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Understanding the Public's Opinions of UAV-Assisted Residential Monitoring by Police

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UNDERSTANDING THE PUBLIC'S OPINIONS OF UAV-ASSISTED RESIDENTIAL MONITORING BY POLICE

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INTRODUCTION

Unmanned aerial vehicles (UAVs, UASs, drones) are being used by a wider variety of organizations, private citizens, and nations than ever before.[1] Although initially introduced into the public's awareness via

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1. *See* CIARA BRACKEN-ROCHE ET AL., SURVEILLANCE STUD. CTR., QUEEN'S UNIV., SURVEILLANCE DRONES: PRIVACY IMPLICATIONS OF THE SPREAD OF UNMANNED AERIAL VEHICLES (UAVS) IN CANADA 8–26 (2014), https://www.sscqueens.org/sites/sscqueens.org/files/Surveillance_Drones_Report.pdf [https://perma.cc/NP5L-MJKC]; *see also* FED. AVIATION ADMIN., U.S. DEP'T OF TRANSP., FAA AEROSPACE FORECAST FISCAL YEARS

media and policy discussions of military drone attacks in war zones, UAVs have the potential to decrease costs and augment capabilities for many industrial, security, and safety applications.[2] For example, UAVs are currently at work patrolling the large campuses of some corporations, aiding search and rescue efforts in inaccessible areas, and even supporting border security.[3] Given these possibilities, many law enforcement agencies have deployed or are considering drones for patrol, surveillance, and security functions.[4]

UAVs are attractive to police departments because they may reduce the costs of flight when compared with traditionally-piloted craft, like helicopters.[5] Although there is some disagreement about the extent of actual cost savings in the literature, the cost to acquire and fly a UAV may be much lower than a piloted craft, depending upon the capabilities of the drone.[6] These decreased operational costs may enable the use of flight for new functions, such as the use of UAVs to collect intelligence when police are faced with hazardous terrain or dangerous situations.[7] UAVs may also facilitate increased monitoring or photography of residential neighborhoods or public spaces, such as parks, if police agencies opt to utilize the aircraft in this manner.[8]

Due to their surveillance capabilities, UAVs can also prompt potentially serious privacy and transparency concerns. Drones can be used for

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2010–2030 48 (2010), http://www.faa.gov/data_research/aviation/aerospace_forecasts/2010-2030/media/2010%20Forecast%20Doc.pdf [https://perma.cc/6RR8-7MHL].

2. *See* Philip Boucher, *Domesticating the Drone: The Demilitarisation of Unmanned Aircraft for Civil Markets,* 21 SCI. & ENG'G ETHICS 1393, 1394–98 (2014); *see also* Claudia Stöcker et al., *Review of the Current State of UAV Regulations*, 9 REMOTE SENSING 459 (2017).

3. *See* BRACKEN-ROCHE ET AL., *supra* note 1, at 14–15.

4. *See generally* BRACKEN-ROCHE ET AL., *supra* note 1; DAN GETTINGER, CTR. FOR THE STUDY OF THE DRONE, BARD COLL., PUBLIC SAFETY DRONES (3d ed. 2020), https://dronecenter.bard.edu/files/2020/04/CSD-Public-Safety-Drones-3rd-edition.pdf [https://perma.cc/Z57X-9AKX].

5. U.S. GOV'T ACCOUNTABILITY OFF., GAO-12-981, UNMANNED AIRCRAFT SYSTEMS: MEASURING PROGRESS AND ADDRESSING POTENTIAL PRIVACY CONCERNS WOULD FACILITATE INTEGRATION INTO THE NATIONAL AIRSPACE SYSTEM 11 (2012).

6. *See* CHAD C. HADDAL & JEREMIAH GERTLER, CONG. RSCH. SERV., RS21698, HOMELAND SECURITY: UNMANNED AERIAL VEHICLES AND BORDER SURVEILLANCE 5 (2010); *see also* JEREMIAH GERTLER, CONG. RSCH. SERV., R42136, U.S. UNMANNED AERIAL SYSTEMS 10 (2012); Michael Salter, *Toys for the Boys? Drones, Pleasure and Popular Culture in the Militarisation of Policing*, 22 CRITICAL CRIMINOLOGY 163 (2014).

7. *See* BRACKEN-ROCHE ET AL., *supra* note 1; *see also* Reece A. Clothier et al., *Risk Perception and the Public Acceptance of Drones*, 35 RISK ANALYSIS 1167 (2015).

8. *See* BRACKEN-ROCHE ET AL., *supra* note 1; *see also* Clothier et al., *supra* note 7; Jay Stanley, *We Already Have Police Helicopters, So What's the Big Deal over Drones?*, ACLU (Mar. 8, 2013, 11:26 AM), https://www.aclu.org/blog/mass-incarceration/we-already-have-police-helicopters-so-whats-big-deal-over-drones [https://perma.cc/Q95Y-ERUB].

surveillance by equipping the aircraft with cameras for recording pictures or high-definition video.[9] Although somewhat less common at the present moment, drones may also be enhanced with specialized microphones or utilize other noise-reduction methods for recording audio.[10] The potential intrusiveness of UAV surveillance may further be amplified by linking UAVs with other advanced technologies, such as facial recognition, infrared lenses, or heat sensors.[11] Moreover, detailed information about individuals' activities may also be revealed by connecting different sources of data together, such as by linking the products of UAV surveillance with other police and government databases or even with consumer data.[12] Since data linking could allow the viewing of an individual's actions from multiple vantage points and over sustained periods, it greatly increases the information that is readily available to police and other government entities and moves beyond the inferences that may be drawn from officer observations or even single uses of advanced technologies, like drones.[13] And advanced UAVs may stay airborne for long periods of time and collect data from a height that renders the device imperceptible to those on the ground, capabilities which may raise the specter of persistent, covert surveillance in the minds of the public.[14]

Despite the increasing use of drones, a variety of issues remain relatively unexplored in the literature. First, although much has been written about UAVs, a large percentage of the literature examines the technology's use

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9. *See* Rachel L. Finn & David Wright, *Unmanned Aircraft Systems: Surveillance, Ethics and Privacy in Civil Applications*, 28 COMPUT. L. & SEC. REV. 184, 187 (2012).

10. *See* Abdirahman Mohamud & Ashwin Ashok, Drone Noise Reduction Through Audio Waveguiding (DroNet'18, Conference Paper, 2018), https://doi.org/10.1145/3213526.3213543 [https://perma.cc/8D87-8ACJ]; *see also* Finn & Wright, *supra* note 9; Hyohoon Ahn et al., Hybrid Noise Reduction for Audio Captured by Drones (International Federation of Automatic Control, Conference Paper, 2018), https://doi.org/10.1145/3164541.3175682 [https://perma.cc/EY7N-TCZW].

11. *See* Finn & Wright, *supra* note 9, at 188.

12. *See* Francesco Schiliro et al., *iCOP IoT-Enabled Policing Processes*, SERV.-ORIENTED COMPUTING, 2019, at 447; *see also* Dan Bogdanov et al., *Privacy-Preserving Statistical Data Analysis on Federated Databases*, ANN. PRIVACY F., 2014, at 30; Dinusha Vatsalan, Peter Christen & Vassilios S. Verykios, *A Taxonomy of Privacy-Preserving Record Linkage Techniques*, 38 INFO. SYS. 946 (2013).

13. *See* David Lyon, *Surveillance, Snowden, and Big Data*, BIG DATA & SOCIETY, July–Dec. 2014, at 1, 13; *see also* Linda Merola et al., *Community Support for License Plate Recognition*, 37 POLICING 30 (2014); Jeffrey H. Reiman, *Driving to the Panopticon: A Philosophical Exploration of the Risks to Privacy Posed by the Highway Technology of the Future*, 11 SANTA CLARA COMPUT. & HIGH TECH. L.J. 27, 29 (1995).

14. *See* Chris Francescani, *Domestic Drones Are Already Reshaping U.S. Crime-Fighting*, REUTERS (Mar. 3, 2013, 10:09 AM), https://www.reuters.com/article/us-usa-drones-lawenforcement/domestic-drones-are-already-reshaping-u-s-crime-fighting-idUSBRE92208W20130303 [https://perma.cc/T64S-2CWW].

by the military or in the international (rather than the domestic) context.[15] Within the domestic literature, some surveys examine perceptions of police drones,[16] but most (by design) explore a wide variety of drone-related issues to establish an early baseline for understanding the public's opinions. Thus far, however, the research has made clear that opinions of UAVs are highly context- and function-dependent, suggesting that opinions will vary widely based upon specific uses.[17] At present, only a few studies investigate public reactions to particular surveillance functions and the

15. *See, e.g.*, Sarah Kreps, *Flying Under the Radar: A Study of Public Attitudes Towards Unmanned Aerial Vehicles*, RSCH. & POL., Apr.–June 2014, at 260; *see also* Sarah Kreps & Geoffrey P.R. Wallace, *International Law, Military Effectiveness, and Public Support for Drone Strikes*, 53 J. PEACE RSCH. 830 (2016).

16. *See generally* Chantal Lidynia, Ralf Philipsen & Martina Ziefle, *Droning on About Drones: Acceptance of and Perceived Barriers to Drones in Civil Usage Contexts*, *in* ADVANCES IN HUMAN FACTORS IN ROBOTS AND UNMANNED SYSTEMS 317 (Pamela Savage-Knepshield & Jessie Chen eds., 2017); Clothier et al., *supra* note 7; Miliaikeala S.J. Heen, Joel D. Lieberman & Terance D. Miethe, *The Thin Blue Line Meets the Big Blue Sky: Perceptions of Police Legitimacy and Public Attitudes Towards Aerial Drones*, 31 CRIM. JUST. STUD. 18 (2018); Mari Sakiyama et al., *Big Hover or Big Brother? Public Attitudes About Drone Usage in Domestic Policing Activities*, 30 SEC. J. 1027 (2017); Alana Saulnier & Scott N. Thompson, *Police UAV Use: Institutional Realities and Public Perceptions*, 39 POLICING 680 (2016); BRACKEN-ROCHE ET AL., *supra* note 1; KERRY G. HERRON, HANK C. JENKINS SMITH & CAROL L. SILVA, U.S. PUBLIC PERSPECTIVES ON PRIVACY, SECURITY, AND UNMANNED AIRCRAFT SYSTEMS (2014), http://crcm.ou.edu/pvcy2014/report.pdf [https://perma.cc/LF3P-P3GA]; JOEL D. LIEBERMAN ET AL., CTR. CRIME & JUST. POL., UNIV. OF NEV. LAS VEGAS, AERIAL DRONES, DOMESTIC SURVEILLANCE, AND PUBLIC OPINION OF ADULTS IN THE UNITED STATES (2014), https://www.unlv.edu/sites/default/files/page_files/27/Research-AerialDrones-DomesticSurveillance.pdf [https://perma.cc/R3XK-CSXE]; TERANCE D. MIETHE ET AL., CTR. FOR CRIME & JUST. POL., UNIV. OF NEV. LAS VEGAS, PUBLIC ATTITUDES ABOUT AERIAL DRONE ACTIVITIES: RESULTS OF A NATIONAL SURVEY (2014), https://www.unlv.edu/sites/default/files/page_files/27/Research-PublicAttitudesabou tAerialDroneActivities.pdf [https://perma.cc/EM9P-Q2JF]; PHOENIX STRATEGIC PERSPS., INC., SURVEY OF CANADIANS ON PRIVACY-RELATED ISSUES (2013), https://www.priv.gc.ca/media/3323/por_2013_01_e.pdf [https://perma.cc/QR3A-UY52].

17. *See* Boucher, *supra* note 2; *see also* Anne Oltvoort et al., *"I Am the Eye in the Sky — Can You Read My Mind?" How to Address Public Concerns Towards Drone Use*, *in* PERSUASIVE TECHNOLOGY: DEVELOPMENT OF PERSUASIVE AND BEHAVIOR CHANGE SUPPORT SYSTEMS (2019); Francisco Klauser & Silvana Pedrozo, *Big Data from the Sky: Popular Perceptions of Private Drones in Switzerland*, 72 GEOGRAPHICA HELVETICA 231 (2017); Lauren Bowers Reddy & Daniel DeLaurentis, *Opinion Survey to Reduce Uncertainty in Public and Stakeholder Perception of Unmanned Aircraft*, TRANSP. RSCH. RECORD, 2016, at 80; Yang Wang et al., *Flying Eyes and Hidden Controllers: A Qualitative Study of People's Privacy Perceptions of Civilian Drones in The U.S.*, 3 PROC. ON PRIV. ENHANCING TECHS. 172 (2016); SANDRA LYNN MACSWEEN-GEORGE, AM. INST. OF AERONAUTICS & ASTRONAUTICS, A PUBLIC OPINION SURVEY — UNMANNED AERIAL VEHICLES FOR CARGO, COMMERCIAL, AND PASSENGER TRANSPORTATION (2003); Alice Tam, *Public Perception of Unmanned Aerial Vehicles* (Purdue Univ. Aviation Tech. Graduate Student Publ'n, 2011); MONMOUTH UNIV. POLLING INST., NATIONAL: U.S. SUPPORTS UNARMED DOMESTIC DRONES (2013), https://www.monmouth.edu/polling-institute/reports/monmouthpoll_nj_081513/ [https://perma.cc/8W5J-7R2Y].

latest of these involved data collected in 2015.[18] Thus, a goal of this Article is both to update and to add further texture to existing findings in this area.

To do so, the Authors fielded a survey of the U.S. public (n=606) with the goal of examining opinions about the use of UAVs by a local police department for a variety of monitoring functions.[19] In this Article, we focus on three scenarios wherein police are posited to use technology for residential neighborhood photography and recording: (1) a police drone that captures pictures or video from 1,000 feet in altitude, (2) a police drone that captures pictures or video from 50 feet in altitude, and (3) (for comparison's sake) the same pictures or video captured via closed-circuit television (CCTV) cameras located on the ground. The examination of public opinions of police UAVs is important for several reasons. First, in a democratic society, the public's views should guide police department policies regarding the adoption of new technologies and the uses and preservation of the resulting data. Second, as the courts render decisions concerning the uses of UAVs by police and other government actors, they will — by necessity — draw conclusions about the scope of individuals' "reasonable expectation[s] of privacy" with respect to these evolving issues.[20] A further goal of this Article is to provide detailed information concerning the public's actual expectations surrounding the use of UAVs. As mentioned above, existing publications (while exceedingly helpful) have analyzed data from 2015 and earlier. In the case of emerging technologies, though, it is particularly important to update such work, as individuals' notions of privacy may evolve with technological change and increased familiarity. In addition to reporting our survey results, we also analyze this data using multivariable regression to better understand the demographic factors and other opinions which correlate with respondents' judgments of UAVs.

Part I of this Article begins by describing the legal context that governs the use of UAVs by police agencies. Part II then reviews the existing literature examining public opinions concerning police drones. Part III details the data collection and methods used in our empirical analyses, and Part IV presents our results. Finally, Part V contextualizes these results and offers conclusions and policy recommendations on their basis.

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18. *See* Sakiyama et al., *supra* note 16; *see also* Wang et al., *supra* note 17; LIEBERMAN ET AL., *supra* note 16. *See generally* Heen et al., *supra* note 16; HERRON et al., *supra* note 16; MIETHE ET AL., *supra* note 16.

19. For full results from the survey, see Linda Marie Merola & Ryan Patrick Murphy, Towards a Greater Understanding of Opinions about Monitoring by Police Drones in the U.S.: A Survey (on file with author).

20. *See* Katz v. United States, 389 U.S. 347, 360 (1967) (Harlan, J., concurring).

I. THE LEGAL CONTEXT GOVERNING THE USE OF UAVS BY POLICE

In 2012, the Federal Aviation Administration (FAA) Modernization and Reform Act[21] was successfully passed by Congress and directed the Secretary of the FAA to determine whether Unmanned Aircraft Systems (UAS) operations could safely be operated in the national airspace system (NAS) and if so, to "establish requirements for the safe operation of such aircraft systems in the national airspace system."[22] In response, the FAA developed a series of rules governing registration, safety, marking, and a variety of other requirements for different classes of pilots, including those operating UAVs for recreational, commercial, public safety or government, and educational purposes.[23] Moreover, in 2018, the FAA also introduced LAANC, the Low Altitude Authorization and Notification Capability system, which allowed drone operators to receive flight authorizations in real time and air traffic controllers to view drone activity in controlled airspace.[24] Though most of the efforts of the FAA have been directed towards operations and safety, the National Telecommunications and Information Administration (NTIA) has published a set of best practices for UAS privacy, transparency, and accountability, following a process by which the agency convened UAS stakeholders, including other interested government agencies.[25] These best practices include informing others of the use of UAS, showing care when operating the aircraft, limiting the use of collected data, and protecting "covered" (or personally identifiable) data.[26]

Yet, although these best practices represent efforts to promote privacy and transparency in the context of UAVs, they are voluntary. Efforts to enact UAV-specific restrictions on surveillance into law have been limited at the federal level.[27] In 2013, the Drone Aircraft Privacy and Transparency Act and the Preserving American Privacy Act were

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21. *See* Pub. L. No. 112-095, 126 Stat. 11 (2012).

22. *See id.* 333(c); *see also id.* § 331(9) (defining Unmanned Aircraft System).

23. *See generally Unmanned Aircraft Systems (UAS)*, FED. AVIATION ADMIN. (Mar. 8, 2022, 1:08 PM), https://www.faa.gov/uas/ [https://perma.cc/45JL-FP8M].

24. *See UAS Data Exchange (LAANC)*, FED. AVIATION ADMIN. (Jan. 19, 2022, 9:10 AM), https://www.faa.gov/uas/programs_partnerships/data_exchange/ [https://perma.cc/9ZCB-RP5A].

25. *See* NAT'L TELECOMMS. & INFO. ADMIN., VOLUNTARY BEST PRACTICES FOR UAS PRIVACY, TRANSPARENCY, AND ACCOUNTABILITY 1, 3–6 (2016), https://www.ntia.doc.gov/files/ntia/publications/voluntary_best_practices_for_uas_privacy_transparency_and_accountability_0.pdf [https://perma.cc/AGK4-WNSJ]; *see also* Angela Simpson, *Finding Common Ground on UAS*, NAT'L TELECOMMS. & INFO. ADMIN (May 19, 2016), https://www.ntia.doc.gov/blog/2016/finding-common-ground-uas [https://perma.cc/RNE2-S6LX].

26. *See* NAT'L TELECOMMS. & INFO. ADMIN., *supra* note 25.

27. *See* Stanley, *supra* note 8.

introduced in Congress, but neither of these bills were passed into law.[28] Thus, under the existing framework, the FAA holds exclusive authority for many areas of UAV regulations. In taking such a position, the FAA argued that UAVs fall under the authority of the national government because of the national interest in a functional NAS.[29] In support of this, the FAA has cited the grant of lawmaking authority given to the U.S. Congress under the Commerce Clause of the U.S. Constitution, arguing that Congress has preempted the "field" of air regulation and that "[w]here Congress occupies an entire field . . . even complementary state regulation is impermissible."[30]

Despite this preemption, however, there are certain types of issues related to UAVs that may be preserved as the appropriate subject of state and local lawmaking under the grant of state and local police power, such as those related to "land use, zoning, privacy, trespass, and law enforcement operations."[31] Consequently, there remain particular issues that are open to state and local lawmaking either because they fall into zones for which there is concurrent authority with the federal government (such as privacy) or because they fall into categories where authority has traditionally been reserved to the states.[32] At the state level, since 2013, at least 44 states have passed some form of legislation relating to UAS operations, but these laws vary greatly from state to state, and many of these statutes were passed with the goal of encouraging the development of the drone industry (as opposed to regulating it).[33] For example, bills of this sort include those which allocate funding to initiate drone programs at universities, establish UAV centers, or launch collaborations between educational institutions and businesses.[34] Another frequent area of attention for UAV legislation involves issues of safety and security. For example, one of the most popular pieces of legislation at the state level prohibits the flying of UAVs above correctional facilities; legislation

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28. *See* H.R. 1262, 113th Cong. (2013) (Drone Aircraft Privacy and Transparency Act); *see also* H.R. 637, 113th Cong. (2013) (Preserving American Privacy Act)..

29. *See* OFF. OF THE CHIEF COUNS., FED. AVIATION ADMIN., STATE AND LOCAL REGULATION OF UNMANNED AIRCRAFT SYSTEMS (UAS) FACT SHEET 1 (2015) [hereinafter FAA FACT SHEET], https://www.faa.gov/uas/resources/policy_library/media/UAS_Fact_Sheet_Final.pdf [https://perma.cc/E2X3-ZWNB].

30. Arizona v. United States, 567 U.S. 387, 401 (2012).

31. FAA FACT SHEET, *supra* note 29, at 3.

32. *See id.*

33. *See Current Unmanned Aircraft State Law Landscape*, NAT'L CONF. ST. LEGISLATURES (Aug. 3, 2021), https://www.ncsl.org/research/transportation/current-unmanned-aircraft-state-law-landscape.aspx [https://perma.cc/FA9U-VGZ2].

34. *See, e.g.*, ALASKA. STAT. § 14.40.082 (2019); NEV. REV. STAT. § 493.210 (2019); VA. CODE ANN. § 19.2-60.1 (2020); H.B. 1109, 66th Legis., Reg. Sess. (Wash. 2019).

prompted in part by the use of UAVs to transport illicit items into these facilities.[35]

A review by the Authors of all existing state-level drone legislation through the year 2020 reveals that there have been 31 pieces of UAV legislation containing provisions relating to police agencies and that these have been enacted by 18 different states.[36] By our count, there have been 172 total pieces of UAV-related legislation enacted across all states between 2013 and 2020, meaning that legislation relating at least partially to police agencies represents approximately 18% of the total enactments.[37] Many of these statutes prohibit the use of UAVs by police without a warrant, but even in states with relatively strict laws, the legislation then routinely enumerates a list of exceptions allowing certain warrantless uses of UAVs.[38] For example, the Florida drone statute begins by declaring that "[a] law enforcement agency may not use a drone to gather evidence or other information."[39] Following this, it then allows the use of UAVs in the following cases:

> [(1)] To counter a high risk of a terrorist attack by a specific individual or organization if the United State Secretary of Homeland Security determines that credible intelligence indicates . . . such a risk . . . . [(2)] If the law enforcement agency first obtains a search warrant signed by a judge authorizing the use of a drone . . . . [or (3)] If . . . law enforcement . . . possesses reasonable suspicion that, under particular circumstances, swift action is needed to prevent imminent danger to life or serious damage to property, to forestall the imminent escape of a suspect or the destruction of evidence, or to achieve purposes including, but not limited to, facilitating the search for a missing person.[40]

Thus, most drone statutes have enumerated exceptions that allow law enforcement agencies some latitude with respect to their use of UAVs, such as in the variety of situations mentioned in the Florida statute at number three above. These uses require law enforcement to possess only enough evidence to meet the lower threshold for reasonable suspicion, as opposed to the higher standard of probable cause that would be required for a warrant.

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35. *See* Alejandro Sanchez & Cameron McKibben, *Worst Case Scenario: The Criminal Use of Drones*, COHA (Feb. 2, 2015), https://www.coha.org/worst-case-scenario-the-criminal-use-of-drones/ [https://perma.cc/XX49-LVCV].

36. *See Current Unmanned Aircraft State Law Landscape*, *supra* note 33.

37. *See id.*

38. *See, e.g.*, N.C. GEN. STAT. § 15A-300.1 (2015); S.B. 92, 2013 Leg. (Fla. 2013).

39. S.B. 92 § 1(3).

40. *Id.* § 1(4)(a)–(c).

In this way, although those states that have enacted drone legislation have tended to limit potential uses, the statutes also tend to contain enumerated exceptions which can allow law enforcement to use drones for photography or surveillance in certain situations. Moreover, certain states have included an even larger list of exceptions, many times adding functions such as assessing the damage during natural disasters, documenting traffic accidents, photographing crimes scenes, or even allowing the use of UAVs for training or public relations purposes.[41] Although many of these permissible UAV uses could reasonably be considered to be limited to specific events or to certain discrete geographical areas, one could envision situations where at least some photography of individuals or property not directly related to the incidents or occurring in broader areas could potentially occur.

Further, with respect to the question of surveillance of property specifically, many state UAV statutes also include a specific exemption that permits warrantless flights over real property if a police agency secures the property owner's consent.[42] Consent is a well-recognized exception to the warrant requirement because courts have reasoned that there can be no reasonable assertion of an expectation of privacy in items or property that an owner has voluntarily agreed to reveal to the police.[43] However, despite the inherent logic of this position, the consent doctrine has sometimes allowed for evidence to be considered admissible despite the property owner's objections, such as when courts have accepted "apparent authority" arguments made by police who have obtained consent from someone they reasonably believed was the owner of the property at the time but who later turned out not to be.[44] One could also envision situations where the joint ownership of property might allow for one owner to consent to the search over the objections of another; this could apply to either the common areas of a property (in the case of roommates, for example) or even to the entire property, such as in situations involving married couples or where one co-owner with control over a space gives consent and the other is not physically present to object.[45] Thus, if doctrines of this sort were to be extended to the UAV scenario, exceptions of this type might potentially be used to override the wishes of a property

41. *See, e.g.*, MINN. STAT. § 626.19 (2021); IDAHO CODE § 21-213 (2020); VA. CODE ANN. § 19.2-60.1 (2022); UTAH CODE ANN. § 72-14-203 (2022).

42. *See, e.g.*, OR. REV. STAT. § 837.310 (2021); S.B. 840 § 1(A)6, 85th Leg. (Tex. 2017); S.B. 155, 2016 Leg. (Vt. 2016).

43. *See* Schneckloth v. Bustamonte, 412 U.S. 218, 219 (1973).

44. *See* Illinois v. Rodriguez, 497 U.S. 177, 181–82 (1990).

45. *See* Fernandez v. California, 571 U.S. 292, 302 (2014); *see also* United States v. Matlock, 415 U.S. 164, 171 (1974).

owner or to permit some types of warrantless UAV photography over real property. And, of course, there is the potential problem of individuals who feel pressured to consent or who do so without full knowledge of the implications of their waivers of rights.[46]

Likewise, many UAV statutes also contain a general exemption for "judicially recognized exceptions to warrant requirements."[47] Since the particular exceptions that comprise this category are not enumerated, their precise scope in each state is likely to be filled in via judicial interpretation and extension of each state's case law as parties challenge individual UAV flights. One exception that seems highly likely to be included (and, in several states, has even been specifically enumerated) would be that of allowing UAVs to be used in exigent circumstances.[48] In efforts to restrict the scope of monitoring that would occur pursuant to such an emergency, some states, like Illinois, have time-limited the use of UAVs under this exception to a discrete emergency or to a specific time period. For example, Illinois limits exigent circumstances uses of UAVs to 48 hours and requires "the chief executive officer of the law enforcement agency . . . [to] report in writing the use of the drone to the local State's Attorney" within 24 hours of its use.[49] Yet, even where the emergency use of UAVs has been limited in some manner, the declaration of an emergency conceivably permits some surveillance to occur (for example, during the 48 hours of a declared emergency).[50] Further, most state statutes do not place a time limit on exigent circumstances uses of UAVs, presumably intending to rely upon the judiciary to determine the reasonableness of an emergency use and, following this, to apply the exclusionary rule to any collections of evidence deemed unreasonable.

Indeed, with respect to the exclusionary rule, about half of the state-UAV statutes also explicitly contemplate an exclusionary remedy for violations by police, thereby including language which makes any evidence collected in contravention of the statute inadmissible. However, it needs to be recognized here that the exclusion of evidence is only available to those

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46. *See, e.g.*, Alafair S. Burke, *Consent Searches and Fourth Amendment Reasonableness*, 67 FLA. L. REV. 509 (2016); Janice Nadler, *No Need to Shout: Bus Sweeps and the Psychology of Coercion*, 2002 SUP. CT. REV. 153, 156; Roseanna Sommers & Vanessa K. Bohns, *The Voluntariness of Voluntary Consent: Consent Searches and the Psychology of Compliance*, 128 YALE L.J. 1962 (2019); Ric Simmons, *Not "Voluntary" but Still Reasonable: A New Paradigm for Understanding the Consent Searches Doctrine*, 80 IND. L.J. 773 (2005).

47. *See, e.g.*, UTAH CODE ANN. § 72-14-203(1)(b) (2022); S.B. 155, 2016 Leg. (Vt. 2016).

48. *See, e.g.*, S.B. 92 § 1(4)(c), 2013 Leg. (Fla. 2013).

49. Freedom from Drone Surveillance Act, Pub. Act 098-0569 § 15(3) (Ill. 2013).

50. *See id.*

with a legitimate expectation of privacy in a particular searched area; for example, in the drone case, non-owners who are captured on video taken from a drone would likely not have the ability to challenge a piece of evidence even if the search was deemed illegal as to the owner of the property.[51] Moreover, there are a number of judicially-recognized exceptions to the exclusionary rule, which, if extended to UAVs, might allow prosecutors to use the evidence collected even against an owner. For example, the "good faith" exception allows for the use of evidence that would otherwise be considered illegal in situations where officers have acted in good faith yet still violated an individual's reasonable expectation of privacy.[52] In the federal courts, for example, this has been applied in cases where warrants contained mistakes or even where the police entered the wrong home entirely due to a mistaken address.[53] Thus, in these ways, the ability of individuals to challenge such evidence collections may be limited by the courts.

Finally, it must also be recognized that the mechanism of the exclusionary rule, itself, generally only applies where prosecutors seek to introduce evidence at a criminal trial. For this and other reasons, some states have gone even further to create a civil cause of action for anyone subjected to unlawful surveillance via a drone.[54] The Idaho statute, for example, further includes a provision awarding either "actual and general damages" or liquidated damages in the amount of $1,000 (whichever is greater), plus attorney's fees and litigation costs, for instances of unlawful surveillance via UAV.[55]

The discussion above, however, is particular to the 18 states which have passed legislation relating to police UAVs. In the other states, the judgments of the courts as to the breadth and depth of one's protections in relationship to drones assume even greater importance because no specific legislation has been enacted. As cases arise, state courts are likely to rely upon provisions of their state constitutions and existing state and federal case law. Likewise, since no dedicated drone legislation has been passed at the federal level to manage the privacy issues specific to drone proliferation, the key consideration related to monitoring and police UAVs will be the interpretation of the Fourth Amendment to the U.S. Constitution.[56] The Fourth Amendment is, of course, directly applicable to

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51. *See, e.g.*, Rawlings v. Kentucky, 448 U.S. 98, 104 (1980).

52. *See* United States v. Leon, 468 U.S. 897, 923 (1984).

53. *See, e.g.*, Maryland v. Garrison, 480 U.S. 79, 80 (1987); Massachusetts v. Sheppard, 468 U.S. 981, 986–87 (1984).

54. *See, e.g.*, IDAHO CODE ANN. § 21-213 (2020).

55. *See id.* § 21-213(3)(b).

56. *See* U.S. CONST. amend. IV.

agents of the federal government and also constrains the operation of state-level actors (such as the police) through the operation of the Due Process Clause of the 14th Amendment.[57]

To determine the scope and applicability of the Fourth Amendment to police searches more generally, the Supreme Court has applied the "reasonable expectation of privacy" criteria derived from the case of *Katz v. United States*.[58] *Katz*, itself, involved the question of whether the Federal Bureau of Investigation had violated the Fourth Amendment when agents attached a warrantless listening device to the outside of a public telephone booth.[59] Although the booth was located in public, the Court decided that this action violated the Fourth Amendment because Katz had demonstrated a subjective expectation of privacy through his actions, such as closing the door to the booth.[60] Moreover, Katz's expectation was considered by the Court to be objectively reasonable because members of our society do not expect the government to be routinely monitoring conversations in public telephone booths.[61]

Under the *Katz* test, then, the justices assess what is "reasonable" in the context of society's expectations of privacy.[62] Thus, individuals' expectations of the scope of privacy become important to understanding what the Constitution protects. In this way, until Congress enacts privacy legislation specific to the drone context, it will be the justices' assessments of individuals' expectations that are likely to be determinative in many situations. For this reason, the survey analyzed below was created with the intent of providing updated evidence relevant to this test and, specifically, with respect to which surveillance functions the public views as "reasonable."

Since drones are a relatively new technology, the most relevant information regarding the protections afforded by the Fourth Amendment at the present time can be gleaned from an examination of the Court's decisions concerning law enforcement surveillance via piloted flights. Although these cases occurred prior to the development of UAVs, they provide guidance as to the rules that govern law enforcement flights for the purposes of photography or surveillance. Historically, the Court has allowed most monitoring from the air if conducted from altitudes where

57. *See id.* amend. XIV, § 1.
58. 389 U.S. 347, 360–61 (1967) (Harlan, J., concurring).
59. *See id.* at 349–50 (majority opinion).
60. *See id.* at 359.
61. *See id.*
62. *See id.* at 360–61 (Harlan, J., concurring).

police had the legal right to be.[63] In *California v. Ciraolo*, officers used a piloted airplane to fly over the defendant's fenced backyard at 1,000 feet in the air to investigate a tip that marijuana was growing there.[64] In response, the Court held that the defendant had no reasonable expectation of privacy in this area since members of the public flying in an aircraft would similarly be able to view this area.[65] Likewise, *Florida v. Riley* posed a similar issue.[66] In that case, officers received a tip that marijuana was growing inside a greenhouse, an area that could not be viewed from the ground.[67] This time, officers utilized a helicopter flying at 400 feet to view what was growing inside through openings in the greenhouse roof.[68] The Court again held that this action (taken without a warrant) did not violate *Riley*'s reasonable expectation of privacy because members of the general public could also do the same.[69] Indeed, in the opinion, the Court made the point of observing that the police did not interfere with Riley's use of his greenhouse or any other areas of his curtilage.[70]

Similarly, in *Dow Chemical Co. v. United States*, the Environmental Protection Agency (EPA) utilized a piloted flight to take pictures of a chemical plant in Midland, Michigan after the company denied permission for the agency to conduct a follow-up inspection of the facilities.[71] The Court ruled in favor of the EPA, arguing that the authority of the agency "carries with it all the modes of inquiry and investigation traditionally employed or useful to execute the authority granted."[72] In so holding, the Court likened the outside areas of an industrial complex to "open fields," or areas where a reasonable expectation of privacy does not exist. Indeed, the Court reasoned, the fact that the EPA could take these pictures from public airspace meant that other members of the public could do the same.[73] Taken together, these three cases likely mean that law enforcement will be permitted by the Court to utilize UAVs to fly over property in public airspace for the purposes of conducting photography or surveillance.[74]

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63. *See* Florida v. Riley, 488 U.S. 445, 450 (1989); *see also* California v. Ciraolo, 476 U.S. 207, 215 (1986); Dow Chem. Co. v. United States, 476 U.S. 227, 239 (1986).

64. 476 U.S. at 209.

65. *See id.* at 216.

66. 488 U.S. at 450.

67. *See id.* at 448.

68. *See id.* at 451–52.

69. *See id.* at 451.

70. *See id.* at 452.

71. 476 U.S. 227, 229 (1986).

72. *Id.* at 233.

73. *See id.* at 231.

74. *See Riley*, 488 U.S. at 451; *see also* California v. Ciraolo, 476 U.S. 207, 215 (1986); *Dow Chem. Co.*, 476 U.S. at 239.

However, this may not be the case if law enforcement captures pictures of areas of a property that are not viewable by the general public or if a UAV flies lower than in the cases discussed above.

The case of *United States v. Causby* may be of particular interest on this point.[75] In *Causby,* the Court held that a property owner had the right to exclude flights that were "so low and so frequent as to be a direct and immediate interference with the enjoyment and use of the land."[76] The precise extent of this height limitation remains an open question, but we do know from the cases discussed above that piloted flights of limited duration at altitudes of 400 and 1,000 feet were deemed high enough to be in publicly-navigable airspace and, therefore, legal without a warrant.[77] Yet, *Causby* would suggest that this calculation may be altered if police were to opt to fly drones either very frequently or at low altitudes because this might be deemed to interfere with an owner's use or enjoyment of their property.[78]

And, more recently, the Court has also recognized the potential for technological advances to continue to curtail the zones of privacy afforded by the Fourth Amendment.[79] Since 2012 alone, the Court has issued a series of landmark rulings concerning the privacy of electronic data in the police context, including the protection of information in arrestees' cell phones, the unconstitutionality of using a beeper to warrantlessly monitor a vehicle's movements, and the requirements governing police access to cellphone location data.[80] In these cases, the Court has relied upon the well-known "reasonable expectations of privacy" formulation from *Katz v. United States* but has also expressed a recognition that technological advancements now allow police to gain access to materials and information about individuals that previously would only have been accessible via a traditional search conducted pursuant to a warrant.[81] Thus, a similar line of reasoning may be applied by the Court if police were to operate a UAV in a way that would seem to constrict customary notions of the zone of privacy surrounding a home.

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75. 328 U.S. 256, 259 (1946).

76. *Id.* at 266.

77. *See Riley*, 488 U.S. at 450; *see also Ciraolo*, 476 U.S. at 215. *See generally* Gregory S. McNeal, *Drones and the Future of Aerial Surveillance*, 84 GEO. WASH. L. REV. 354, 396 (2016).

78. *See Causby*, 328 U.S. at 266.

79. *See* Kyllo v. United States, 533 U.S. 27, 40 (2001).

80. *See* Carpenter v. United States, 138 S. Ct. 2206, 2223 (2018) (describing police accessing cellphone data); *see also* Riley v. California, 573 U.S. 373, 386 (2014) (regarding arrestee's cellphone); United States v. Jones, 565 U.S. 400, 404 (2012) (pertaining to beeper tracking vehicle).

81. *See Katz*, 389 U.S. 347, 361 (Harlan, J., concurring).

II. PUBLIC OPINIONS OF UAV MONITORING

As discussed above, the public's reasonable expectations of privacy inform the extent of Fourth Amendment protections under the *Katz* test.[82] Yet, although some surveys have examined overall perceptions of police drones, most studies have not focused specifically on questions of privacy or the use of UAVs in residential neighborhoods but rather have adopted a wide-ranging approach to gauge responses to drone use more generally.[83] This literature makes clear, however, that the public believes that the expansion of police UAVs will increase surveillance, threaten privacy, and create accountability problems because individuals will not be able to confront those conducting the surveillance, know what is being recorded, or where the data is sent.[84] Notably, Professor Burchan Aydin conducted an experiment showing that the public perceived UAVs equipped with cameras to pose a greater risk than those without cameras.[85] The experiment also further found the public to be generally concerned about UAV monitoring by police.[86]

Only a few studies examine public reactions to specific police surveillance scenarios in the United States.[87] Professor Kerry Herron et al. reported only 34% support for police using "drone cameras to continuously monitor streets and businesses."[88] Support was higher for drone monitoring of "large public gatherings" (47% support) or "train terminals,

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82. *See id.*

83. *See, e.g.*, Lidynia et al., *supra* note 16; Clothier et al., *supra* note 7; Sakiyama, *supra* note 16; Saulnier & Thompson, *supra* note 16; BRACKEN-ROCHE ET AL., *supra* note 1; HERRON ET AL., *supra* note 16; LIEBERMAN ET AL., *supra* note 16; MIETHE ET AL., *supra* note 16; PHOENIX STRATEGIC PERSPS., *supra* note 16.

84. *See, e.g.*, Lidynia et al., *supra* note 16; Oltvoort et al., *supra* note 17; Burchan Aydin, *Public Acceptance of Drones: Knowledge, Attitudes, and Practice*, 59 TECH. IN SOC'Y 101180 (2019); Philip Boucher, *'You Wouldn't Have Your Granny Using Them': Drawing Boundaries Between Acceptable and Unacceptable Applications of Civil Drones*, 22 SCI. & ENG'G ETHICS 1391 (2016); Victoria Chang, Pramod Chundury & Marshini Chetty, *"Spiders in the Sky": User Perceptions of Drones, Privacy, and Security*, 2017 CHI CONF. ON HUM. FACTORS IN COMPUTING SYS. 6765; Heen et al., *supra* note 16; Jake R. Nelson et al., *The View from Above: A Survey of the Public's Perception of Unmanned Aerial Vehicles and Privacy*, 26 J. URB. TECH. 83 (2019); Wang et al., *supra* note 17; HERRON ET AL., *supra* note 16; LIEBERMAN ET AL., *supra* note 16; MIETHE ET AL., *supra* note 16; MARIA VALDOVINOS ET AL., CMTY. ORIENTED POLICING SERVS., U.S. DEP'T OF JUST., COMMUNITY POLICING AND UNMANNED AIRCRAFT SYSTEMS (UAS): GUIDELINES TO ENHANCE COMMUNITY TRUST (2016).

85. *See* Aydin, *supra* note 84, at 8.

86. *See id.* at 10.

87. *See generally* Sakiyama et al., *supra* note 16; Wang et al., *supra* note 17; HERRON ET AL., *supra* note 16; LIEBERMAN ET AL., *supra* note 16; MIETHE ET AL., *supra* note 16, at 3.

88. HERRON ET AL., *supra* note 16, at 35.

bus stations, and airports" (46% support).[89] However, approval of these UAV uses may be higher than for others because these functions are both time- and area-limited and are focused on serious and specific security concerns. Likewise, a survey conducted by Professor Miethe et al. similarly found large majorities of respondents to oppose more general UAV monitoring "around their homes" (93%), at the "workplace" (77%), or in "open public places" (63%).[90] However, a study by Professor Sakiyama et al. found some disparate results in their 2014 sample: 74% support for "[t]raffic monitoring" and only 47% support for "[c]rowd monitoring."[91] Perhaps the high levels of support for traffic monitoring stem from differences in public opinion regarding this UAV monitoring function.

Overall, though, privacy appears to represent a significant concern, but a relatively limited number of specific surveillance scenarios have been tested so far. Moreover, opinions of UAV monitoring may have altered considerably since 2014. From a theoretical standpoint, the intervening years may have altered opinions in a variety of ways: by increasing familiarity with drones, but also by potentially heightening surveillance concerns as technologies of this type have proliferated and databases have become increasingly linked. Research examining the content, storage, and linking of police UAV data has yet to be conducted, but investigations of other technologies have suggested that the large majority of data collected and stored by police consists of observations of *legal* activities by ordinary individuals.[92] The public may find this troubling because any large data collections inevitably contain mistakes in the data, can be targets for hacking, and can be used in unauthorized ways which may pose risks to average individuals, their reputations, finances, and even freedom, such as in instances when data is used as evidence in court.[93] As data collections expand, individuals increasingly lose the ability to control how they are perceived, how data are used or protected, and who may access the information.[94] Studies by both Professor Chang et al. and Professor Wang et al. have noted that participants expressed a variety of concerns about

89. *Id.*

90. LIEBERMAN ET AL., *supra* note 16, at 1–2.

91. Sakiyama et al., *supra* note 16, at 1033.

92. *See* ACLU, YOU ARE BEING TRACKED: HOW LICENSE PLATE READERS ARE BEING USED TO RECORD AMERICANS' MOVEMENTS 2–3, 7 (2013), https://www.aclu.org/sites/default/files/field_document/071613-aclu-alprreport-opt-v05.pdf [https://perma.cc/G5EA-WDHC].

93. *See* Stephen Rushin, *The Judicial Response to Mass Police Surveillance*, 2011 ILL. J.L., TECH., & POL'Y 281, 328 (2011); *see also* Daniel J. Solove, *A Taxonomy of Privacy*, 154 U. PA. L. REV. 477, 560 (2006).

94. *See* Solove, *supra* note 93, at 513–16.

UAV data collection itself, including those related to data protection, unauthorized access, and data ownership.[95]

In our multivariable results section below, we utilize our survey data to model public support for UAVs in the police context using regression. Professor Sakiyama et al. also utilized regression to examine responses to three potential examples of UAV monitoring or surveillance functions conducted by local police: (1) "traffic monitoring," (2) "detecting criminal activities," and (3) "crowd monitoring."[96] In the case of all models, respondents' concerns over surveillance and beliefs about privacy were found to significantly predict responses.[97] Additionally, a variety of demographic variables were also found to be significant, although the precise combination of significant demographic predictors was different for each model.[98] From their models, the authors concluded that the key predictors of attitudes about police UAVs are individuals' beliefs about privacy, libertarian views about individual rights, and concerns about surveillance generally.[99] Although the authors found younger respondents and non-whites to be less supportive of UAVs, they reported that such age and race effects disappeared once controls were introduced representing the heightened privacy and surveillance concerns exhibited by these groups in the sample.[100]

Similarly, using data from their 2015 survey, Professor Heen et al. also utilized regression to predict support for ten police UAV functions, which they categorized as either "proactive" or "reactive" policing functions.[101] Then, they averaged participants' responses to create measures representative of each category.[102] "Proactive" policing involves actions that the police take on their own initiative, while "reactive" policing functions are those which occur when members of the community call police to a particular location.[103] The authors found the key significant predictors of public attitudes toward police UAVs to be respondents' perceptions of police legitimacy and the extent to which participants believed the use of UAVs would enhance public safety.[104] In the case of proactive policing functions, however, the authors reported that

95. *See* Chang et al., *supra* note 84, at 6765, 6769; *see also* Wang et al., *supra* note 17, at 177–81.

96. *See* Sakiyama et al., *supra* note 16, at 1037–38.

97. *See id.* at 1036.

98. *See id.*

99. *See id.*

100. *See id.*

101. *See* Heen et al., *supra* note 16, at 24–26, 29.

102. *See id.* at 26.

103. *See id.* at 20–21.

104. *See id.* at 30.

respondents' levels of concern over privacy in the context of UAVs were also significant.[105] Though Professors Sakiyama et al. and Heen et al. do not explicitly examine residential UAV monitoring, we follow their leads and include similar independent variables in our models below.

III. DATA AND METHODS

To extend this line of literature, the Authors present regression models of public support for drone monitoring by police in the residential context. To do so, we utilize data from a 2018 online survey of the U.S. public (n=606) conducted via Mechanical Turk (MTurk). MTurk is an online labor market where requesters post Human Intelligence Tasks (HITS) for completion by MTurk users.[106] MTurk is often used by survey researchers seeking low-cost access to a diverse subject pool.[107] Analyses of MTurk samples have shown them to be as reliable as traditionally-collected data and much more representative than convenience or area samples.[108] Most of the existing research examining UAVs and public opinion has similarly relied upon MTurk for sample recruitment.[109]

A. Survey Instrument

The MTurk listing solicited participation using a general descriptor (technology survey). Upon clicking the link, participants then encountered the IRB-approved consent document. The survey's key substantive portions consisted of two short vignettes presented on separate pages.[110]

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105. *See id.*

106. *See Amazon Mechanical Turk*, MTURK, https://www.mturk.com/ [https://perma.cc/KJ9G-SCNT] (last visited Mar. 23, 2022).

107. *See* Winter Mason & Siddharth Suri, *Conducting Behavioral Research on Amazon's Mechanical Turk*, 44 BEHAV. RSCH. METHODS 1, 3 (2012).

108. *See* Adam J. Berinsky, Gregory A. Huber & Gabriel S. Lenz, *Evaluating Online Labor Markets for Experimental Research: Amazon.com's Mechanical Turk*, 20 POL. ANALYSIS 351, 355–61, 366 (2012); *see also* Tara S. Behrend et al., *The Viability of Crowdsourcing for Survey Research*, 43 BEHAV. RSCH. METHODS 800, 812 (2011); Michael Buhrmester, Tracy Kwang & Samuel D. Gosling, *Amazon's Mechanical Turk: A New Source of Inexpensive, Yet High-Quality, Data?*, 6 PERSPS. ON PSYC. SCI. 3, 5 (2011); Scott Clifford, Ryan M. Jewell & Philip D. Waggoner, *Are Samples Drawn from Mechanical Turk Valid for Research on Political Ideology?*, RSCH & POL., Oct.–Dec. 2015, at 1, 6–9; Joseph K. Goodman, Cynthia E. Cryder & Amar Cheema, *Data Collection in a Flat World: The Strengths and Weaknesses of Mechanical Turk Samples*, 26 J. BEHAV. DECISION MAKING 213, 222 (2013).

109. *See* MIETHE ET AL., *supra* note 16, at 2; *see also* Nelson et al., *supra* note 84, at 85; Lisa M. PytlikZillig et al., *A Drone by Any Other Name*, IEEE TECH. & SOC'Y MAG. 80, 82–83 (2018); LIEBERMAN ET AL., *supra* note 16, at 2.

110. The survey also contained three additional vignettes related to UAV use by police. Specifically, these invovled: (1) a UAV used to follow an individual and record pictures and video in public spaces, (2) a UAV used to record pictures and video of public spaces more

The vignettes described the use of a police UAV: (1) to record pictures or video of the outside of a home and its surrounding property from 50 feet in the air and (2) to record pictures or video of the outside of a home and its surrounding property from 1,000 feet in the air. Respondents indicated the strength of their agreement or disagreement with each UAV use on a 5-point Likert scale.

On each page, participants were instructed to consider whether police should be allowed to legally take each action without getting a warrant from a judge. This instruction was given to clarify that respondents should consider the legal acceptability of these actions *without* judicial pre-approval. This distinction is important because, if the police possess enough evidence of criminal activity to secure a warrant, then the duration and scope of surveillance would be limited by that warrant. Other than these mentions of a "warrant," legal terms or "buzz" words like "privacy" or "spying" were excluded from the survey in favor of concrete descriptions to aid comprehension.

For comparison, we further included a vignette describing identical pictures and video captured via a camera attached to a closed-circuit television system (CCTV). The vignette specified that the camera was situated in such a manner that it would capture video of a residential neighborhood but that it was located on a public street. CCTV is in widespread use in the United States and has been deployed by police for at least two decades.[111] We included the CCTV vignette to compare responses concerning a more longstanding police technology that can produce a similar surveillance output. In a study led by Professor Herron, researchers conducted a similar type of comparison, finding that public support for UAV cameras was lower than for their ground counterparts.[112] Moreover, Professor Saulnier and Professor Thompson showed that Canadians approved of many police functions at higher rates when conducted via more traditional, piloted crafts (e.g., helicopters) versus UAVs.[113] Studies by Professor Wang et al. and Professor Fischhoff et al.

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generally, such as in parks, and (3) a decision by police to store public-space UAV recordings for a period of one year. The Authors plan to discuss these additional scenarios in future work.

111. *See generally* Nicholas R. Fyfe & Jon Bannister, *City Watching: Closed Circuit in Public Spaces*, 28 AREA 37, 37 (1996); Lorraine Mazerolle, David Hurley & Mitchell B. Chamlin, *Social Behavior in Public Space: An Analysis of Behavioral Adaptations to CCTV*, 15 SEC. J. 59, 59 (2002); Katherine S. Williams & Craig Johnstone, *The Politics of the Selective Gaze: Closed Circuit Television and the Policing of Public Space*, 34 CRIME, L. & SOC. CHANGE 183, 183–88 (2000); MARCUS NIETO, CAL. RSCH. BUREAU, CRB-97-005, PUBLIC VIDEO SURVEILLANCE: IS IT AN EFFECTIVE CRIME PREVENTION TOOL? 1 (1997).

112. *See* HERRON ET AL., *supra* note 16, at 12, 34–37, 44–47.

113. *See* Saulnier & Thompson, *supra* note 16, at 687.

have also produced results suggesting that this method of comparing technologies can yield insights.[114] We adopt this approach and extend it to previously-untested surveillance scenarios.

All vignettes were presented in random order, and participants were prevented from returning to previous questions. Following the section of the survey containing the vignettes, respondents then encountered a series of questions asking about any potential concerns they might have regarding technology use by police. A list was provided and respondents were directed to check any items that were concerning to them.[115] Finally, all respondents also answered both a series of demographic questions and five police perceptions items.[116] The section of the survey containing the five police perception items came at the beginning of the survey for half of the sample and at the end of the survey for the other half of the sample to counter any potential impact of the substantive questions on the perceptions of police and vice versa.[117]

B. Sample Characteristics and Limitations

To participate, respondents were required to be U.S. citizens and at least 18 years of age. We further required respondents to spend at least five minutes with the survey to encourage substantive consideration of the questions. Data retained in the sample was also screened for correct answers to five "attention check" questions which were embedded within the survey but associated with objectively correct answers. Respondents who failed any attention check question or who did not spend sufficient time on the survey (n=47) were excluded from the data set. Participants received $1 in remuneration. Lastly, the Authors checked all IP addresses and rejected responses that did not originate from a U.S. IP address (n=4). Following these exclusions, a total of 606 participants remained. Since the vignettes were marked as required questions, each also totals 606 responses.

Individuals from a wide range of geographic locations (all 50 U.S. states) participated, yielding sample characteristics very similar to those found in the 2010 U.S. Census.[118] For example, our sample's gender distribution (50% male) did not significantly differ from the population

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114. *See* Wang et al., *supra* note 17, at 175; *see also* Baruch Fischhoff et al., *How Safe Is Safe Enough? A Psychometric Study of Attitudes Towards Technological Risks and Benefits*, 9 POL'Y SCIS. 127, 128 (1978).

115. See "concerns related to police technology use" in *infra* Section III.B named "Multivariable Analyses" for a detailed list of these concerns.

116. *See infra* Section III.B.

117. *See infra* app. A.

118. *See, e.g.*, Sakiyama et al., *supra* note 16, at 1036; Heen et al., *supra* note 16, at 25.

(49.2% male), $t(605) = 1.47$, $p = .143$. Likewise, our sample's average age (37.9 years) was not significantly different from the population (37.2 years), $t(605) = 1.43$, $p = .154$. Also, the proportion of respondents who considered themselves to be White did not significantly differ between our sample (74.9%) and the population (72.4%), $t(605) = 1.43$, $p = .154$.

We did, however, find a significant difference when we compared the proportion of African American respondents in our sample (8.6%) with the Census (12.6%), $t(605)=-3.53$, $p<.001$. Only limited literature so far has examined the extent to which race-based differences in opinions exist in the context of UAVs, and this literature has not yet produced clear expectations as to whether race might correlate with opinions of police UAV use in the scenarios examined by our survey. For example, Professor Sakiyama et al. found non-whites to be less supportive of UAV usage in certain circumstances but found no significant differences with respect to other functions.[119] Likewise, Professor Heen et al. reported that African Americans were significantly less likely to support the use of UAVs for "reactive" policing functions but found that race did not predict differences in opinions of UAVs used for "proactive" policing functions.[120] We examined the correlations between race and responses to our vignettes but found no significant correlations in our data (both $p>.05$).

However, we note this sample characteristic as a limitation because, theoretically, such a link seems reasonable. Existing literature has demonstrated that minority group members distrust police at higher rates and are more frequently dissatisfied with police performance than are white residents.[121] It would not be surprising, then, if these higher levels of average distrust and dissatisfaction might render African Americans less likely to support UAV use because UAVs can have the effect of empowering police to a greater extent. Since we find highly negative reactions to UAV monitoring in our sample, however, it is unlikely that the inclusion of greater numbers of minority group members would have altered the direction of our results. Rather, it seems likely that a more inclusive sample would have expressed *even greater* disapproval than our findings suggest.

Respondents accessed the survey via an internet-connected device and were users of the MTurk service. Thus, our sample may have been more

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119. *See* Sakiyama et al., *supra* note 16, at 1036–37.

120. *See* Heen et al., *supra* note 16, at 28–29.

121. *See, e.g.*, MATTHEW R. DUROSE, ERICA L. SMITH & PATRICK A. LANGAN, BUREAU OF JUST. STAT., U.S. DEP'T OF JUST., NCJ 215243, CONTACTS BETWEEN POLICE AND THE PUBLIC (2005), https://bjs.ojp.gov/content/pub/pdf/cpp05.pdf [https://perma.cc/5LVF-X878]; FAIRNESS AND EFFECTIVENESS IN POLICING 293, 300–01 (Wesley Skogan & Kathleen Frydl eds., National Academies Press, 2004).

technologically savvy and potentially of higher socioeconomic status than are average members of the public. Research so far does not suggest that responses to UAVs differ systematically along these dimensions. Yet, it seems possible that increased technological sophistication might be correlated with greater knowledge or more positive views of emerging technologies when compared with the general public. Since we find that substantial majorities perceived UAVs negatively, however, it is unlikely that a more technologically-averse sample would alter the direction of our findings.

C. Multivariable Analyses

To examine factors that may influence support for drone use by police in the residential context, we estimated a series of linear regression models utilizing the answers to each vignette as a dependent variable in one model.[122] Responses to these vignettes were provided on a 5-point Likert scale (strongly disagree to strongly agree), where an answer of "5" indicated strong support for allowing police to utilize a drone to perform the particular function. Respondents' answers to other survey questions were then utilized as the independent variables in these regressions. Although we examine three vignettes (UAV monitoring at 1,000 feet, UAV monitoring at 50 feet, and CCTV monitoring of a residential neighborhood), we present a total of six regression models (two for each vignette). We do so to closely replicate the approach taken by Professor Sakiyama et al., who presented two models per vignette — one model containing only demographic predictors and a second model containing both demographics and other opinions that might correlate with opinions of police UAVs.[123] This approach allows readers to compare results from both the demographics-only and the full models. As discussed below, the full models add several independent variables that are not found in the demographics-only models, namely respondents' concerns about police technology use, their perceptions of police, and their levels of crime concern.

Concerns Related to Police Technology Use. As mentioned above, following the substantive vignettes, participants were then asked about any potential concerns they might have regarding technology use by the police. A list of concerns was provided and respondents were directed to check all

122. Given the ordinal nature of our dependent variable, we also performed these analyses utilizing ordinal logistic regression but found the results to be substantially similar. Consequently, we present the linear regression results here for the sake of ease of interpretation.

123. *See* Sakiyama et al., *supra* note 16.

items which applied to them. Specifically, the following concerns were presented as options: (1) "I have concerns about the data being misunderstood or misinterpreted by the police or government."; (2) "I have concerns about too many people 'watching me' or monitoring my activities too often."; (3) "I have concerns about the data being misused or databases being hacked to get personal information."; (4) "I have concerns about how long the information collected is stored." Responses to each of these items were dummy coded (Concern Selected = 1, All Others = 0) and incorporated as independent variables into the regressions.

Perceptions of Police. Participants also responded to a series of statements related to perceptions of police which were included because there is some evidence that perceptions of this type may influence the extent to which individuals are willing to allow an agency latitude to adopt new technologies.[124] Moreover, one recent survey experiment found evidence that reading short vignettes about the use by police of another advanced technology, automated license plate recognition (LPR), prompted respondents to express significantly lowered trust in police.[125] To assess perceptions of police, the survey asked respondents to indicate the strength of their agreement or disagreement (on a 5-point Likert scale) with the following statements: (1) "Police in my community respect citizens' rights."; (2) "Police in my community treat citizens fairly."; (3) "Police in my community treat people equally."; (4) "Police in my community treat citizens with respect."; (5) "The police department in my community makes good decisions." A factor analysis of these items suggested that the first four overlapped, so we combined them into a scale with a range of 0 to 4 (Police Fairness, Equality, and Respect or PFER Scale) (see table 1).[126] The fifth item was not included in the scale because it appears to be a distinct factor in these data.

Crime Concern. Additionally, we incorporated a measure of concern over crime to account for the possibility that it may influence individuals' willingness to support UAV use by police. Some prior research has suggested that crime concern may be relevant to public approval of

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124. *See, e.g.*, Heen et al., *supra* note 16; Ben Bradford et al., *Live Facial Recognition: Trust and Legitimacy as Predictors of Public Support for Police Use of New Technology*, 60 BRIT. J. CRIMINOLOGY 1502 (2020); Linda M. Merola & Cynthia Lum, *Predicting Public Support for the Use of License Plate Recognition Technology by Police*, 15 POLICE PRAC. & RSCH. 373, 373–88 (2014).

125. *See* Linda M. Merola, Cynthia Lum & Ryan P. Murphy, *The Impact of License Plate Recognition Technology (LPR) on Trust in Law Enforcement: A Survey-Experiment*, 15 J. EXPERIMENTAL CRIMINOLOGY 55, 60 (2018).

126. *See* app. A, Table 1.

advanced technologies.[127] In this case, participants were asked "How concerned are you about crime happening near where you live?" and responded on a 4-point scale (Very, Somewhat, Slightly, or Not At All). After examining the descriptive statistics, however, we collapsed these categories into a binary indicator due to the limited numbers of individuals placing themselves at the higher end of the scale. Thus, the independent variable utilized below combines the "Very" and "Somewhat" groups together (Moderate/High Concern = 1) and contrasts those with individuals in the lower two categories (Low/No Concern = 0). Once coded in this manner, 35.8% of respondents expressed moderate/high concern and 64.2% expressed low/no concern over crime.

Demographics. Finally, participants also responded to a variety of demographic questions, which are included in the regressions as control variables. The gender dummy variable (male = 1, female = 0) may be relevant because gender differences in the likelihood of arrest or citation may produce differences in support for the use of advanced technologies by police.[128] We also included a control variable related to age, measured as a continuous variable. As age increases, so may support for UAV use by law enforcement, since older individuals tend to be more supportive of police, more concerned about crime, and less likely to commit infractions that police will be called to investigate.[129] A few studies so far have suggested that older individuals are also generally more approving of police surveillance technologies, such as CCTV and automated license plate recognition, but existing UAV studies have found mixed results when examining correlations between age and support for UAV surveillance functions usage, with some reporting significant differences in support

127. *See, e.g.*, Martin Gill, Jane Bryan & Jenna Allen, *Public Perceptions of CCTV in Residential Areas: "It Is Not As Good As We Thought It Would Be."* 17 INT'L CRIM. JUST. REV. 304, 304–24 (2007); Heen et al., *supra* note 16 (examining the relationship between public safety concerns and UAVs used for reactive and proactive policing functions); Merola & Lum, *supra* note 124.

128. *See, e.g.*, John Allen & Elizabeth Monk-Turner, *Citizen Perceptions of the Legitimacy of Traffic Stops*, 38 J. CRIM. JUST. 589 (2010); Richard J. Lundman & Robert L. Kaufman, *Driving While Black: Effects of Race, Ethnicity, and Gender on Citizen Self-Reports of Traffic Stops and Police Actions*, 41 CRIMINOLOGY 195 (2003).

129. *See, e.g.*, Ben Brown & Wm Reed Benedict, *Perceptions of the Police: Past Findings, Methodological Issues, Conceptual Issues and Policy Implications*, 25 POLICING 543 (2002); Steven Chermak, Edmund F. McGarrell & Alexander Weiss, *Citizens' Perceptions of Aggressive Traffic Enforcement Strategies*, 18 JUST. Q. 365 (2001); Chris L. Gibson et al., *Social Integration, Individual Perceptions of Collective Efficacy, and Fear of Crime in Three Cities*, 19 JUST. Q. 537 (2002).

based on age, while others did not.[130] Thus, the association between these two variables remains somewhat undetermined.

Additionally, we incorporated an independent variable representing race. Although (as described above), the extent of a correlation between race and opinions of police UAVs is not yet clear in the literature, we opted to control for this variable because race is highly relevant to perceptions of police. Members of minority groups are more likely both to perceive and to experience instances of disrespect and violence when dealing with the police than are non-minorities.[131] Minority group members also distrust police at higher rates and are more frequently dissatisfied with police performance than are non-minorities.[132] Moreover, in addition to the race-related findings in the existing literature described above, some further research suggests that race may influence support for other advanced police technologies, like automated license plate recognition technology.[133] Within the regression models, race is operationalized utilizing a series of dummy variables (first, White = 1, All others = 0, and, then, African American =1, All others = 0).

We also included control variables reflecting political partisanship, which were derived from a survey item where respondents were asked to self-identify as a Republican, a Democrat, or an Independent. Prior research has found that more conservative individuals may trust legal authorities (including police and the government) at higher than average rates, which suggests that partisanship may, therefore, be theoretically relevant to a willingness to allow police more latitude to experiment with advanced technologies.[134] The political partisanship variable was operationalized as a pair of dummy variables reflecting either an individual's identification as a Republican (Republican = 1, All others = 0) or as an individual independent of political party affiliation (Independent = 1, All others = 0). Lastly, a dummy variable reflecting each respondent's

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130. *See* MIETHE ET AL., *supra* note 16; *see also* Sakiyama et al., *supra* note 16; Gill et al., *supra* note 126; Merola & Lum, *supra* note 124; LIBERMAN ET AL., *supra* note 16.

131. *See* DUROSE ET AL., *supra* note 121. *See generally* TOM R. TYLER & YUEN J. HUO, TRUST IN THE LAW: ENCOURAGING PUBLIC COOPERATION WITH THE POLICE AND COURTS (2002).

132. *See, e.g.*, DUROSE ET AL., *supra* note 121; Tom R. Tyler, *Policing in Black and White: Ethnic Group Differences in Trust and Confidence in the Police*, 8 POLICE Q. 322, 323 (2005).

133. *See* Merola et al., *supra* note 125.

134. *See* Emily Elkins, *Who Really Likes the Police? Older, Richer, White, Conservative Republicans*, REASON (Oct. 24, 2014, 8:46 AM), http://reason.com/poll/2014/10/24/who-really-likes-the-police-older-richer [https://perma.cc/GJ5A-KLAT]; *see also* Jeffrey M. Jones, *In U.S., Confidence in Police Lowest in 22 Years*, GALLUP (June 19, 2015), http://www.gallup.com/poll/183704/confidence-police-lowest-years.aspx [https://perma.cc/6YPX-U72A].

education level (college degree or higher = 1, All others = 0) was also included for control purposes.[135]

IV. RESULTS

A. Survey Responses

As can be seen in Figure 1,[136] large majorities of our respondents expressed disagreement with the decisions to use UAVs for the functions discussed in our vignettes. Sixty-four percent of respondents expressed either strong disagreement or disagreement with UAVs used to record pictures or video of property from 1,000 feet in the air. When presented with the same scenario referencing a UAV flying at 50 feet, a full 78.2% of the sample expressed either strong disagreement or disagreement. In addition to the overall negativity of responses, these results suggest that the height at which a UAV flies may be a factor in determining acceptability for some members of the community. Similarly, a high percentage of the sample (62.4%) indicated disapproval when asked about CCTV cameras situated in a way that would capture recordings of the outsides of homes and their property. Thus, regardless of the mode of capturing the recordings, both technologies produced similar negative responses.

B. Multivariable Analyses Predicting Support for Drone Usage

Table 2 presents six regression models which correspond to the three UAV and CCTV vignettes discussed above.[137] For each vignette, we present two models (for a total of six). As discussed above, we do so to follow the lead of Professor Sakiyama et al. in previous research.[138] For each vignette, the first model contains only demographic variables as predictors, while the second model adds independent variables related to crime concern, privacy concerns, and perceptions of police. Table 2 reveals that many of the significant variables overlap regardless of the vignette's focus on monitoring via UAVs at 50 or 1,000 feet or monitoring via CCTV.[139] In this way, at least for scenarios focused on residential monitoring, similar predictors tend to be important across disparities in altitude and types of monitoring technology.

First, looking at the demographics-only models, it appears as if the control variables related to partisanship and education significantly explain

135. *See* app. A, Figure 1.
136. *See* app. B.
137. *See* app. C.
138. *See* Sakiyama et al., *supra* note 16.
139. *See* app. C.

at least some of the variation in opinions regarding UAV monitoring. Table 2 reveals that college-educated respondents were significantly more likely to support UAV monitoring of neighborhoods by police at 1,000 feet in altitude. Although the distinction between college-educated and non-college-educated respondents yielded a significant coefficient in the model, it is important to note that overall support for this UAV function remained low in both groups. Specifically, for non-college-educated respondents, only 25.9% of the sample expressed support of any kind. In comparison, for college-educated respondents, this percentage was 30.8%. In the case of drone monitoring at 50 feet, the distinction between college-educated and non-college-educated respondents did not yield a significant coefficient. With respect to lower-altitude monitoring, 11.8% of college-educated respondents supported this function, while 12.3% of non-college-educated respondents expressed approval. As can be seen by these results, support for lower-altitude drone monitoring was extremely low. Thus, overall approval of this function may be so low that it cuts across educational differences. Moreover, the education variable was once again significant in the demographics-only model related to the use of CCTV in neighborhoods. Specifically, 27.9% of college-educated respondents supported this use of CCTV, while only 19.8% of non-college-educated respondents supported it. Overall, however, like drone monitoring from either high or low altitudes, there was relatively little support among these respondents for this type of monitoring.

Political independents were also significantly less likely to support the use of a UAV for 1,000-foot monitoring than were respondents in the base category (Democrats). In fact, only 19.1% of Independents expressed support for the use of police UAVs for high-altitude monitoring. The coefficient attached to the "Republican" dummy variable also approached statistical significance ($p = .085$) but was positive, meaning that — in this particular sample — Republican respondents were more likely to support UAV monitoring at 1,000 feet. 37.3% of those identifying as Republican respondents supported the use of UAVs for this type of neighborhood monitoring. In comparison, 30.9% of Democrats in our sample supported this function. Moreover, we find a similar pattern when examining the demographics-only model related to UAV monitoring at 50 feet. As Table 2 shows, this time, the dummy variable attached to Republican Party identification yields a significant and positive coefficient. 18.6% of those identifying as Republicans supported 50-foot UAV monitoring, compared with only 7.5% of Independents and 12.5% of Democrats. In the 50-foot monitoring scenario, the independent variable denoting political independence very nearly approaches the customary significance level of .05 ($p = .051$). Further, Republicans were also significantly more supportive of CCTV used for residential monitoring, with 33.1%

supporting it, compared with 25.4% of Democrats and 16.6% of Independents.

The dummy variable related to identification as African American also approached (but did not meet) the customary .05 significance level ($p = .097$) in the 1,000-foot monitoring scenario. In this particular sample, however, African American respondents were less likely to support this type of UAV monitoring by police (19.2% support), whereas 29.3% of those self-identifying as white expressed support for this. We do not, though, find similar results with respect to race in the 50-foot monitoring scenario. In the case of lower-altitude surveillance, 11.5% of those self-identifying as African Americans supported this, while 12.4% of those self-identifying as white felt similarly. Further, the variables related to race also did not yield significant distinctions with respect to CCTV monitoring. Twenty-three percent of African American respondents supported residential CCTV monitoring, while 25.3% of white respondents felt similarly.

In the CCTV monitoring model, we further find the age variable to be significant, with older respondents expressing greater support for CCTV surveillance. Although age is not significant in the regression models predicting support for UAV monitoring at either 50 or 1,000 feet, we note that there exists a remarkably consistent pattern of increasing approval of police UAV use amongst each higher age cohort within our survey. Additionally, the Pearson correlation for both UAV vignettes was significant; the Pearson correlation between age and approval of monitoring by a police UAV at 1,000 feet was $R = .16$, $p < .001$, while the correlation between age and approval of monitoring by a police UAV at 50 feet was $R = .09$, $p = .027$. Thus, although age does not appear to be significant once other demographic predictors are controlled for, there is a consistent relationship between increased age and (somewhat) higher support for UAV monitoring. Yet, although older individuals are consistently more supportive of residential UAV monitoring, support remains generally low even amongst respondents in the highest age cohorts (with means near or below the mid-point of the response scale).

In comparison, the full models (which include variables accounting for privacy concerns, concerns about crime, and police perceptions) yield distinct results. In several cases, demographic variables are no longer significant once these opinions are added to the models. In model 4, those respondents who identified as political independents remain significantly less likely to support UAV monitoring at 1,000 feet, while model 6 suggests that college-educated respondents are more likely to approve of police surveillance of neighborhoods via CCTV. However, it is an examination of the additional opinion-related variables that yields the most substantive results in these more-inclusive models. For one thing, across

both technologies and regardless of the height at which a police UAV is posited to fly, a respondent's level of concern about crime in his or her neighborhood appears to be an important predictor. Indeed, those placing themselves in the higher categories of crime concern (somewhat/very concerned), consistently approved of UAV monitoring in greater numbers (1,000-foot UAV monitoring = 36.4%; 50-foot UAV monitoring = 17.1%; CCTV monitoring = 30.0%) than did those with fewer concerns about crime (1,000-foot UAV monitoring =23.9%; 50-foot UAV monitoring = 9.3%%; CCTV monitoring = 20.5%). Moreover, the coefficients attached to the variable representing higher levels of crime concern were relatively large compared with most coefficients in the models (1,000-foot UAV monitoring = 0.40; 50-foot UAV monitoring = 0.37; CCTV = 0.32). Since support for drone use under each of these circumstances was expressed on a 5-point scale, the movement of an individual from little/no concern about crime to somewhat/very concerned about crime represents a shift of up to 8% of the full length of the scale. As an example, with respect to higher-altitude monitoring, if all other variables are set at their minimum values, such a change in an individual's level of concern over crime from low to high is enough to move that participant from a baseline support value of 2.35 (mildly negative concerning UAV surveillance at 1,000 feet) to an expression of near-neutrality (or a value of 2.75) on the same scale. Thus, the practical impact of concern over crime is not trivial.

Additionally, respondents' opinions of their local police also appear significant to their support of or opposition to UAV monitoring. Across all models and vignettes, an increase in an individual's score on the police fairness, equality, and respect (PFER) scale corresponded significantly with increased approval of both UAV and CCTV monitoring. Interestingly, however, the coefficients are larger in the model pertaining to CCTV monitoring than in the UAV models, meaning that the PFER variable is correlated with even greater impacts on opinions about CCTVs. In comparison to the coefficients attached to crime concern, however, the impact of PFER beliefs is much more modest (representing only about 1% of the response scale). As an example, with respect to higher-altitude monitoring, if all other variables are set at their minimum values, an individual with the highest level of belief in the fairness, equality, and respect of police (4) would average a value of 2.59 (mildly negative) with respect to UAV monitoring at 1,000 feet. In contrast, a respondent with the lowest belief in the fairness, equality, and respect of police (1) would, on average, express an opinion located at a value of 2.35 regarding UAV monitoring at 1,000 feet. Thus, the practical impact for views on police is significant but more modest when compared to concern over crime.

As mentioned above, however, the coefficient attached to opinions about PFER is larger (0.23) in the case of the CCTV model. As an example, in

the final included in Table 2, if all other variables are set at their minimum values, an individual with the highest belief in the fairness, equality, and respect of police (4) would average a value of 2.52 (mildly negative concerning CCTV monitoring). In contrast, a respondent with the lowest belief in the fairness, equality, and respect of police (1) would, on average, express an opinion of CCTV monitoring located at a value of 1.6 (quite negative). This represents a much larger change in average opinions of CCTVs as individuals hold less positive perceptions of police. Moreover, the relationship between another factor concerning the public's opinion about police (the belief that "police make good decisions") also appears different in the model concerning CCTV monitoring. The belief that police make good decisions was not a significant predictor in either drone model. However, in the case of the final model related to CCTV monitoring, this predictor approached (but did not meet) the threshold for statistical significance ($p = .064$). In and of itself, this coefficient was moderately-sized (0.17).

In addition to concerns about the prevalence of crime and police perceptions, the models further suggest that a variety of technological and data storage concerns are highly relevant to opinions about the use of these technologies within residential areas. Not too surprisingly, respondents who indicated that they were generally concerned about "the numbers of people watching me" (67% of the sample) also expressed significantly lowered approval of police UAV and CCTV use across all models, with coefficients ranging from -0.27 to -0.42. When comparing across the models, however, we see that the coefficient attached to this independent variable is the smallest in magnitude when respondents considered UAV monitoring of property from 1,000 feet in the air (-0.27). Surveillance from such a height may have felt more removed or less intrusive to respondents than did cameras closer to the ground or on the ground. When compared with the coefficients attached to some of the other independent variables, however, it should be noted that the coefficients attached to this concern are relatively large across all of the models. Indeed, this one factor seems to weigh as heavily in the minds of respondents as does concern over crime (discussed above).

Further, a second technology-related concern also yields significant coefficients across all models. A concern "over the data being misunderstood by government or police" negatively corresponded with support for UAV monitoring, this time with coefficients ranging from -0.25 to -0.37. In fact, within the overall sample, a large percentage (74.6%) of respondents indicated concern about this issue. This finding is interesting because it suggests the potential for issues arising after the data are collected (such as issues with data interpretation) to be just as concerning to the community as the existence of the surveillance itself. The magnitude

of the coefficient attached to this independent variable and the fact that it is significant across all models suggest that individuals are concerned about the ways in which these data may shape the judgments made about them by criminal justice actors. In fact, in these models, this one concern alone can move an individual in the negative direction between 5% and 7.4% on the support scale. Interestingly, although relatively large percentages of the sample indicated concerns related to data storage (46.9%) and data hacking (83.7%), the variables representing these concerns did not yield significant coefficients in explaining views about residential surveillance by UAVs or CCTVs. If respondents had been given vignettes related to other functions, perhaps these concerns might have been significant.

V. DISCUSSION

Police departments are increasingly deploying advanced technologies, such as UAVs, body-worn cameras, and automated license plate recognition.[140] Yet, like many advanced police technologies, UAVs may be used for a wide range of functions with varying costs and benefits. One potential concern raised in the literature is that the proliferation of UAVs can facilitate easy and inexpensive surveillance.[141] Indeed, our results suggest a public that is seriously concerned about this potential in the residential context; specifically, disapproval of the use of UAVs by local police departments in the scenarios described by our survey ranged from 64% to 78.2% of the sample. Moreover, in the low-altitude drone scenario, the number of respondents expressing *strong disapproval* approached 50%.

The comparatively higher levels of opposition to pictures or videos taken at a reduced altitude of 50 feet suggest that proximity was a factor in determining acceptability for some respondents. A few previous studies have documented participant concerns over close-proximity drones during detailed interviews, but ours is the first to report this distinction on a larger scale.[142] Interestingly, privacy scholars and others have emphasized the extent to which *higher-altitude* monitoring can be particularly problematic because it would be impossible for individuals to shield their activities

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140. *See, e.g.*, James Byrne & Gary Marx, *Technological Innovations in Crime Prevention and Policing: A Review of the Research on Implementation and Impact*, 20 J. POLICE STUD. 17 (2011); Andrew Guthrie Ferguson, *Big Data and Predictive Reasonable Suspicion*, 163 U. PA. L. REV. 327, 410 (2015); Reiman, *supra* note 13; Rushin, *supra* note 93; Tyson E. Hubbard, Note, *Automatic License Plate Recognition: An Exciting New Law Enforcement Tool with Potentially Scary Consequences*, 18 SYRACUSE SCI. & TECH. L. REP. 3 (2008).

141. *See* Stanley, *supra* note 8.

142. *See* Chang et al., *supra* note 84; *see also* Wang et al., *supra* note 16.

from imperceptible recording devices.[143] Likewise, in their survey, Professor Bracken-Roche et al. found that a mere 13% of Canadians expressed approval when asked generally if UAVs should be permitted to fly "too high to be seen."[144] Our sample's disapproval in the 1,000-foot scenario accords with the direction of this finding, but it is interesting to note that, although the majority of our sample also disapproved, greater numbers of our respondents (28.3%) expressed approval than in the earlier study. This may stem from differences in the acceptability of the entity using the UAV (in our case, the police), from national differences, or from some other source. Further research is needed to establish in greater detail how factors such as these alter the public's calculus about the acceptability of UAV surveillance.

Although CCTV has been in use for much longer in the United States, we found similarly negative responses to the use of CCTV cameras to accomplish monitoring in residential neighborhoods. Specifically, 62.4% of the sample indicated disapproval when asked about CCTV cameras in residential settings — a nearly-identical percentage of the sample that indicated disapproval of high-altitude UAVs used in this way. The CCTV result further underscores the idea that respondents generally disapprove of decisions to conduct this type of surveillance, regardless of the type of technology used. To a certain extent, the finding of similar levels of disapproval across technologies contradicts some results from Professor Herron et al.'s study, which found that public support for UAV cameras was lower than for their ground counterparts.[145] However, Professor Herron et al.'s survey was conducted much earlier in the development of UAVs, so an evolution of opinions may be one reason for the difference.[146]

Additionally, the difference may stem from our survey's focus on residential neighborhoods, where the public's disapproval of surveillance may be particularly robust. Professor Herron et al.'s survey comparing responses to either drone-based or ground-based cameras described the devices as "cameras used to continuously monitor streets and businesses," a wording which may have suggested a commercial (rather than a residential) context.[147] Thus, it is possible that the mention of businesses produced a higher level of support for ground-based cameras (in their case, 58% approval) because surveillance around commercial areas may feel more

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143. *See, e.g.*, Robert Molko, *The Drones Are Coming! Will the Fourth Amendment Stop Their Threat to Our Privacy?*, 78 BROOK. L. REV. 1279, 1333 (2013); Wang et al., *supra* note 16; Francescani, *supra* note 14; Stanley, *supra* note 8.

144. *See* BRACKEN-ROCHE ET AL., *supra* note 1, at 42.

145. *See* HERRON ET AL., *supra* note 16, at 29.

146. *See id.* at 1.

147. *Id.* at 35.

common in today's society and, perhaps also, less intrusive than residential monitoring. Although we cannot be certain of the reasons for the differences between our study and Professor Herron et al.'s, this explanation makes sense because Professor Herron et al.'s mention of drone cameras "used to continuously monitor streets and businesses" also produced a finding of greater support (34%) than did either of our drone monitoring scenarios.[148] Both of our scenarios were limited to the residential context, a limitation that seems to have produced lower levels of support.

Another interesting aspect of focusing on the residential context can be found in the fact that our respondents seem to have perceived CCTV similarly to high-altitude drone flights. Although disapproval was high in all scenarios across our survey, some respondents actually expressed approval of both CCTV and higher-altitude UAV flights but expressed disapproval of lower-altitude flights. For these respondents, low-altitude flights may have seemed more intrusive — either in terms of surveillance output or potentially other factors, such as noise or safety. Since our study is the first to examine these particular scenarios, we did not attempt to conduct a survey experiment where details regarding the types of cameras or conditions like noise or the size of the UAV were varied. That is a direction for future research. However, one possibility is that some respondents thought a higher-flying UAV might not be able to capture the same level of detail as a lower-flying UAV. It is also possible that our respondents' consideration of the low-altitude vignette may have been influenced by their perceived greater awareness of being watched by a craft flying lower. In fact, this may also provide an explanation as to why the results for CCTV cameras on the ground were similar to the 1,000-foot UAV; people tend to forget about the high prevalence of surveillance cameras within our society because the cameras are relatively small and often unobtrusively placed. Greater awareness of surveillance, however, may increase an individual's self-consciousness and, therefore, may have caused our respondents to express greater discomfort with the 50-foot vignette. Indeed, there is existing research in the field of psychology which documents the effects of the perception of "being watched."[149] If this explains our results, however, it is interesting that respondents felt such

148. *Id.*

149. *See, e.g.*, Carol L. Esmark, Stephanie M. Noble & Michael J. Breazeale, *I'll Be Watching You: Shoppers' Reactions to Perceptions of Being Watched by Employees*, 93 J. RETAILING 336 (2017); Moe Fathi, Melissa Bateson & Daniel Nettle, *Effects of Watching Eyes and Norm Cues on Charitable Giving in a Surreptitious Behavioral Experiment*, 12 EVOLUTIONARY PSYCH. 878 (2014); Costas Panagopoulos & Sander van der Linden, *The Feeling of Being Watched: Do Eye Cues Elicit Negative Affect?*, 19 N. AM. J. PSYCH. 113 (2017).

discomfort in the 50-foot scenario merely by reading about and imagining such surveillance (as opposed to experiencing it firsthand).

Existing U.S. Supreme Court precedent has allowed police to surveil the areas of an individual's property that are observable by other members of the public, including by flying over the property to take warrantless high-resolution photographs at 400 and 1,000 feet.[150] Our results suggest that a majority of average individuals do not support granting police this permission and hold an expectation that the areas surrounding their homes and property will not be photographed or recorded by police technologies without a warrant. Thus, the public seems to hold different expectations of privacy than are reflected in the *Ciraolo* and *Riley* cases.[151] Our findings in this respect are consistent with the few existing empirical studies that have examined other types of residential monitoring scenarios.[152] In the case of Professor Herron et al.'s study mentioned above, for example, the authors also found that 69% of their sample agreed with the statement that "[i]t should be illegal for anyone to take drone imagery of me on my own property without my permission."[153] Although this statement includes imagery of a person (in addition to property) and was not limited specifically to police drones, their sample's reactions are consistent with our findings of high levels of disapproval of surveillance in residential settings. Our findings are similarly consistent with a study led by Professor Fradella, who examined the public's expectations of privacy and compared them with vignettes reflecting Supreme Court precedent.[154] Professor Fradella et al. do not investigate UAV use per se, but the study also finds that only 32.5% of respondents concurred with the *Riley* decision, while 44.4% of respondents concurred with the ruling in *Ciraolo*.[155] The fact that the public was more closely split with respect the *Ciraolo* decision (with 40.6% expressing disagreement and 15% expressing neutrality) is also consistent with our finding of somewhat higher levels of support for UAV monitoring at 1,000 feet in altitude.

In the future, when the U.S. Supreme Court is faced with a case of high-altitude drone monitoring over real property, the *Ciraolo* and *Riley* precedents would suggest that the justices will elect to allow such

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150. *See generally* Florida v. Riley, 488 U.S. 445 (1989); California v. Ciraolo, 476 U.S. 207 (1986).

151. *See supra* note 144.

152. *See generally* Sakiyama, *supra* note 16, at 1039; HERRON ET AL., *supra* note 16, at 2; LIEBERMAN ET AL., *supra* note 16, at 1; MIETHE ET AL., *supra* note 16, at 1.

153. HERRON ET AL., *supra* note 16, at 36.

154. *See* Henry F. Fradella et al., *Quantifying* Katz*: Empirically Measuring "Reasonable Expectations of Privacy" in the Fourth Amendment Context*, 38 AM. J. CRIM. L. 289, 293 (2011).

155. *See id.* at 365.

monitoring without a warrant, as long as the police surveil areas that the public could similarly view while flying over the property.[156] Given the consistency of this line of precedent, it would not be surprising if the substitution of a UAV flight in place of a piloted police flight would make no difference in the outcome. However, at least two factors, if altered, might change this calculus. First, the Court may regard incidents of repetitive or prolonged UAV surveillance differently, especially if such surveillance enables police to gather information about individuals' activities that they otherwise would not be able to access without a warrant. In fact, recent Supreme Court opinions have begun to recognize that technologically-assisted, *prolonged* surveillance of individuals' public movements can reveal substantial personal information and may, therefore, require a warrant.[157]

The Court has so far explored these concerns under only very limited circumstances, such as when police attached a "beeper" to monitor the whereabouts of a private car for over one month or when they obtained large quantities of stored cellphone location data.[158] These cases suggest that the Court may be moving in the direction of recognizing expanded privacy interests and limiting prolonged, warrantless surveillance in public spaces, so the frequency and duration of UAV surveillance (and the Court's opinions of the public's expectations at the time of such a case) will be key to determining whether or not routine surveillance via UAV would be considered to be different. As mentioned above, our results and the results of other studies which have examined the *Ciraolo* and *Riley* opinions suggest that the public's view of privacy surrounding their homes are more expansive than the current Supreme Court precedent recognizes.[159]

One interesting note is that the potential for repetitive or prolonged UAV surveillance was actually not explicitly discussed on our survey (a duration was not mentioned), so the public's reactions to prolonged or repetitive scenarios may garner even less support than ours did. In a policy sense, these distinctions are also important for police executives because of the potential for extremely negative public reactions to UAV monitoring suggested by our findings. Time- or geographically-limited flights might theoretically be approved of by greater percentages of the public. Future work will broaden the categories of information tested to examine further

156. *See* Florida v. Riley, 488 U.S. 445, 449 (1989); *see also* California v. Ciraolo, 476 U.S. 207, 213 (1986).

157. *See* Carpenter v. United States, 138 S. Ct. 2206, 2217 (2018).

158. *See id.* at 2212; *see also* United States v. Jones, 565 U.S. 400, 408 (2012).

159. *See Riley*, 488 U.S. at 450; *see also Ciraolo*, 476 U.S. at 215; Fradella, *supra* note 154, at 293.

factors that the public uses in rendering these decisions — for example, the noise, size, and look of a drone, as well as the duration of the surveillance.

The second factor which may come into play with respect to the Court's decision making in future cases is the altitude of the UAV surveillance. With respect to lower-altitude surveillance, although the Court has not rendered an opinion concerning UAVs specifically, the *Causby* case can provide some guidance as to some of the factors that the Court might consider.[160] If a UAV were to fly so low, to be so noisy, or to be so large as to pose a safety or other hazard, strong evidence could be marshalled by the property owners to argue that the UAV had interfered with their use and enjoyment of the property.[161] Thus, this type of UAV flight would seem to violate the holding of the *Causby* decision.[162] However, with respect to UAV surveillance, it may be difficult for property owners to utilize *Causby* effectively to challenge UAV flights.[163] First, the higher a UAV flies, the harder it will be for the landowners to provide evidence of an interference with their use and enjoyment. And, perhaps more critically, what constitutes "interference" may be somewhat subjective — many individuals may feel that the use of a UAV for photography in more than very rare instances interferes with their ability to use their property fully — even if no noise or provable hazard exists. Even if courts are unwilling to validate this type of more expansive view of an owner's right to enjoy their property in an unfettered way, our results suggest that this will not alter the public's disapproval of police agencies' decisions to engage in such monitoring.

In addition to the magnitude of public disapproval of this type of monitoring and its disagreement with Supreme Court precedent, police departments may also want to consider community-specific opinions when assessing how broad or limited their uses of UAVs should be. Our multivariable results provide some guidance as to the different factors which may lead particular communities to be more or less supportive of UAV flights or CCTVs in residential areas. As discussed above, many of the results are similar across technologies, signifying that similar predictors tend to be important across disparities in altitude or type of monitoring technology. For example, education was a significant predictor of some increased support for UAV flights at 1,000 feet in altitude and for CCTV monitoring. Again, this pattern suggests some similarity in the way that high-altitude UAV and CCTV monitoring were viewed by respondents.

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160. *See* United States v. Causby, 328 U.S. 256, 261 (1946).
161. *See id.*
162. *See id.*
163. *See id.*

Educational differences did not significantly predict attitudes towards 50-foot UAV flights. This may be due to the fact that respondents disapproved of low-altitude flights at such high rates (78.2%) that distinctions based on education became no longer relevant. Consequently, even in places where low-altitude flights are legal and in communities with a highly-educated public, police agencies should think carefully about conducting such flights without a warrant and should anticipate significant community criticism if they do.

Similarly, our regressions demonstrated that Republicans were more likely to support monitoring in all three scenarios, followed by Democrats and then Independents, who were the least supportive of UAV surveillance in this sample. This finding is interesting because few existing studies have connected routine differences in opinions about police UAVs to political party identification,[164] and no study so far has connected political party differences to variations in support for residential UAV monitoring. Yet, previous research has suggested that Republicans and political conservatives tend to trust legal authorities (including police and the government) at higher-than-average rates.[165] This added trust may translate into a greater willingness to permit police to use advanced technologies with greater discretion or for a larger variety of functions, including around homes, where greater trust in the agency operating the drone would seem particularly important. If it is greater trust in police which explains the connection between Republican identification and approval of our survey's monitoring scenarios, this is also consistent with our findings (described below) that positive perceptions of police were also significantly correlated with support for UAV and CCTV monitoring.

Interestingly, however, we did not find significant differences with respect to the ways in which respondents of different races perceived our monitoring scenarios. Even if we restrict our inquiry to this sample alone, the only real discernible difference can be seen in the 1,000-foot monitoring scenario, where approximately ten percentage points fewer African Americans supported this function. Yet, this disparity did not produce a statistically significant result, so we cannot generalize this finding to the overall population. Consequently, similar to the studies cited above, our data do not allow for resolution of the question of whether or not African Americans regard UAV monitoring by the police differently than do other respondents. Theoretically speaking, a link still seems possible since African Americans tend to be less trusting of police and

164. *See, e.g.*, LIBERMAN ET AL., *supra* note 16; MIETHE ET AL., *supra* note 16.
165. *See, e.g.*, Elkins, *supra* note 134; Jones, *supra* note 134.

perceive them more negatively.[166] One explanation may be that a limited number of factors have been tested within the vignettes examined in the existing literature so far. Further attention may reveal additional influences on drone perceptions, but we cannot find evidence of significant race-based differences in perceptions of the residential monitoring scenarios we tested.

Likewise, in the multivariable models, we find that age is only significant when respondents considered monitoring via CCTVs. However, across this survey, we found a particularly consistent pattern of decreasing approval of police surveillance with each younger age cohort. Although this effect disappears once other opinion-based predictors are controlled for, we note the effect here because police agencies may want to consider the possibility that disapproval may be even more intense among younger members of the community and, further, that disapproval may become even more pronounced over time. And although these findings with respect to age are not significant within the multivariable models, the results concerning age are consistent with some earlier studies.[167] Though the police cannot control the age distribution of the populations they serve, they can take these demographic factors into account when designing policies and assessing how supportive their communities may be over time. Similarly, this may be something that courts wish to consider as they assess the changing "expectations of privacy" within the general population.

Taken together, our results suggest that the population will tend to subscribe to a more (rather than less) expansive zone of privacy over time when it comes to police monitoring in residential neighborhoods. As we have argued previously, one reason for this may be that, as more surveillance technologies are developed and data collections grow, individuals may become even more aware of the potential problems inherent in large data collections or the lack of control they have over information that is collected about their lives. In fact, increased familiarity with the problems inherent in large-scale technological surveillance and data collection seems to us to be a reasonable hypothesis as to why younger individuals answering our survey tended to already be less supportive of monitoring.

On the other hand, one of the most consistent predictors of more positive responses to our survey's vignettes was concern over crime and this correlation held across both monitoring scenarios and technologies. Further, other studies examining advanced police technologies with

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166. *See* DUROSE ET AL., *supra* note 121, at 3; *see also* FAIRNESS AND EFFECTIVENESS IN POLICING, *supra* note 121, at 300.

167. *See* MIETHE ET AL., *supra* note 16, at 4; *see also* Sakiyama et al., *supra* note 16, at 1035.

surveillance capabilities have produced similar evidence that concern over crime predicts support.[168] Interestingly, one study reported that younger individuals believed UAV surveillance would increase public safety at higher rates than did older individuals, a finding which might suggest that crime concern could moderate the effects of age on support for these functions.[169] Additionally, across all ages, the study found that respondents who supported UAV use by police did so most often because they believed UAVs would increase public safety.[170] Likewise, in our regressions, the coefficients attached to the crime concern variables are large enough in magnitude across all models to underscore the importance of this factor to communities and police agencies. Police may wish to discuss both priorities with respect to privacy and with respect to crime concern with members of their communities when deciding which uses of surveillance technologies best reflect their communities' beliefs. Once these technologies are in use, police agencies may also wish to document their specific uses and make this information freely available to the community, as well as to document the benefits derived from them where possible. Simultaneously, it may also be helpful to present a transparent set of limitations on their use to the community in order to provide reassurance that warrantless monitoring will be severely limited.

Efforts to increase transparency with respect to these technologies and to engage with the community are particularly important. In fact, our results demonstrate that community opinions of police agencies matter when it comes to the public's willingness to allow police discretion to use both UAVs and CCTVs. We found a consistent correlation between positive opinions about police fairness, equality, and respect and support for UAV monitoring and the effect was even larger for CCTV. Similarly, in the CCTV model, the belief that "police make good decisions" was also significant. Overall, though, the impacts of these factors were more modest than the impacts of concern over crime on support for residential UAV monitoring. And it is important to note in this context that only those respondents with *extremely* positive perceptions of police tended to actually support UAV or CCTV monitoring in residential areas.

Although the link between police legitimacy and support for advanced technologies has not been examined frequently in the literature, this finding is consistent with Professor Heen et al.'s multivariable results suggesting that perceptions of police legitimacy were an important factor in predicting

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168. *See* Gill et al., *supra* note 127, at 319; *see also* Merola & Lum, *supra* note 124, at 383.

169. *See* LIEBERMAN ET AL., *supra* note 16, at 4.

170. *See id.* at 1.

support for the UAV functions examined by their survey.[171] These results also seem consistent with similar findings from a study of LPR cameras (another technology with locational monitoring capabilities) and with Professor PytlikZillig et al.'s finding that trust in an organization is one of the greatest predictors of support for UAV use by that organization.[172]

We have previously argued that positive police perceptions may provide a kind of 'social capital' that may prompt a community to be more willing to allow police some discretion to deploy systems of this type.[173] This is also consistent with an argument made in the police legitimacy literature — that increased legitimacy is associated with community support for policies that have the effect of expanding police discretion.[174] As mentioned above, a recent survey experiment also found that learning about the use of LPR cameras tended to reduce trust in police.[175] Given these prior results and the results we have presented above, it seems reasonable to continue to argue that it is necessary to develop a more systematic understanding of how technological change in policing may impact police-community relationships.[176] As police continue to adopt and deploy these technologies at a rapid rate, consultation with the community becomes vitally important.

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171. *See* Heen et al., *supra* note 16, at 27.

172. *See* Merola & Lum, *supra* note 124, at 380; *see also* PytlikZillig et al., *supra* note 109.

173. *See* Merola & Lum, *supra* note 124, at 384.

174. *See* Jason Sunshine & Tom R. Tyler, *The Role of Procedural Justice and Legitimacy in Shaping Public Support for Policing*, 37 LAW & SOC'Y REV. 513, 524 (2003).

175. *See* Merola et al., *supra* note 125, at 60.

176. *See generally* Merola & Lum, *supra* note 124, at 374; Peter Neyroud & Emma Disley, *Technology and Policing: Implications for Fairness and Legitimacy*, 2 POLICING 226, 229 (2008).

APPENDIX A

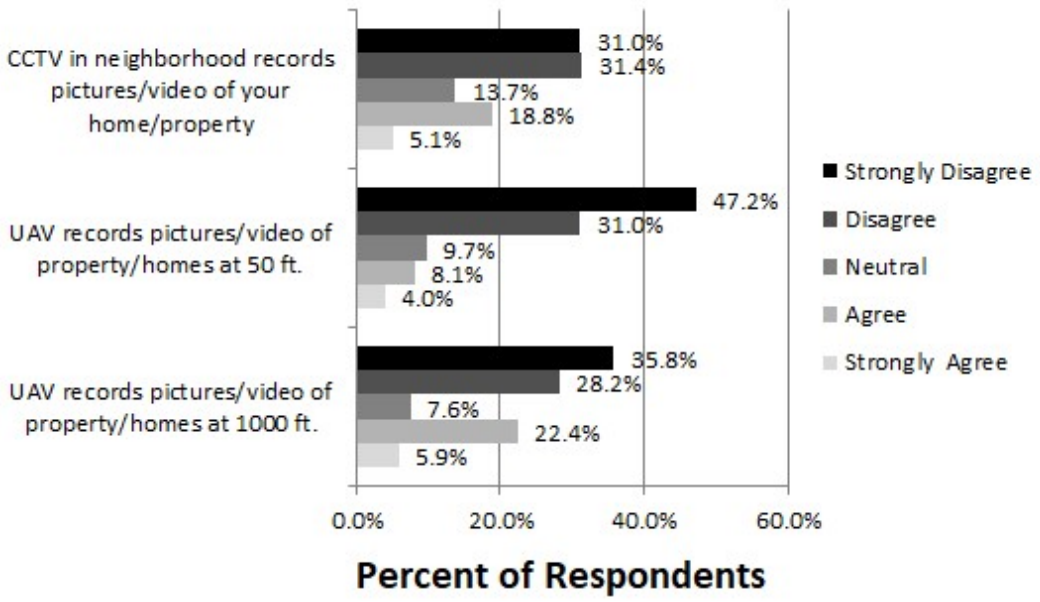
Table 1: Sample Characteristics

Independent variable	Variable coding	Descriptive Statistics
Age (*n*=606)	Continuous	Range = 19-75; mean = 37.91; SD = 12.18
Gender (*n*=580)	Dummy (1 = male)	M = 50.0%; F = 45.7%; No Resp. = 4.3%
Race (*n*=606)*		
White	Dummy (1 = white)	White = 74.9%
African American	Dummy (1 = African American)	African American = 8.6%
Political Party (*n*=605)		
Republican	Dummy (1 = Republican)	Republican = 19.5%
Independent	Dummy (1 = Independent)	Independent = 32.9%
Education (*n*=605)	Dummy (1 = College or higher)	College or Higher = 51.5%
Crime Concern (*n*=606)	Dummy (1 = moderate/high)	Moderate/High = 64.2%
Fairness, Equality, and Respect Scale (*n*=606)	Scale (1 to 4)	Range = 0-4; mean = 2.18; SD = 1.00
Police make good decisions (*n*=606)	Likert Scale (5-point)	Range = 1-5; mean = 2.70; SD = 1.01

* The base condition for race includes: Asian (7.3%), Native American (0.7%), Latino (6.4%), and Other (2.1%).

APPENDIX B

Figure 1. Approval of police technologies used for neighborhood monitoring.



APPENDIX C

Table 2: Models of Respondent Approval of Police UAV and CCTV Usage

	UAV records pictures/video at 50 ft.				UAV records pictures/video at 1000 ft.				CCTV of Home and Surrounding Property			
	Demographics-only		Full Model		Demographics-only		Full Model		Demographics-only		Full Model	
Factor	*B* (SE)	β	*B* (SE)	Β	*B* (SE)	β	*B* (SE)	β	*B* (SE)	β	*B* (SE)	β
Intercept	1.65 (.20)	***	1.74 (.48)	***	2.24 (.23)	***	2.35 (.57)	***	1.76 (.24)	***	1.60 (.30)	***
Age	.01 (.00)	.06	.00 (.00)	.03	.01 (.01)	.05	.00 (.00)	.01	.01 (.01)	.10*	.01 (.00)	.05
Male	.00 (.09)	.00	.07 (.09)	.03	-.09 (.11)	-.03	.01 (.11)	.00	-.14 (.12)	-.05	-.09 (.11)	-.03
College Educated	.11 (.09)	.05	.06 (.09)	.03	.23 (.11)	.09*	.17 (.10)	.06	.33 (.12)	.13**	.24 (.11)	.09*
Republican	.29 (.12)	.12*	.10 (.12)	.03	.25 (.15)	.08	-.00 (.14)	-.00	.42 (.16)	.13**	.14 (.15)	.04
Independent	-.21 (.11)	-.09	-.16 (.10)	-.07	-.31 (.12)	-.11*	-.27 (.12)	-.10*	-.20 (.13)	-.07	-.13 (.12)	-.05
White	-.00 (.13)	.00	.08 (.12)	.03	-.13 (.15)	-.04	-.03 (.14)	-.01	.01 (.16)	.00	.08 (.15)	.03
African American	-.01 (.20)	-.00	.11 (.18)	.03	-.38 (.23)	-.08	-.22 (.22)	-.05	-.03 (.25)	-.01	.10 (.23)	.02
Crime Concern	-	-	.37 (.09)	.16***	-	-	.40 (.11)	.15***	-	-	.32 (.11)	.12**
Police Fairness, Equality, and Respect Scale	-	-	.05 (.02)	.17*	-	-	.06 (.02)	.18*	-	-	.23 (.10)	.17*
Police Make Good Decisions	-	-	-.03 (.08)	-.03	-	-	-.11 (.09)	-.09	-	-	.17 (.09)	.13
Concern-Data Misunderstood	-	-	-.27 (.11)	-.10*	-	-	-.25 (.13)	-.08*	-	-	-.37 (.13)	-.12**
Concern-People Watching Me	-	-	-.36 (.10)	-.15***	-	-	-.27 (.12)	-.10*	-	-	-.42 (.12)	-.15**
Concern-Data Being Hacked	-	-	-.21 (.12)	-.07	-	-	-.16 (.14)	-.04	-	-	-.06 (.15)	-.02
Concern-Data Storage Length	-	-	-.15 (.09)	-.07	-	-	-.21 (.11)	-.08	-	-	-.13 (.12)	-.05
Model R^2 and *p* value	R^2=.033	*p*=.008	R^2=.182	*p*<.001	R^2=.043	*p*=.001	R^2=.183	*p*<.001	R^2=.064	*p*<.001	R^2=.238	*p*<.001

Note. Base category for political party is 'Democrat'. Base category for Race is 'Other'. All models use n = 606.
b = regression coefficient; SE = standard error; β = standardized coefficient.
** p < .05. ** p < .01. *** p < .001.*