of life by making the county a place where all people are safe and businesses can prosper. In order to manage alcohol-related disorder, ACPD launched the **Arlington Restaurant Initiative (ARI)** that focuses on best practices for restaurants and nightlife to reduce the risk of such crimes. The initiative grew out of the **Clarendon Detail**, the creation of a team of patrol officers to control pedestrian and road traffic, such as drunk patrons stumbling into the road, managing large numbers of taxis/ride-sharing services picking up along narrow roadways, and assisting bars with crowd control. ARI expands these activities to focus on encouraging bars and restaurants to adopt place management techniques to improve public safety inside and outside bars.

To better understand the problem, officers working the Clarendon Detail began collecting **activity logs** to capture information about all contacts between police and citizens on the busiest nights (typically weekends, as well as holidays and special events that attract large crowds, such as St Patricks Day and Cinco de Mayo), regardless of whether or not a formal incident report was written. Officers on the detail tallied the number, location, and type of contacts they had with citizens, and basic demographic information about the individuals involved. The logs revealed that, despite the impact of excessive alcohol consumption on the crimes listed above, only about 10% of police contacts with the public result in an arrest. Detail officers use over-time to ensure that intoxicated patrons are protected from harm and people can move in and out of the area safely, and assisting bar managers and staff in reducing the incidence of behaviors that contribute to more serious problems, such as fake ID use, underage drinking, and over-serving.

Since the program's inception, the number of alcohol-related arrests in Clarendon has dropped by 49%. The number of arrests, however, is used as a measure of the resources that police department needs and determines the funding to receive (an incentive-scheme that can facilitate police-citizen conflict). In order to sustain and support such programs, ACPD has to make the **evidence-based** case that the decline is due to these practices, and that there will be further spillovers which will result in positive economic impact for various reasons (e.g., people moving in because it is viewed as safe, increased business revenue, etc.). Therefore, **a multi-source data-driven measurement tool** is needed that will provide the necessary evidence to the ACPD regarding the social and economic impact of their program.

## 1.2 Policy Impact Analysis and Dashboard for Community Policing

We propose to **(1) conduct research to understand the social and economic impacts of ACPD's ARI project** using local data sources such as administrative records (911 emergency and crime data; data hand-collected by the Clarendon Detail; Alcohol Board of Control (ABC) licensing data); socioeconomic data (to characterize the population), and web-based sources such as social media data (to identify social events and popularity) and Zillow data (to quantify the impact on real-estate value) and **(2) develop a dashboard to visualize the research results** to

inform police department and local community and to monitor the long-term impacts of ARI program. Our goal is to measure the impact of the program on alcohol-related criminal activities, the local economy (e.g., bar revenue) and business owner/manager perceptions of police officers and their actions. We will apply and implement the Data Discovery and Re-purposing Model<sup>1</sup> that provides a systematic approach to potential data source analysis and quality assessment, and will conduct the necessary analyses to provide a comprehensive view of ARI's impacts. Additionally, the research will engage students from three different areas, including urban planning graduate students from Virginia Tech, graduate fellows involved in the Data Science for Public Good (DSPG) Program at Virginia Tech, and Criminology, Law and Society students from George Mason University, to equip them with research experiences in multi-source data collection, social and economic impact analysis, Data Discovery and Re-purposing Model implementation, and data visualization. We will work closely with local police, economic development leaders, and community members to discover and collect necessary data sources (described in Section 2.1) and web-based tools for analyzing and presenting them.

There will be multiple opportunities to disseminate our research products, including (but not limited to) submitting to the applied research track of Association for Computing Machinery's Special Interest Group on Knowledge Discovery and Data Mining (ACM SIGKDD) Meeting and the American Society of Criminology/Academy of Criminal Justice Sciences conferences, and publishing in multidisciplinary journals, such as *Justice Quarterly*, *Policing: A Journal of Policy and Practice*, and *Environmental Planning B: Urban Analytics and Science*. The developed dashboard will be available to and fully expendable by other data scientists via open source licensing (MIT). The project products will be developed using open-source web (nginx or httpd), database (PostgreSQL or MySQL), statistical analysis (R and Python/Pandas), and visualization (D3, Leaflet, Plotly, DataTable) programs and libraries. In addition, the dashboard will be hosted within an open-source fully-portable architecture (Docker or Rkt).

## 2 Project Design

This project will incorporate three critical components, including research (Section 2.1), teaching (Section 2.2), and community engagement (Section 2.3). Each component will not be independent, but integrated to improve and strengthen each other.

### 2.1 Impact Analysis Research Design

In this research, we will analyze the impact of ARI from three perspectives, including social impacts, economic impact, and business' perception impact, using a combination of quantitative and qualitative approaches.

#### 2.1.1 Measuring Social Impact of ARI

We will measure the social impact of ARI by considering factors such as the safety of the neighborhood, crime and accidents due to inebriation, and measures of perceived well-being. This will be done by analyzing the crime and emergency incident rates before and after the programs implementation. Given a reduction in crime, it is challenging to identify the causal factors that lead

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<sup>1</sup>Keller, S. A.; G. Korkmaz; A. Schroeder; et al. (2016). Leveraging External Data Sources to Enhance Official Statistics and Products. Report prepared for the U.S. Census Bureau. Social and Decision Analytics Laboratory (SDAL), Biocomplexity Institute of Virginia Tech., Chp. 3

to the observed decline. In order to address that, we will use **Difference-in-Difference quasi-experiment design** to compare the change in social impact before and after the study period to similar neighborhoods (as measured by socioeconomic, lifestyle, and demographic characteristics). In order to quantify these notions, we will use insights from the ACPD in addition to the following **data sources:** (1) 911 call and crime data (quantify change in the incident rates), (2) Clarendon Detail data, (3) Arlington County Fire Department (ACFD) Fire and Emergency Medical Services (EMS) data, (4) American Community Survey (to characterize the demographics of the neighborhoods under study).

### **2.1.2 Measuring Economic Impact of ARI**

We will estimate the cost and the cost effectiveness of ARI using the following potential **economic impact factors** (data accessed through the collaboration of ACPD with other agencies and businesses): (1) Loss/increase revenue of establishments, (2) Reduction in liability insurance, (3) Loss/restriction of Use Permits, Loss of business revenue due to loss of ABC license/Fines and loss of business revenue, (4) Cost of Police and Fire personnel, EMS transports, (5) Uber/Lyft rides and Arlington Taxi companies, (6) Cost in justice system – VA State Courts/Arlington County Commonwealths Attorney Office, and (7) Real estate taxes and property values from Zillow.

### **2.1.3 Measuring Impact on Community Perceptions of ARI and ACPD**

Successful community policing and problem-solving efforts are “co-productions” between police and the local community. The participation and cooperation of the business and patron communities in Clarendon are crucial to the success of ARI. Thus, it is also important to incorporate **qualitative data** that measures the perceptions of businesses and patrons into the data dashboard to understand how knowledge and attitudes affect program implementation and sustainability. Dr. Gill previously worked with ACPD to conduct a preliminary case study of alcohol-related problems by exploring the attitudes and perceptions of business owners and managers toward training, place management, and safety techniques, and restaurant/bar patrons’ feelings of safety and attitudes toward the police, through **surveys, interviews, and focus groups**. We will develop these tools to explore the evolving relationship between businesses, patrons, and the police department and incorporate this information into the dashboard.

## **2.2 Real-world Project Based Learning**

This project will provide a variety of student engagement opportunities by incorporating the data collection, analytics, and visualization process with the existing courses and internship projects that PIs are involved in. **Graduate Urban Planning Students** in PI Zhang’s Computer Application in Planning (UAP 5114, Spring 2018) at Virginia Tech will be involved heavily in the economic and social impact analysis framework development via literature review and early data collection and processing process. Students in PI Zhang’s Planning Studio: Real World Problems and Solutions (UAP 5125, Fall 2018) course will get experience in social and economic impact analysis methodology design and framework implementation. Supervised by Co-PIs Korkmaz and Schroeder, **Undergraduate, Graduate assistant and fellows at Data Science for Public Good program (DSPG)** at Virginia Tech will be equipped with knowledge of advanced data analytics and data visualization process by participating into the proposed in-depth social and economic impact analysis research and the design and implementation of community data dashboard. **Undergraduate and graduate student interns and federal work-study students** from George Mason University

will work with Co-PI Gill to learn more about qualitative data collection and analysis techniques to support evidence-based crime policy-making by conducting survey, interview, and focus group meeting with local business owners, staff, and patrons. This project will engage students from two Universities and multiple majors (especially urban planning, criminology, and computer science) and hence provides unique opportunities to improve students' ability to collaborate in interdisciplinary research and studies.

## 2.3 Community Engagement

Stakeholders from local communities, especially ACPD, economic development leaders, restaurant owners, and bar patrons, will be involved heavily in the project. We will work directly with these partners to ensure that the information included in the dashboard is relevant to their priorities and helps them achieve their mission, whether that is improved public safety, economic development and profit, or feelings of safety and enjoyment. In particular, the inclusion of qualitative perception data from key stakeholders ensures that the diverse voices of the various communities who share the physical and social space are represented and disseminated. Communities that surround nightlife areas can share perspective on problems that can affect quality of life issues. In Clarendon, the Lyon Village Civic Association and the Clarendon Courthouse Civic Association are active community stakeholders. In Shirlington, the Shirlington Civic Association is active and in the east end of the County the Arlington Heights, Alcova Heights, Douglas Park, and Penrose Civic Associations are active stakeholders. Additionally, several Business Improvement Districts are active including, the Ballston BID, Clarendon Alliance, Columbia Pike Revitalization Organization, Crystal City BID, Lee Highway Alliance, and the Rosslyn BID.

## 2.4 Potential Impact of the Proposed Project

Our research results and Policy Impact Dashboard will enable ACPD to sustain its program and will benefit multiple parties; in particular, the **local community** (lower crime rates, increased safety and welfare, reduced alcohol-related accidents), **businesses** (increased profits, reduced risk of business loss due to licensing) and **police** (more resources, positive perception by the community and businesses, safer community). Moreover, the program will engage the police department in using data to develop effective evidence-based policy and improve community relations, reflecting increased interest in data-driven practice and evidence-based strategies in police departments around the country.

The developed web-based tools will help local governments with limited resources measure the direct and indirect benefits of the policing strategies they want to implement. The data streams that are used in the dashboard are commonly available in all jurisdictions (the local data sources are collected in every community, and the federally collected surveys are publicly available). The dashboard will have separate fields for uploading different types of data (911 data, bar revenues, cost of living, demographics, shape files) and will guide the user through assessment of the quality of the variables (e.g., completeness, consistency), necessary transformations and imputations, exploration of the data with meaningful summaries, spatial and temporal visualizations, and conducting the analysis to quantify the impact. The dashboard will be **a key resource to advance evidence-based policy decisions in community policing**, and could easily be **adapted to policies in other domains**, such as education and health.

In addition, students supported by the project will gain important skills to make them ideal candidates to be later employed as policy analytics experts for municipal governments, helping

**data analytics workforce development** outside academia. The team will train a diverse set of students, leveraging the wide range of educational and diversity initiatives at VT and GMU.

### 3 Management Approach

#### 3.1 Investigators and Qualifications

**Wenwen Zhang** (PhD, Urban Planning) is an Assistant Professor of Urban Affairs and Planning at VT. She has worked closely with Atlanta Fire Department to develop data-driven fire inspection framework, and received the best student paper runner-up award in 2016 SIGKDD conference and was recognized as the “Best Practice in using Data Analytics to Improve Fire Safety” by the National Fire Protection Agency.

**Gizem Korkmaz** (PhD, Economics) is an Assistant Professor at the Social & Decision Analytics Lab (SDAL) at the Biocomplexity Institute of VT. She has led a number of projects in collaboration with ACPD and ACFD. She co-chairs SDAL’s Data Science for the Public Good (DSPG) Program with **Aaron Schroeder** (PhD, Public Policy) who is the Information Architect and Data Scientist at SDAL.

**Charlotte Gill** (PhD, Criminology) is the Deputy Director of the Center for Evidence-Based Crime Policy and Assistant Professor in the Department of Criminology, Law and Society at GMU. She has led a number of research, evaluation, and data collection projects with police departments and communities around the country, including ACPD.

**Corporal Dimitrios Mastoras** is a Master Police Officer and the Restaurant Liaison Officer at ACPD. He oversees the Clarendon Detail officer team and created ARI. Together with Dr. Gill, he supervised projects to develop evidence-informed approaches to expand ARI. He will provide insights about the nightlife issues in the area and other neighborhoods and facilitate researcher access to police personnel and business owners.

#### 3.2 Team Management Plan

**Dr. Zhang** and **Dr. Korkmaz** will oversee all of the activities of the proposed project. **Dr. Zhang** will supervise a team of graduate students (~ 20) in her Computer Application in Planning (UAP5114, Spring 2018) and Planning Studio (UAP5125, Fall 2018) courses to collect existing literature and current practices and synthesize impact measurement metrics. The students will also collect and process external data sources, conduct difference-in-difference impact analysis, and prepare meta data to fuel the data dashboard.

As the leads of the DSPG program, **Dr. Korkmaz** and **Dr. Schroeder** will supervise a team of students and a graduate fellow that will discover relevant data sources, be responsible for the collection and analysis of the data, and develop the dashboard.

**Dr. Gill** will oversee the development and implementation of the survey and focus group instruments and form and manage a team of undergraduate and graduate student interns and federal work-study students to collect and analyze the qualitative data.

**Cpl. Mastoras** will also provide the data collected by ACPD as well as other agencies and businesses that collaborate. The team will have bi-weekly status update calls.

The detailed timeline, project milestones, and deliverables are tabulated in Table 1.

**Table 1:** Project Schedule, Deliverables and Milestones

Activity & Deliverables & Management	Date	Description
Project Kick-off Meeting (Team)	3/5 - 9	Virtual team meeting to finalize the project plan and timeline
VT Urban Affairs and Planning Course (Dr. Zhang)	Spring 2018, 1/16 - 5/9	Collect existing literature and current practices and synthesize impact measurement metrics. Discover, organize, and clean data and prepare meta data for the dashboard.
GMU Survey Design (Dr. Gill)	3/5 - 5/9	Development and implementation of the survey and focus group instruments
Status Report & Presentation (Team)	5/14 - 5/18	Share progress with ACPD for feedback
GMU Data Collection (Dr. Gill)	5/21 - 7/6	Collect and organize the qualitative data
DSPG (Drs. Korkmaz and Schroeder)	5/21 - 8/8	Data discovery, collection, analysis and development of the dashboard, incorporate qualitative data
DSPG Symposium Presentation (Dr. Korkmaz)	8/9	Pilot dashboard presentation to ACPD at the poster session
VT Planning Studio (Dr. Zhang)	Fall 2018, 8/20-12/13	Data Visualization and dashboard improvement
Dashboard v.2 (Team)	8/9 - 20	Incorporate feedback
Dashboard v.3 (Team)	8/27 - 10/5	Incorporate feedback
Dashboard v.4 (Dr. Schroeder)	10/8 - 12/13	Heuristic testing and documentation
Final Report & Presentation to ACPD (Team)	12/13	Present findings and the dashboard to ACPD leadership

### 3.3 Human Subject Research and Data Management Plan

VT team has already data sharing agreement with ACPD and ACDF that gives access to the 911 call, crime, fire and EMS data. The IRB approval has been in place with the Protocol Number 14-799. Dr. Gill will obtain approval from GMU's IRB for qualitative data collection activities. GMU IRB is familiar with Dr. Gill's prior work with ACPD and is likely to make a decision within 1-2 weeks to approve the protocol once the instruments are developed.

### Budget Justification

*Total funds requested for 1-year period: \$8,000 (direct cost only)*

*Senior/Key Personnel:* No salary is requested for the investigators. An amount of \$2,719 is requested for one month of a graduate student. *Other Personnel:* A stipend in the amount of \$3,281 is requested for a DSPG graduate fellow, responsible for data analysis and supervising undergraduate students for data exploration, cleaning and analysis, and developing the dashboard. *Travel:* A total of \$2,000 is requested for domestic travel for Dr. Zhang and VT students between Blacksburg and Arlington to present their findings at the ACPD.