

BACKGROUND

- The World Health Organization (WHO) estimates that by 2030 there will be more than 8 million deaths attributable to tobacco use.
- According to the Centers for Disease Control and Prevention (CDC) in the U.S, smoking and Second-Hand Smoke (SHS) contribute to about 480,000 deaths annually
- Philadelphia had the highest rate of adult smokers among the 10 largest U.S. cities, at 25.2% in 2010. Overall, in the U.S., the smoking rate was only 17.5%; well below the rate in Philadelphia.
- Researchers have found that in neighborhoods with high prevalence of tobacco retailers, the prevalence of smoking is higher in adults and youth.
- Much research has looked at the association between tobacco retailer density and adolescent smoking behavior, but no research has been done on tobacco retailers and adult smoking behavior at parks
- This study sought to identify whether there was an association between proximity of tobacco retailers and adult park-patron smoking behavior at the entrances of three Philadelphia parks in May and June, 2016.

METHODS

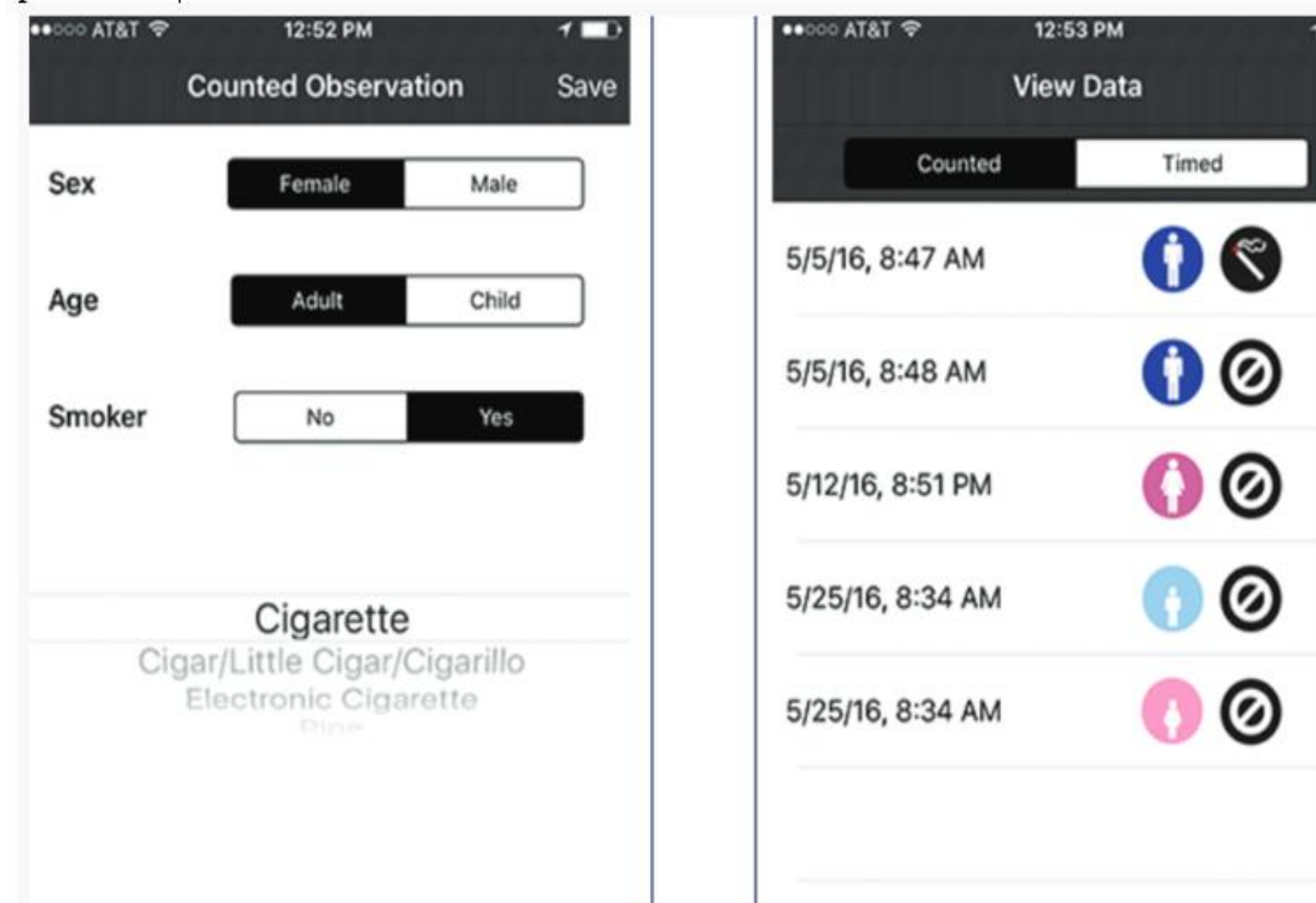
Study Design

- Observational Study done at Washington Square Park, Independence Square Park, and Louis Khan Park during Advanced Epidemiology class on Thursdays from 4:15 PM to 4:45 PM during the months of May and June using the ObserveSmoking smartphone application **Figure 1**

Data Collection and Analysis

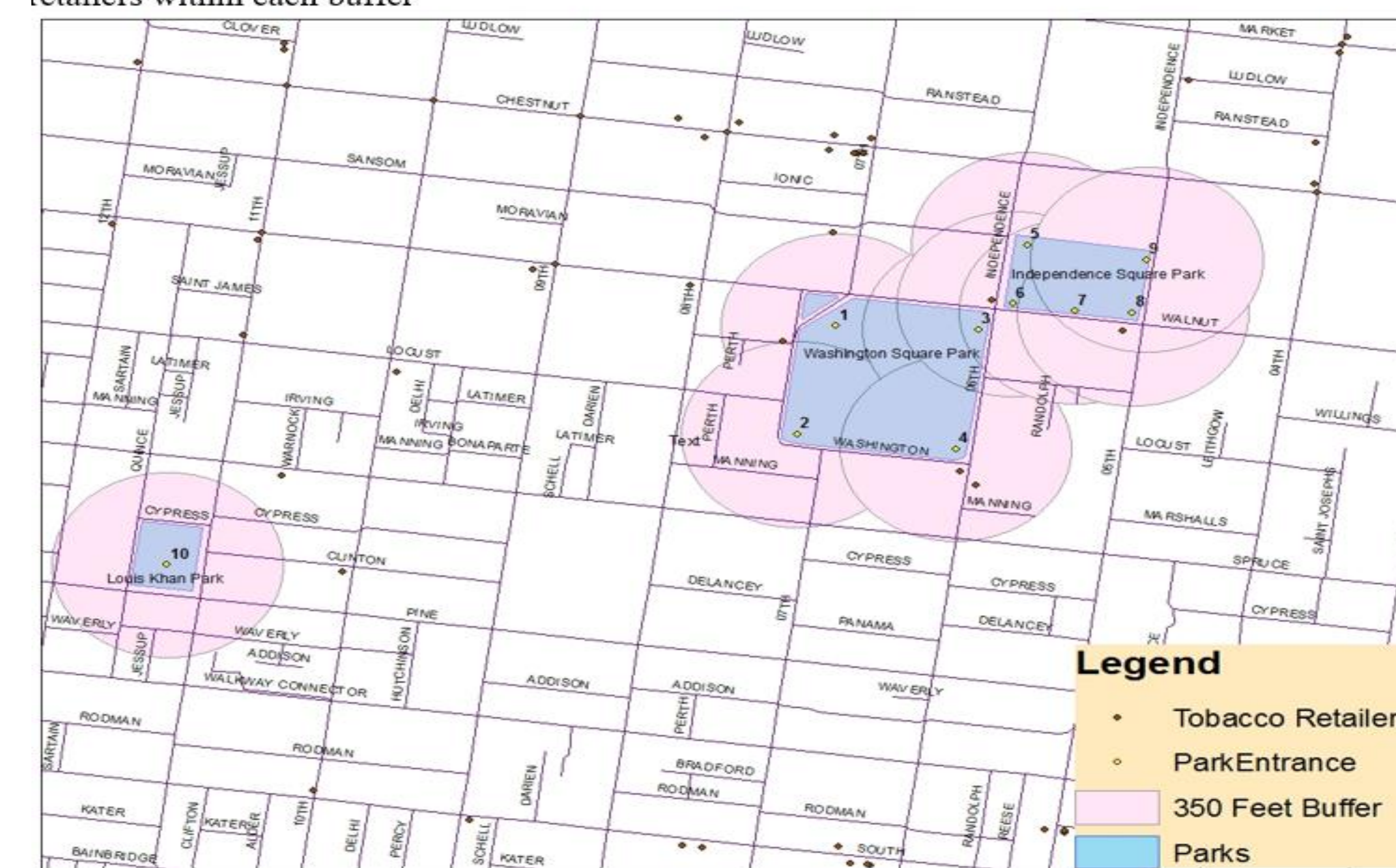
- Simultaneous observations were performed at each park entrance. People were observed as they entered the park. Observers were assigned to one of the entrances at each park and they were responsible for recording the sex (Male or Female), age (Adult or Child), Smoking status (Smoker or non-Smoker) in the ObserveSmoking application.
- Tobacco retailers' addresses were obtained from Philadelphia Department of Public Health. A buffer map was created to count all the tobacco retailers within 350 feet of each park entrance using ArcGIS 10.3 mapping software. Chi-square and logistic regression analyses were done in IBM SPSS Statistics version 25. All variables were treated as categorical except for number of tobacco retailers by entrance

Figure 1 The ObserveSmoking smartphone application used by observers to collect all park patrons' data



RESULTS

Figure 2 The map shows Washington Square Park, Independence Square Park, and Louis Khan Park with the 350 foot buffer drawn around the entrances of each park along with the tobacco retailers within each buffer



- Entrances with 1 tobacco retailer had the highest number of smokers followed by entrances with zero tobacco retailers. Entrances with the least number of smokers were the entrances with 2 tobacco retailers.

Table 1 Demographics, smoking behavior, and tobacco retailers proximity by entrances observed among adult park patrons at Washington Square Park, Independence Square Park, and Louis Khan Park during the months of May and June 2016

| Demographics | Total (N= 4822) N(%) | Smokers (N= 124) N(%) | Non-Smokers (N= 4698) N(%) |
|---|----------------------------|-----------------------------|----------------------------------|
| Sex | | | |
| Male | 2391(49.6) | 73(3.1) | 2318(96.9) |
| Female | 2431(50.4) | 51(2.1) | 2380(97.9) |
| Park | | | |
| Washington Square | 2680(55.6) | 61(2.3) | 2619(97.7) |
| Independence Square | 1903(39.5) | 45(2.4) | 1858(97.6) |
| Lois Khan Park | 239(5.0) | 18(7.5) | 221(92.5) |
| Park Entrance at Washington Square | | | |
| 1 | 822(17.0) | 16(1.9) | 806(98.1) |
| 2 | 732(15.2) | 26(3.6) | 706(96.4) |
| 3 | 431(8.9) | 16(3.7) | 415(96.3) |
| 4 | 695(14.4) | 3(0.4) | 692(99.6) |
| Park Entrance at Independence Square | | | |
| 5 | 613(12.7) | 17(2.8) | 596(97.2) |
| 6 | 308(6.4) | 3(1.0) | 305(99.0) |
| 7 | 234(4.9) | 15(6.4) | 219(93.6) |
| 8 | 394(8.2) | 2(0.5) | 392(99.5) |
| 9 | 354(7.3) | 8(2.3) | 346(97.7) |
| Park Entrance at Louis Khan Park | | | |
| 10 | 239(5.0) | 18(7.5) | 221(92.5) |
| Tobacco Retailers by Entrance | | | |
| 0 | 971(20.1) | 44(4.5) | 927(95.5) |
| 1 | 2922(60.6) | 62(2.1) | 2860(97.9) |
| 2 | 929(19.3) | 18(1.9) | 911(98.1) |

- It was found that there were lower likelihood of smoking when there were 1 or 2 tobacco retailers within 350 feet of an entrance to zero tobacco retailers within 350 feet of an entrance with (OR 0.499, CI 0.288, 0.865) for 1 retailer and (OR 0.484 CI 0.259, 0.906) for 2 retailer.
- Louis Khan Park had a greater likelihood of smoking in comparison with Washington Square park (OR 2.149 CI 1.155, 3.999).
- Independence Square had slightly higher likelihood of smoking in comparison to Washington Square Park (OR 1.296, CI 0.815, 2.062)
- Male had a higher likelihood of smoking in comparison to females (OR 1.452, CI 1.009, 2.091)

Table 3 Prediction of smoking among adult park patrons in Washington Square Park, Independence Square Park, and Louis Khan Park during the month of May and June 2016 (N=4822).

| Logistic regression variables (Reference) | P-Value | Adjusted odds ratio | 95% CI |
|---|---------|---------------------|--------------|
| Male (Female) | 0.045 | 1.452 | 1.009, 2.091 |
| Independence Square Park (Washington Square Park) | 0.274 | 1.296 | 0.815, 2.062 |
| Louis Khan Park (Washington Square Park) | 0.016 | 2.149 | 1.155, 3.999 |
| One Retailer (Zero Retailer) | 0.013 | 0.499 | 0.288, 0.865 |
| Two Retailer (Zero Retailer) | 0.023 | 0.484 | 0.259, 0.906 |

DISCUSSION & LIMITATIONS

- This study identified the association between tobacco retailers' proximity and park patrons' smoking behavior at three Philadelphia parks
- It was found that park entrances with only one retailer had higher numbers of smokers entering the park in comparison with entrances that had two retailers. But the entrance with zero retailers also had more smokers than the entrance that had two retailers.
- This contradicts previous studies that have been done on tobacco retailers and smoking behavior. This can be due to the location of the entrance of each park.
- The entrances of Washington Square Park and Independence Square Park are located near a tourist site which can also bring fewer smokers.
- The results from this study can help organizations such as the PDPH to identify how the tobacco environment effects smoking in parks
- Further studies can expand this study to include more parks and more time frames instead of just one day of the week at 4:15 to 4:45PM.
- A limitation to this study was the narrow focus. This study only focused on three parks and on a single time frame, which could limit the amount of data available.
- With such a narrow focus this data may not be representative of all parks and to the general population.

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