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Law enforcement manpower analysis: an enhanced calculation model

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Abstract

Purpose – This study aims to advance the existing analytic model to include staff allocation information at the district level. Maintaining adequate size of staff is essential to law enforcement agencies' ability to ensure social order, fight crime and, increasingly, deliver a widening range of social services. Review of the scientific literature on police size of force and staffing calculation models indicates that this line of inquiry (i.e. manpower analysis) is attentive to population size and workload demands but generally inattentive to how service demands are affected by community-level variables. Current staffing calculation models specify number of staff needed for a jurisdiction but do not inform the allocation of personnel across districts within the jurisdiction.

Design/methodology/approach – To address this problem, the current study illustrates an enhanced analytic model to provide law enforcement staffing recommendations for a southern coastal county. An integrated per capita-workload manpower analysis model first factors the minimum number of law enforcement deputies needed per population size served and recent history workload demands and then executes the six-step workload model process. This study enhances staffing analysis by adding an additional seventh arithmetical step indicating the staffing needs by districts across a jurisdiction.

Findings – The results from the integrated per capita-workload analysis indicate the need to hire additional deputies to meet current and future demands.

Originality/value – Discussion centers on the need to include drivers of police services identified but not measured in this study's application of the hybrid manpower analysis model and its replication potential.

Keywords Manpower analysis, Strength of force, Law enforcement staffing

Paper type Research paper

Introduction

A democratic society based on rule of law depends upon law enforcement for public safety and social order maintenance. As the face of government, police presence is vital to both the perception and reality of safe and orderly communities, so ensuring a sufficient police force is an essential sociopolitical issue. Historically, the number of officers or deputies needed has been viewed in terms of crime fighting and law enforcement functions (Carriaga and Worrall, 2015; Kleck and Barnes, 2014). Law enforcement across the country, however, has been required to deliver a steadily increasing range of services in addition to traditional crime fighting objectives – to such an extent that many agencies are hard-pressed to maintain quality performance indicators such as response times and number of dispatch calls answered. Timely response is further challenged by spiraling contemporary social problems, especially mental health, substance abuse and recent justice system developments. National criminal justice system trends of offender declassification and prison overcrowding, for example, have relocated the responsibility for housing lower-level felony offenders and their treatment programming from state to community corrections (i.e. county jails and probation offices), necessitating additional detention officers often at the expense of patrol slots (Miller *et al.*, 2019). Per the large number of dynamic variables that collectively inform adequate size



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of force, calculating an agency's staffing needs is a complex endeavor, with direct implications for quality of life return on public expenditure.

The scientific knowledge base on police strength has thoroughly examined the relationship between number of patrol officers and crime rates – a line of research that has continued since the 1960s (Lee *et al.*, 2016). Alternatively, subsequent and more applied research has been concerned with the question of how many officers or deputies are needed to respond to calls for service that vary per the specific crime and social issues within a jurisdiction (Hollis and Wilson, 2015; Wilson and Weiss, 2012; McCabe, 2013; and Koper *et al.*, 2001). This body of police staffing research is known as *manpower analysis* and, while there are multiple calculation models, most agencies rely on either: a *per capita* approach specifying the number of officers needed per population served or a *workload performance*-based approach that factors the nature of services provided across shifts. Other less used staffing models include crime rate reactive and agency objective-based approaches, but there is virtually no research considering their calculation rigor or soundness in staffing outcomes.

While there are tradeoffs and assumptions particular to each of the calculation models, clearly, the size of the citizenry, quantity of calls and nature of services actually delivered must be factored comprehensively to inform the quantity of officers required to meet demand. It is important to note that law enforcement performance is also heavily influenced by local socioeconomic and ecological factors that command police resources to different extents across and sometimes within districts and sectors of jurisdictions. Thus, variability in demands for services by units across the jurisdiction must also be factored into size of force determinations overall as well as officer placement within jurisdictions (Wilson and Heinonen, 2012; Maloney and Moty, 2002; and McGinnis, 1989). Drawing upon official county and state agency data, this study employed an integrated per capita-workload research design to specify the immediate and near-future staffing needs for the Flagler County Sheriff Office (FCSO) located on the east coast of central Florida between St. Augustine and Daytona Beach.

After briefly reviewing the scientific literature on size of force and manpower analytic approaches, we describe the research setting and present an improved research design with formulaic extension of established models. We incorporate population size served and execute the established six-step method assessing demands for law enforcement services but also add an additional arithmetical step to consider demands for services across districts within the jurisdiction to enable more effective officer allocation. The findings indicate immediate (2020) and near-future (2025) staffing needs necessary to maintain basic law enforcement services at current and projected future levels based on the study agency's hiring, training and retention data, as well as county growth and development trends known to impact size of force observations (Chamlin, 1989). Discussion focuses on the implications for agency staffing and the broader issue of how the illustrated hybrid manpower analysis model can better inform staffing needs for police departments and sheriff offices, generally.

Background

The scientific literature on the size of police force is essentially a dichotomy of either criminological research on the relationship between size of force and crime rates or less theoretical and more technocratic studies on number of officers needed to meet demands for services (i.e. manpower analysis). Reducing crime by adding officers has long been and remains a common promise in mayoral and gubernatorial campaigns across the nation as commitments of more law enforcement, particularly in settings plagued with urban violence, convey notions of more protection and crime suppression (Payne, 2017). That adding officers will decrease crime through literal and perceived increased risk of arrest seems logical but has been proven to not necessarily be the case as offenders may not perceive increased arrest risk

and continue at the same rate of offending or simply migrate away from areas with increased officer presence.

Related, the premise that adding police will reduce crime has been controversial since the well-known Kansas City Preventative Patrol experiment (Kelling *et al.*, 1974), where selective increases in officers shifted around but did not reduce the overall amount of crime over time. Specifically, the Kansas City study and replications of it have demonstrated that saturating an area with officers tends to only generate a “push” effect that resituates criminal activity in nearby less enforced areas (Risman, 1980). In that, law enforcement cannot be everywhere at once, increased presence may project a deterrence optic, but at best, only slows some street and vice crime. Overall, area saturation only minimally affects a city or county’s overall extent of crime.

More recent systematic size of force reviews have reaffirmed that crime rates are rarely associated with fluctuations in force size but also acknowledge that force reduction may lead to increases in crime (Lim *et al.*, 2010; Kleck and Barnes, 2014; Carriga and Worrall, 2015). In short, the summative conclusion of the crime rate – number of police line of research, including a meta-analysis by Lee *et al.* (2016) that examined 62 size of force studies, is that policing style more so than officer head count affects crime rates (Stindall and Sturgis, 2013). Despite overwhelming evidence, such as Lee’s meta-analysis, researchers keep examining the officer–crime rate correlation to no new results and politicians continue to promise that more police will reduce crime. The vast majority of criminologists and criminal justice scientists, however, acknowledge that the crime rate–officer-level question has been answered, and that this line of research has been exhausted.

In that, crime rate alone cannot indicate appropriate size of force, scholars have turned to multiple alternative indicators that, collectively, can more accurately specify an agency’s staffing needs through analysis of actual officer functions and services provided (Koper, 1995). By acknowledging crime prevention and crime fighting as only part of the police function, the demands for other services the police supply must be taken into account and, for the purpose of staffing determinations, thought of as drivers that obligate officer shift time (Lee *et al.*, 2018; Terrill *et al.*, 2014; Dean *et al.*, 2000). The variety of services now required of law enforcement that obligates time and takes officers out of rotation for dispatch to service calls was recently observed by a southern state Supreme Court Justice:

Police officers wear many hats: criminal investigator, first aid provider, social worker, crisis intervener, family counselor, youth mentor and peacemaker, to name a few. They are charged with the duty to protect people, not just from criminals, but also from accidents, natural perils and even self-inflicted injuries. We ask them to protect our property from all types of losses—even those occasioned by our own negligence. They counsel our youth. They quell disputes between husband and wife, parent and child, landlord and tenant, merchant and patron and quarreling neighbors. Although they search for clues to solve crime, they also search for missing children, parents, dementia patients, and occasionally even an escaped zoo animal. They are society’s problem solvers when no other solution is apparent or available – Tennessee Supreme Court, May 9, 2016.

These multi-faceted demand for services ebb and flow across jurisdictions per community needs and service demands, agency objectives regarding how much time officers should spend on proactive and community policing, training needs and shift relief to prevent officer fatigue (Wilson and Weiss, 2012). Next, we observe leading manpower analysis models to inform design of a more rigorous one that includes the expanded scope of contemporary police services, population and community growth, human resource issues of recruiting and attrition and calls for services and the nature of services needed. It is important to specify the type of service being delivered, as traffic, mental health and substance abuse emergencies oblige more manpower and length of time on call than more basic officer–citizen encounters (Miller and Miller, 2016). Related, it is also important to distinguish how demands vary by call

type, time and location; amount of time spent on calls; and how these fluctuate across day of week and work shift.

Leading manpower analysis models

Leading manpower analysis models include crime trends, minimum levels, per capita and workload performance-based approaches. The research literature has identified shortcomings of the crime trends and minimum level strategies (Hollis and Wilson, 2015; Wilson, 2012; Koper *et al.*, 2001), noting that police staffing responsive to crime trends is too reactionary and oriented toward neither optimal law enforcement performance nor community needs over time, and the minimum level approach has been proven problematic, in that setting staffing levels for fixed periods of time tends to limit responsiveness to emergent and changing crime patterns and service demands, as well proving difficult to align with police union contracts. Accordingly, the vast majority of manpower analyses employ either the per capita or workload model.

The per capita model of manpower analysis was previously promoted by the International Association of Chiefs of Police (IACP) as the preferable method for determining size of force with a specified officer per 1,000 citizens. False assumptions of this approach, however, include: all employees are dispatch available when the number should be patrol officers minus officers assigned to specialized units; the amount of officers assigned to a shift reflects actual police force and available manpower when the actual number of officers per shift varies due to absenteeism for training, vacation, sick leave, etc.; and that work functions of patrol, crime prevention and community policing are time balanced across shifts. A current technical report on the IACP webpage acknowledges these issues, denounces the per capita approach and notes that manpower analysis entails a multi-faceted calculation process (IACP, 2020).

Decades of direct observation research has shown that police officers spend more time on activities not related to crime, such as traffic accidents, noise complaints and service delivery, than on crime-related activities (Terrill *et al.*, 2014) and indicate that police force size should be determined by a complex set of factors informed by workload, actual service and agency and community drivers. Common variables to be considered include citizen demand for services, proactive/cutting-edge policing practices, training, shift relief and attrition. These important variables are factored into the workload analysis approach that is customizable to individual agency resources and workload and thus the more comprehensive of the two leading manpower analysis models.

The workload analysis model is oriented in actual levels of demand for police services and matches that demand with the supply of police resources. Typically, this approach relies on an examination of calls for services received by a department and understood in terms of supply and demand. This method enables comprehensive assessment of workload through both calls for service, operational commitments placed on a department (such as service contracts, grant conditions and specialized units) and shift and squad information – data all available from law enforcement agencies. This approach also requires additional community as well as county and state agency data that empirically condition and contextualize the final staffing observations. This calculation model entails the execution of six analytic steps indicating workload relative to available resources. Accordingly, we propose a blended per capita and workload-based analytic plan that merges the strengths of each with the addition of a seventh step factoring demands across a jurisdiction's districts (Maloney and Moty, 2002; McCabe, 2013).

Methods

Noted shortcomings notwithstanding, the basic per capita model has been the most utilized of the police staffing formulas and provides a crude reference of minimum officers needed consistent with agency past staffing practices. Per capita data also provide an opportunity to

examine how officer staffing compares to other law enforcement agencies on national, regional, state and local levels. As a first phase of empirical observation, then, per capita assessment provides a general benchmark from which a second workload analysis phase involving arithmetical adjustments factoring drivers of police time indicates final staffing needs. Workload analysis is comprised of seven sequential analytic steps identifying specific staffing needs based on the number of officers (supply) relative to the number of calls for service (demand). Individually and collectively, these data indicate whether and to what extent an agency is understaffed and if hiring additional personnel is necessary to approximate recent year performance records for number of dispatches and response times. After describing the research setting and agency characteristics, we explain our integrated model and methodologically enhanced stepwise approach to manpower analysis.

The study research setting was Flagler County, located on the east coast of central Florida and home to the tourism areas of Palm Coast and Flagler Beach. With a size of 483 square miles, Flagler is the seventh smallest county in the State of Florida, with an estimated 108,000 predominantly white residents with an average income of US\$50,000 per year (US Census Bureau, 2020). The leading industry is healthcare per a large retiree population mostly residing in the City of Palm Coast, the county's major residential area with a population of 83,000 (US Census Bureau, 2020). The FCSO is responsible for law enforcement services and management of the county jail. The FCSO is the only full-service law enforcement support to the county, as well as the main law enforcement provider for the City of Palm Coast that has no police department. For patrol purposes, the county is separated into three districts comprised of multiple sectors, with the vast majority of residents and demands for FCSO services concentrated in the City of Palm Coast (District 2) that, in turn, is provided enhanced law enforcement services through a special contract between the City and the FCSO. Staffing and shift relief data were provided by the FCSO and other county agencies.

Official data from the Florida Department of Law Enforcement (FDLE) indicate the FCSO employed 170 deputies during 2018. At any one time (i.e. shift observation), the maximum number assigned was 19 patrol deputies for a total of 76 across four units. Each unit includes two sergeants, two corporals and 15 deputies whose responsibilities include, but are not limited, to responding to calls for service across the FCSO's three districts. Shift data for deputies assigned to traffic, K9, marine and agricultural units were reviewed during the data gathering process, but ultimately excluded from consideration in the workload analysis because these positions are not part of dispatch rotation.

Findings

Per capita findings

The Federal Bureau of Investigation compiles staffing information from law enforcement agencies across the USA presented by region for staffing level comparison to local and national agencies. Figure 1 depicts the number of full-time officers per 1,000 residents across all regions and the South region's average of 2.5 full-time officers per 1,000 residents. This staffing level ranks second behind the Northeast (2.7) and ahead of the Midwest (2.2) and West (1.6). At present, the FCSO has a staffing level of 1.70 full-time officers per 1,000 residents, falling well below the 2.5 level of staffing for agencies in the region.

While the number of officers per 1,000 residents by region provides an understanding of officer staffing across the four defined regions of the USA, it is important to examine the level of staffing by population within an agency's own region. Figure 2 depicts the number of full-time officers per 1,000 residents by population in the South. Flagler County currently falls into the category of 50,000 to 99,999. On an average, agencies within this category staff 1.9 full-time officers per 1,000 residents. Given the trajectory of population growth estimated for Flagler County, it is important to consider the adjacent category of 100,000 to 249,000

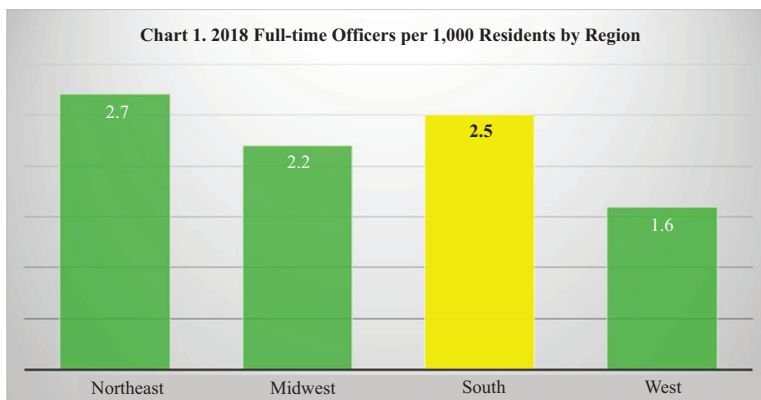


Figure 1. 2018 full-time officers per 1,000 residents by region. Source: Federal Bureau of Investigation (2020)

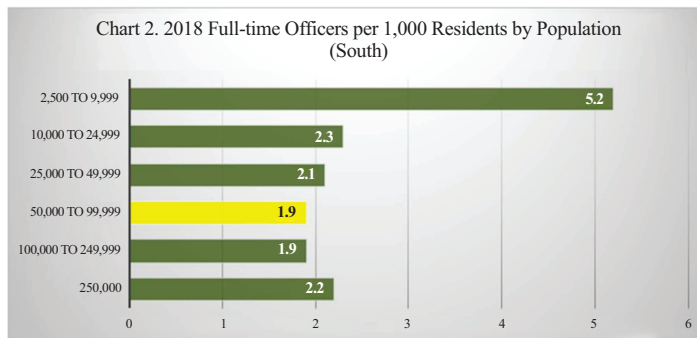


Figure 2. 2018 full-time officers per 1,000 residents by population (South). Source: Federal Bureau of Investigation (2020)

residents. In this case, the 100,000–249,000 category also staffs an estimated 1.9 full-time officers per 1,000 residents. At present, the FCSO has a staffing level of 1.70 full-time officers per 1,000 residents – below the staffing levels of other agencies in the South with a similar population size.

The regional information provided by the Federal Bureau of Investigation allows for comparisons against other similarly sized agencies in the South region. However, it is important to also make comparisons to neighboring agencies within the State of Florida. Data from the FDLE are utilized to compare FCSO staffing to staffing in nearby St. Johns, Putnam and Volusia Counties. In this case, the FCSO ranks third out of the four agencies, with 1.70 deputies per 1,000 residents, as noted in [Figure 3](#).

Workload analytic steps and findings

To better illustrate how the empirical observations in turn inform subsequent step calculations, we present the findings of each step executed to provide final staffing recommendations. Through a series of calculation steps drawing upon official FCSO shift and squad data, this analytic approach estimates the minimum number of deputies needed (supply) to respond to the number of service calls (demand). These estimates are inherently

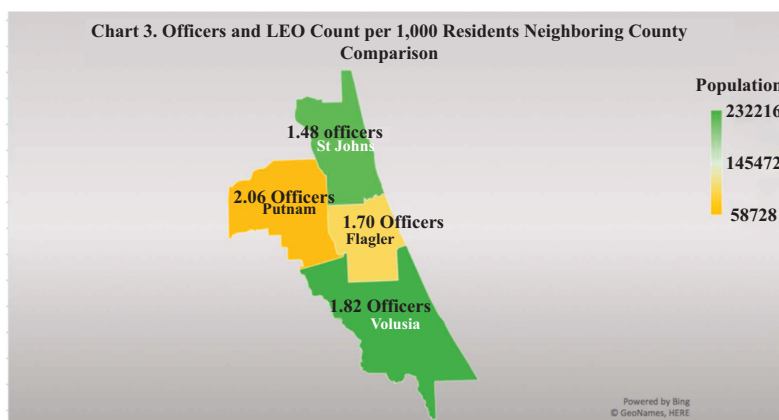


Figure 3. Officer and LEO count per 1,000 residents neighboring county comparison. Source: Florida Department of Law Enforcement (2020)

conservative because it assumes that patrol activity is limited to responding to calls for service. Adjusted estimates are provided to account for time spent on other activities (e.g. patrol, proactive policing, community engagement, etc.).

Step 1 – calls for service

The FCSO utilizes a 12-h day or night shift staffing model for patrol deputies and, similarly, calls for service are divided by days and nights as reflected in the FCSO current staffing model. The FCSO received 102,691 calls for service during 2018, with the majority (62,050) received during the day shift as opposed to 40,641 night shift calls.

The 102,691 calls for service reflect instances where a single deputy was dispatched, but the figure does not capture instances where more than one deputy was dispatched or instances of self-dispatch to assist with calls. A conservative adjusted call for service calculation of 5 percent is included for day and night shifts in Table 1 to account for calls where multiple deputies are dispatched or self-dispatch. The 5 percent adjustment results in 65,153 calls for service during the day shift and 42,673 calls for service during nights. From this point forward, all calculation will be based on the 5 percent adjusted number of calls for service.

Step 2 – time to address calls for service

The next step requires an inspection of the amount of time spent to address each call for service and the calculation of an average time spent for all calls for service. In this study, time spent per call includes time responding to the call for service, time on scene and time to complete administrative tasks (e.g. paperwork and follow-up). The average time spent per call on day shift was 1:33:22 rounded to 93 min. The average time per call on night shift was 0:39:59 rounded to 40 min. A weighted average was calculated to account for the difference in the number of calls on day and night shifts, resulting in a 72-min average time per call. The adjusted number of calls is multiplied by the average time per call to calculate number of minutes required to respond. The total number of minutes for day and night shifts are

Shift	CFS	5%	Total (CFS + 5%)
Day	62,050	3,103	65,153
Night	40,641	2,032	42,673

Table 1. FCSO 2018 adjusted calls for service by shift

converted to hours by dividing by 60 min, as illustrated in Table 2 outlining the time required by FCSO deputies to respond during 2018 assuming 5 percent of calls involved multiple deputies.

Step 3 – minimum deputies to address 2018 calls for service before shift relief factor

The next step in the process is to calculate the minimum number of deputies by shift needed to respond to service call level. The initial calculation of minimum number of staff by shift is based on FCSO deputies working 12 h per day, 365 days per year (4,380) hours. To this end, the total number of hours is divided by 4,380 to determine the minimum number required per shift. Table 2 indicates that a minimum of 18 deputies is needed per day shift and 12 per night shift. Note, this calculation does not consider the shift relief factor, which will subsequently be calculated and included to reflect the difference between the maximum number of hours an officer could and actually works.

Step 4 – minimum staff per shift to meet performance objectives before shift relief

Once the minimum number of deputies per shift has been calculated, the performance objectives of the organization must be considered. Each column of Table 3 indicates a percentage of time a deputy is assumed obligated (e.g. 100, 75, 50 and 33 percent) that, for the purpose of this analysis, refers to the percentage of time patrol officers spend responding to calls for service. The “Obligated 100%” column illustrates the minimum number needed per shift assuming deputies spend 100 percent of work time responding to calls for service. In reality, they spend a considerable portion of time performing policing-related tasks beyond responding to calls for service (e.g. patrol, proactive policing, community engagement, etc.). The percentage of time allocated to other policing-related tasks is determined by the performance objective identified by the policing agency to best meet the needs of the jurisdiction it serves. The IACP suggests that patrol officer time be divided equally across three work categories: responding to calls for service, patrol and administrative duties (Wilson and Weiss, 2012). In other words, one-third of shift time would be obligated to responding to calls for service, while the remaining two-thirds would remain unobligated to allow for other policing-related activities such as patrol and administrative duties. To comply with IACP’s recommendation, the FCSO would need 54 deputies per day shift and 35 per night shift. More conservative estimates are provided in the “Obligated 50%” and “Obligated 75%” columns. Note, these are the minimum number of deputies needed by shift before the calculation and inclusion of the shift relief factor.

Step 5 – calculation of shift relief factor

A shift relief factor calculation is needed to reflect the difference between the number of days a deputy can and actually does work. To this end, we first calculate the total number of hours that would be worked if a 12-h shift was completed each day of the year

Table 2.
Time spent on 2018 calls for service and minimum deputies by shift

Shift	Minutes	Hours	Deputies required
Day	4,691,016	78,184	17.85
Night	3,072,456	51,208	11.69

Table 3.
Minimum deputies by shift with varying performance objectives

Shift	Obligated 100%	Obligated 75%	Obligated 50%	Obligated 33%
Day	17.85	26.78	35.7	53.55
Night	11.69	17.54	23.38	35.07

($365 \times 12 = 4,380$). From there, we subtract the annual time off hours for a FCSO deputy (2,564). Time off for the FCSO deputies includes personal time, vacation time, holidays, sick leave and seven days off per 14-day period. Lastly, divide the potential number of hours a deputy could theoretically work (4,380) by the actual specified number of hours worked (1,816) to obtain a shift relief factor of 2.41. The shift relief factor reflects the number of FCSO deputies that must be assigned to ensure that at least one is indeed working.

Flagler County Sheriff Office shift relief calculation.

$$365 \text{ days per year} \times \text{shift length} / (365 \times \text{shift length} - \text{total time off})$$

$$365 \times 12 / (365 \times 12 - 2,564)$$

$$4,380 / (4,380 - 2,564)$$

$$4,380 / 1,816$$

$$2.41$$

Step 6 – minimum deputies per shift with shift relief factor

The final step in the analysis process is to calculate the minimum number of deputies assigned to each shift considering the number of calls for service, performance objectives of the agency and shift relief factor. Table 4 provides these calculations in four columns. The first column reflects the minimum number of officers per day and night shifts if sworn staff spend 100 percent of their time responding to calls for service. The second, third and fourth columns depict the minimum number needed per shift based on the performance objectives of the agency. The “Obligated 75%” column indicates that the FCSO must have a minimum of 65 days shift and 42 night shift deputies, with the expectation that 75 percent of the time is spent responding to calls for service and the balance in other policing-related activities.

Step 7 – workload analysis by Flagler County Sheriff Office district

In Steps 1–6, we outline the process for calculating the minimum number of deputies needed per shift to respond to 2018 calls for service. The FCSO jurisdiction is divided into three districts. District 1 accounts for roughly 11 percent (11.19 percent) calls for service, and District 3 accounts for 16 percent (16.09 percent) of calls for service. Collectively, Districts 1 and 3 represent 27 percent (27.28 percent) of all of the study agency’s calls for service. The remaining 73 percent (72.73 percent) occur in District 2, thus relating unequal distribution of calls for service across the three districts and the need to differentially distribute patrol. Step 7 repeats the calculations carried out in Steps 1–6, but applies them to FCSO districts.

Shift	Obligated 100%	Obligated 75%	Obligated 50%	Obligated 33%	Table 4. Minimum deputies per shift by performance objective including the shift relief factor
Day	43.02	64.53	86.04	129.06	
Night	28.17	42.26	56.35	84.52	

District	CFS	5%	Total (CFS + 5%)	Table 5. FCSO 2018 adjusted calls for service by district
1	11,488	574	12,062	
2	74,683	3,734	78,417	
3	16,520	826	17,346	

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Table 5 depicts the calls for service and adjusted call for service by district. Table 6 outlines the time of service for all FCSO calls and the minimum number of deputies needed per district to respond before including the shift relief factor. Table 7 indicates the minimum number of deputies needed per district to meet varying performance objectives.

Table 8 illustrates the minimum number of deputies needed per district including the shift-relief factor. To determine the minimum number of deputies needed per district and shift, we consider the percentage of FCSO calls for service that take place across shifts (60 percent in the day and 40 percent for night).

Finally, Table 9 outlines the minimum number of deputies per district and shift, considering varying performance objectives. The “Obligated 75%” column indicates that FCSO District 1 requires a minimum of seven deputies during day shifts and five for nights. FCSO District 2 requires a minimum of 47 deputies assigned to day and 31 assigned to night, and finally, District 3 requires a minimum of ten for days and seven for nights. Again, these numbers reflect deputies spending 75 percent of their time responding to calls for service and 25 percent engaging in other policing-related activities.

Table 6.
Time spent on 2018 calls for service and minimum deputies by district

District	Minutes	Hours	Officers required
1	868,464	14,474	3.30
2	5,646,024	94,100	21.48
3	1,248,912	20,815	4.75

Table 7.
Minimum deputies by district with varying performance objectives

District	Obligated 100%	Obligated 75%	Obligated 50%	Obligated 33%
1	3.30	4.95	6.6	9.9
2	21.48	32.22	42.96	64.44
3	4.75	7.13	9.5	14.25

Table 8.
Minimum deputies per district, performance objective and shift relief factor

District	Obligated 100%	Obligated 75%	Obligated 50%	Obligated 33%
1	7.95	11.93	15.91	23.86
2	51.77	77.65	103.53	155.30
3	11.45	17.18	22.90	34.34

Table 9.
Minimum deputies per district and shift by performance objective including the shift relief factor

District	Obligated 100%		Obligated 75%		Obligated 50%		Obligated 33%	
	Day	Night	Day	Night	Day	Night	Day	Night
1	4.77	3.18	7.16	4.77	9.55	6.36	14.32	9.54
2	31.06	20.71	46.59	31.06	62.12	41.41	93.18	62.12
3	6.87	4.58	10.31	6.87	13.74	9.16	20.60	13.74

Conclusion

Per capita data from the FDLE indicate that the FCSO employed 170 law enforcement deputies in 2018, which translates to 1.70 deputies per 1,000 residents. This falls below the 1.9 officers per 1,000 residents rate for other similarly populated jurisdictions in the South and well below the 2.5 officers per 1,000 residents rate for all jurisdictions in the South. Based on 2018 population numbers, the FCSO would need to hire 20 additional deputies to realize a rate of 1.9 per 1,000 residents and 82 additional to meet the mark of 2.5 officers per 1,000 residents.

The findings from the workload analysis suggest that the FCSO needed 107 patrol officers obligated at 75 percent to address the 2018 FCSO calls for service. The data indicate that 76 patrol officers were assigned to patrol units during 2018, indicating the FCSO was short 31 patrol officers in 2018. Of note, if the FCSO patrol units had been adequately staffed there would have been 201 FCSO law enforcement officers, which translates to 2.0 officers per 1,000 residents. While still below the 2.5 officers per 1,000 average across all jurisdictions in the South, the number of officers and rate per 1,000 residents closely align with the 1.9 officers per 1,000 average for Southern jurisdictions with populations of 50,000–249,000.

Data from the 2019 Florida Demographics Estimating Conference and the University of Florida, Bureau of Economic and Business Research project, the population of Flagler County will be 112,463 in 2020 and 123,902 in 2025. Assuming a population of 112,463 in 2020, the FCSO will need 225 law enforcement officers to maintain a rate of 2.0 officers per 1,000 residents, and assuming a population of 123,902 by 2025, 248 deputies will be needed for an approximate rate of 2.0 deputies per 1,000 residents.

Study limitations and implications for related research

The current study relied on FCSO, FBI and FDLE data that may not optimally align with manpower needs in terms of capturing all drivers of police services. Minor issues were encountered when attempting to pull select data queries from the agency data management system such as the system's inability to provide average time of 2018 calls for service. However, the study agency's data system did provide an average time of service across day and night shifts, so a weighted average was calculated to approximate average time of service across all calls. Another limitation is that the workload analysis observed calls for service from a single year, providing a snapshot of staffing needs based on the number of calls for service in 2018 only; a multi-year analysis may reveal additional or alternative needs. If the numbers of calls for service fluctuate from one year to the next or the average time of service varies significantly, then additional adjustments to staffing levels would be necessary.

The interrelated issues of this study's bounded timeframe and the absence of identified, but unmeasured important drivers of police work (i.e. missing variables) in our enhanced model suggest the staffing recommendations herein err on the side of being too conservative. More exact time calculations, for example, of whether allocations of specialized traffic unit eases or exacerbates overall officer time obligation when proportioned per district would better inform which balancing enhanced service demand from the city with county-wide needs. Impending community change such as announcement of new planned housing in Palm Coast will bring issues correlated with the socioeconomic diversity that introduce additional demands for police services as will population growth across districts that will likely impact current deputy placements. Future research should strive to both measure all known drivers of police time and execute methods to better proxy time obligation as opposed to projected 50 or 75 percent thresholds. To do so, mixed-methods research will be required that will need to be site based to enable in-depth interviews with administrators, officers and other agency stakeholders to empirically gauge with greater precision the nature of calls for service and dispatch relationship. While there are remaining manpower analysis methodological issues to work out, the enhanced model here proffers law enforcement agencies the opportunity to

calculate overall staffing needs while gaining insight regarding demand-driven allocation of personnel.

References

- Carriaga, M.L. and Worrall, J.L. (2015), "Police levels and crime: a systematic review and meta-analysis", *Police Journal*, Vol. 88 No. 4, pp. 315-333.
- Chamlin, M.B. (1989), "A macro social analysis of change in police force size, 1972– 1982: controlling for static and dynamic influences", *The Sociological Quarterly*, Vol. 30 No. 4, pp. 615-624.
- Dean, C.W., Lumb, R.C. and Proctor, K. (2000), *Social Work and Police Partnership: A Summons to the Village Strategies and Effective Practices*, Criminal Justice Faculty Publications, available at: https://digitalcommons.brockport.edu/crj_facpub.
- Federal Bureau of Investigation (2020), "2018 Crime in the United States: fulltime law enforcement officers by region and geographic division by population group number and rate per 1,000 inhabitants, 2018", available at: <https://www.census.gov/quickfacts/flaglercountyflorida>.
- Florida Department of Law Enforcement (2020), "SO-Ratios-2018, available at: <http://www.fdle.state.fl.us/CJSTC/Publications/CJAP/CJAP-2018>.
- Hollis, M.E. and Wilson, J.M. (2015), "Police staffing levels: disaggregating the variation", *Policing: An International Journal of Police Strategies and Management*, Vol. 38 No. 4, pp. 820-839.
- International Association of Chiefs of Police. (2020), available at: <https://www.theiacp.org/technical-assistance>.
- Kelling, G.L., Pate, T., Dieckman, D. and Brown, C. (1974), *The Kansas City Preventive Patrol Experiment: A Technical Report*, Police Foundation, Washington, DC.
- Kleck, G. and Barnes, J.C. (2014), "Do more police lead to more crime deterrence?", *Crime and Delinquency*, Vol. 60 No. 5, pp. 716-738.
- Koper, C.S., Maguire, E.R., Moore, G.E. and Huffer, D.E. (2001), *Hiring and Retention Issues in Police Agencies: Readings on the Determinants of Police Strength, Hiring and Retention of Officers, and the Federal COPS Program*, Urban Institute, Washington, DC.
- Koper, C.S. (1995), "Just enough police presence: reducing crime and disorderly behavior by optimizing patrol time in crime hot spots", *Justice Quarterly*, Vol. 12 No. 4, pp. 649-672.
- Lee, Y., Eck, J.E. and Corsaro, N. (2016), "Conclusions from the history of research into the effects of police force size on crime -1968 through 2013: a historical systematic review", *Journal of Experimental Criminology*, Vol. 12 No. 3, pp. 431-451.
- Lee, B.X., Sells, D., Klimczak, M., Barber, C. and DeMatteis-Lepore, L. (2018), "Connecting criminal justice, mental health, and family support for better delivery of human services", *International Journal of Public Health*, Vol. 63 No. 8, pp. 897-898.
- Lim, H., Lee, H. and Cuvelier, S.J. (2010), "The impact of police levels on crime rates: a systematic analysis of methods and statistics in existing studies", *Pacific Journal of Police and Criminal Justice*, Vol. 8 No. 1, pp. 49-82.
- Maloney, M. and Moty, L. (2002), "The impact of community growth on the staffing and structure of a midsized police department", *FBI Law Enforcement Bulletin*, Vol. 71 No. 8.
- McCabe, J. (2013), *An Analysis of Police Department Staffing: How Many Officers Do You Really Need?*, ICMA Center for Public Safety Management White Paper, available at: <https://www.gjcity.org/contentassets/01596cb45cba4db185d671b04023f9f6/police-department-staffing-study.pdf>.
- McGinnis, J. (1989), "Predicting police force attrition, promotion, and demographic change: a computerized simulation model", *Canadian Police College Journal*, Vol. 13 No. 2, pp. 77-86.
- Miller, H.V. and Miller, J.M. (2016), "Substance abuse treatment in criminal justice: issue introduction", *American Journal of Criminal Justice*, Vol. 41 No. 1, pp. 1-2.

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- Miller, J.M., Miller, H.V. and Barnes, J.C. (2019), "Treating co-occurring disorders in jails: outcome findings from a second chance act offender reentry program", *Crime and Delinquency*, Vol. 65 No. 5, pp. 583-605.
- Payne, T.C. (2017), "How do you determine the right size of a police department: don't look to crime rates", *Alaska Just. F.*, Vol. 34 No. 3.
- Risman, B.J. (1980), "The Kansas City preventive patrol experiment: a continuing debate", *Evaluation Review*, Vol. 4 No. 6, pp. 802-808.
- Sindall, K. and Sturgis, P. (2013), "Austerity policing: is visibility more important than absolute numbers in determining public confidence in the police?", *European Journal of Criminology*, Vol. 10 No. 2, pp. 137-153.
- Terrill, W., Rossler, M.T. and Paoline, E.A. III (2014), "Police service delivery and responsiveness in a period of economic instability", *Police Practice and Research*, Vol. 15 No. 6, pp. 490-504.
- U.S. Census Bureau (2020), "Quick facts", available at: <https://www.census.gov/quickfacts/flaglercountyflorida>.
- Wilson, J.M. and Heinonen, J.A. (2012), "Police workforce structures: cohorts, the economy, and organizational performance", *Police Quarterly*, Vol. 15 No. 3, pp. 283-307.
- Wilson, J.M. and Weiss, A. (2012), "Police staffing allocation and managing workload demand: a critical assessment of existing practices", *Policing: Journal of Policy Practice*, Vol. 8 No. 2, pp. 96-108.
- Wilson, J.M. (2012), "Articulating the dynamic police staffing challenge: an examination of supply and demand", *Policing: An International Journal of Police Strategies and Management*, Vol. 35 No. 2, pp. 327-355.

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