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ARTICLE

Understanding public opinion of UAVs in Canada: A 2014 analysis of survey data and its policy implications

Scott Thompson, and Ciara Bracken-Roche

Abstract: This study has two aims: first, assessing the knowledge of Canadians with regard to their awareness of the use of UAV technology for data collection; and second, testing the hypothesis that public opinion regarding the use of UAVs for data collection in Canada varies by application, by institution, by collection method, and by respondent demographics. The survey contains questions regarding awareness of UAV use in Canada, as well as (*i*) the degree of support found for use by specific groups, (*ii*) for law enforcement applications, (*iii*) for private or industry applications, (*iv*) for border or coastal surveillance, and (*v*) for visibility and data sharing practices. Polling data also enables the comparison of UAV support against traditionally piloted aircraft and automated UAVs. This study found a majority in support of the use of UAVs for safety or emergency-response purposes. However, this support falls away in cases where UAV are used to perform routinized acts of surveillance, or identification. These findings will be useful to legislators and regulators in developing policy on UAVs that takes into account public sentiment and opinion, and for private sector actors and governments in addressing public concerns about UAVs as the industry moves forward.

Key words: unmanned air vehicles (UAVs), survey data, public opinion, policy, Canada.

Résumé : Cette étude comporte deux buts : premièrement, évaluer la connaissance qu'ont les Canadiens et Canadiennes de l'utilisation de la technologie des véhicules aériens sans pilote (UAV) aux fins de la collecte de données; et, deuxièmement, tester l'hypothèse voulant que l'opinion publique concernant l'utilisation des UAV pour la collecte des données au Canada varie selon l'application, l'institution, la méthode de collecte des données, et le profil démographique des personnes interrogées. Le sondage comprend des questions concernant le niveau de connaissance de l'utilisation des UAV au Canada, ainsi que (*i*) le niveau d'appui à l'utilisation des UAV trouvé selon les groupes spécifiques, (*ii*) aux fins de l'application des lois, (*iii*) à des fins privées ou industrielles, (*iv*) à des fins de surveillance frontalière et côtière, et (*v*) à des fins de visibilité et de pratiques de partage des données. Les résultats de sondage permettent de comparer l'appui aux UAV à celui des aéronefs pilotés et des UAV automatisés. Ce sondage démontre qu'une majorité appuie l'utilisation des UAV aux fins de la sécurité et d'intervention en cas d'urgence. Cependant, cet appui diminue dans les cas où on utilise les UAV pour accomplir des activités routinières de surveillance ou d'identification. Ces résultats serviront aux législateurs et aux chargés de la réglementation à développer une politique sur les UAV qui tient compte du sentiment général et de l'opinion publique, et serviront aussi aux acteurs du secteur privé et aux gouvernements afin d'aborder les préoccupations de la population à l'égard des UAV à mesure que l'industrie progresse.

Mots-clés : véhicules aériens sans pilote (UAV), données de sondage, opinion publique, politique, Canada.

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Introduction

In recent years, several studies have presented results from American public opinion surveys regarding the domestic use of aircraft known as unmanned systems, uninhabited aerial vehicles, remotely piloted vehicles, or (as they are defined under a blanket term within Canadian law) unmanned air vehicles (UAVs). While each of these studies has produced data that is of interest to scholarly research, many place their focus on testing hypotheses seeking to answer the overly broad question: *does the general public support or oppose the adoption of UAV technology*? In reviewing these past studies, there was considerable variation found in responses of support, which suggested an uncaptured complexity within public opinion survey answers. This study was designed specifically to test this hypothesis— that Canadian public opinion rests not solely on the technology, but also on the specific *applications* for which these aircraft are being applied, the reasoning behind their use, and the institution or group behind the operation of the UAV. Additionally, this analysis also tests respondent demographics to determine *if* and *how* public opinion varies based on various demographic factors.

For this study, data were collected from 3045 respondents within Canada and the results weighted to account for demographic and regional differences. A series of six questions was asked, the first relating to the general awareness of the Canadian public of UAV applications, while the remaining questions investigated the degree of support or opposition to UAV use by testing a set of specific institutions and groups, a set of distinctive law enforcement applications, a selection of private company and industry applications, potential uses by boarder and coastal organizations, and, finally, the conditions and means of collecting data, as well as data sharing practices. This article charts the results of this survey data, identifying a complexity within Canadian public opinion regarding the use of UAVs by application and by organization, and demonstrating that *how* these technologies are applied not only matters to Canadians, but plays a significant role in forming the basis for understanding public opinion in regards to how UAV technologies are seen and understood within Canadian society.

Four main findings emerged out of the survey data. First, and foremost, the study data confirms that the tested hypothesis was correct— that *who* was using the UAV technology to gather data, and *for what reasons*, had a significant impact on public support within the Canadian population. Second, regardless of this variation, the technology itself did in fact matter to public opinion, meaning that the use of UAVs of any kind significantly impacts how the public feels about information collection. Across the various applications, support was universally lower compared with traditionally piloted aircraft, though there was also greater support for piloted UAV over autonomous UAV in nearly every instance, other than remote data gathering practices related to industry, security at major sporting events (Pan AM games), and government intelligence services. Third, regardless of the technology that is employed, support is diminished for applications that include the surveillance, targeting or identification of people. Forth, the use of UAVs in the private sector generally leans more towards opposition than support, but again, this is an unreliable generalization because the intended use matters, because security-focused uses are of greater concern to the public than aerial surveying uses, aerial photography or mapping by private industry. Finally, with regard to data collection, sharing, and visibility, the survey data show that individuals do not support the sharing of collected data with other governments; nor do they wish to be viewed by craft that are too high to be seen, or those using technologies that would allow the UAV to "see" into their homes via technologies such as heat-sensing infrared cameras.

After a brief review of the methodologies adopted for this research, the following sections of this paper will provide key findings in much greater detail of the conducted study regarding public opinion and UAV in Canada.

Research question and methodology

The methodology of this study was specifically developed to ask "if public opinion in Canada regarding the use of UAV was dependent on how these technologies were applied." This question came about as a result of a review of previous Canadian and United States public opinion surveys that asked questions about issues of UAV use (see AP-National Constitution Center 2012; Monmouth University Poll 2013; Phoenix Strategic Perspectives 2013). Although past studies have identified nuances between different UAV applications, none, to this point, have sufficiently taken up this point as their primary intent for investigation.

A specific methodology was developed to test the hypothesis that "the [general] act of information identification and collection will be viewed more positively than the act of collecting data using unmanned or autonomous aerial vehicles" (Angus Reid Global 2014). This hypothesis was explicitly designed to highlight how Canadians felt about the use of UAV technology, specifically, when this technology was coupled with particular applications and institutions. To achieve this, "a split cell

(monadic) approach [wa]s used to separate perceptions surrounding forms of information collection in general from perceptions surrounding forms of information collection when drones are used" (Angus Reid Global 2014). Interviews were conducted by means of an online survey, and drew on a sample of 3045 individuals from within Canada. The sample was designed to balance data collection based on age, gender, and region, while collected results were weighed to match the Canadian population's distribution.

To highlight public awareness and support for UAV technologies versus other aerial vehicles, the surveys were broken into four streams that asked questions distinguished between:

1. piloted aircraft: explained as "aerial vehicles such as planes and helicopters, of various sizes, operated by one or more pilots onboard the aircraft";
2. UAVs: explained as "unmanned aerial vehicles – also known as drones or remotely piloted vehicles – include aerial vehicles such as planes and helicopters, of various sizes, operated by one or more pilots who are not onboard the aircraft";
3. autonomous UAVs: explained as "autonomous unmanned aerial vehicles – also known as drones – include aerial vehicles such as planes and helicopters, of various sizes, operated by an onboard computer without a pilot controlling the aircraft"; and finally
4. the control stream, which provided only the following script: that "these questions are about information identification and collection for a range of purposes".

The surveys were distributed to ensure equal and representative numbers of respondents for each technology and then questions related to awareness and applications of the named technology were gathered as well as general demographic information.

This study has four parts: the first investigates general awareness regarding data collection by aerial vehicles in Canada; the second gauges the level of support by the general public for the use of UAV and other craft by specific government, corporate, and public actors; the third demonstrates public support or opposition to specific law enforcement applications; the fourth addresses support or opposition for applications in the private sector; and the final section addresses public opinion regarding border surveillance and information sharing practices. In regard to awareness, respondents were to respond either that "yes" they know that the aircraft was used for the collection of data, "no" they know that it was not, or "unsure". Support–opposition questions asked respondents to answer questions based on a 10 point scale from one, "opposition", to 10, "support". Within this analysis, "opposition" is represented as the bottom three boxes, 1, 2, and 3; "somewhat support" and "somewhat oppose" represent scores of 7, 6, and 5, 4, respectively; while "support" is defined as a response of 8, 9, or 10, on the preceding 10 point scale.

Further analysis was conducted on the data set for the second set of questions, related to support or opposition, to see whether support for use of UAVs for various groups and organizations varied across different demographic factors or variables. As noted in past research, an individual's social grouping often plays a role in shaping their opinions (Stewart 2009, p. 133), thus, shaping their contribution to public opinion. For this reason additional analysis was conducted with the aim of highlighting whether certain demographic factors consistently indicate support or opposition to the use of UAV technologies. Given the ordinal nature of the data, ordered logit regressions are estimated to determine which, if any, characteristics were effective predictors of individuals' responses of support. The estimated odds ratio represents the constant effect of a predictor that a given outcome will occur; this is the value that is taken to reflect the effect of the independent variables of respondent demographics on their reported support of UAV use. The estimated odds ratio value for each demographic variable indicates the level of support for UAV use at every level on the scale (1–10); more specifically, the estimated odds ratio indicates the likelihood of one demographic group to be more likely to answer at a higher level on the support–oppose 10-point scale.

The following sections are separated in accordance with the survey's six central questions. Each section analyzes support for use by group, tests of joint significant following the ordered logistic regression as a means of investigating if the tested demographic category as a whole is significant in how it correlates with the level of support. Each section will present two tables, the first outlining the weighted results of the public opinion survey, and the second outlining the results of the ordered logistic regression analysis of demographic data.

Awareness

In the survey results, respondents reported a general awareness of the deployment of aerial vehicles to collected data for a wide array of applications in Canada. Respondents were asked about their awareness of a set of 18 potential applications for UAV technologies. The polled applications were

largely drawn from a list from Transport Canada's web page regarding the potential uses of UAV under the *Canadian Aviation Regulations* (CARS) legislation, while final selections were made based on the researchers knowledge of current known uses for UAV or known uses that were in development (Transport Canada 2012). The purpose of this line of questions was to have respondents identify in what areas they believe that UAVs are currently being used in Canada, to develop a general sense of Canadians' awareness of the use of UAV and other technologies to collect data. The poll also measured awareness of UAV use against traditionally piloted aircraft, automated UAVs (AUAV), and against a general control. Participants were specifically asked the following question; "thinking of [piloted aircraft / unmanned aerial vehicles / autonomous unmanned aerial vehicles] use in Canada, for the following purposes, if any, is information currently collected or identified [using piloted aircraft / using unmanned aerial vehicles / using autonomous aerial vehicles] in Canada?"

Overall, those polled reported a low degree of awareness of the use of UAVs in Canada. Of the applications that were investigated, there was considerably more awareness of the use of traditionally piloted aircraft when compared with UAVs, and for nearly all of the measured applications, a majority of those polled reported an awareness of traditionally piloted aircraft. For UAVs, and AUAVs specifically, a majority (50%+) of those polled only reported in awareness of their use for seven of the 18 measured applications (see Table 1).

The greatest reported awareness was found to exist regarding UAV in relation to aerial photography (65.3%), followed by atmospheric weather assessment (60.3%), cartography (56.5%), and finally search and rescue (51.6%). UAV and AUAV only reported a greater awareness than traditionally piloted craft in the area of atmospheric weather assessment (UAV +1.1%; AUAV +4.7%). While the lowest levels of awareness were reported for the delivery of packages (13.8%), promotion and advertising (17.7%), mineral exploration (32.2%), and general surveillance (39.3%). The degree of awareness reported for AUAV applications outscored UAV in all but one of the polled areas. Although this disparity is not borne out in actual frequency of the use of these craft (see Thompson and Saulnier 2015), it nonetheless demonstrates a greater prevalence of AUAV use within the public mind.

Support of UAV use by group

The questions in this section of the study were designed to gain an understanding of how comfortable Canadians are with the data collection capabilities of UAV when used by specific institutions. This study asked interview questions regarding the use of UAV by nine different organizations or "groups", adopting the script of; "to what extent do you support or oppose each of the following groups collecting or identifying information in Canada [using piloted aircraft / using unmanned aerial vehicles / using autonomous unmanned aerial vehicles / empty for control]?" The questions again allowed for a comparison between UAVs, AUAVs, and traditionally piloted aircraft, but more importantly worked to address the study's overall hypothesis, suggesting that public opinion regarding the use of these technologies vary by institution, organization or group. Regardless of the group, fewer of those polled supported the use of UAVs or AUAVs over traditionally piloted aircraft, though there was significant variation in the degree of support for UAV use across groups. Of the nine groups polled, only emergency responders (ambulance or fire) found support from a majority of respondents, while two, private investigators (50.3%) and individuals and hobbyists (50.1%), were opposed by a majority of Canadians. Within the six remaining groups, four, university researchers, law enforcement, government intelligence services or agencies, and government border or coastal security organizations, showed a larger degree of support than opposition, while, two, industry and private companies and journalists found more opposition that support within the respondents of those polled (see Table 2).

These data denote a distinctive lack of support for the adoption of UAV technologies to collect data within the private sector, noting that only about one in 10 Canadians support private sector use of UAVs to collect data. In particular, the use of UAVs by private investigators gained the least amount of support, with only 10.6% of respondents answering in support of their use, while this number is followed by "Journalists and Media" (11.7%), and finally, "Industry and Private Companies" (12.5%).

Although these questions provide general public opinion numbers for support and opposition by group, further questions were asked to investigate how specific applications by these groups would impact reported levels of support.

UAV use by law enforcement

To test if the degree of support for law enforcement varied by particular application, 15 different applications were selected and respondents were asked "to what extent do you support or oppose law enforcement in Canada collecting of identifying information [using piloted craft/ using unmanned

Table 1. Awareness of UAV use in Canada.

Application	Yes	No	Unsure	Totals
Law enforcement (active operations or investigations)				
Piloted aircraft	519 (68.2%)	78 (10.2%)	164 (21.6%)	761 (100%)
Unmanned aerial vehicles	312 (41.0%)	155 (20.4%)	294 (38.6%)	761 (100%)
Autonomous unmanned aerial vehicles	343 (45.0%)	145 (19.0%)	274 (36.0%)	762 (100%)
Control	555 (72.8%)	54 (7.1%)	153 (20.1%)	762 (100%)
Border patrol				
Piloted aircraft	475 (62.4%)	86 (11.3%)	200 (26.3%)	761 (100%)
Unmanned aerial vehicles	364 (47.8%)	102 (13.4%)	295 (38.8%)	761 (100%)
Autonomous unmanned aerial vehicles	400 (52.6%)	108 (14.2%)	253 (33.2%)	761 (100%)
Control	528 (69.4%)	62 (8.1%)	171 (22.5%)	761 (100%)
General surveillance over public spaces (e.g., patrols, crime prevention monitoring)				
Piloted aircraft	418 (54.9%)	119 (15.6%)	224 (29.4%)	761 (100%)
Unmanned aerial vehicles	299 (39.3%)	171 (22.5%)	291 (38.2%)	761 (100%)
Autonomous unmanned aerial vehicles	300 (39.4%)	176 (23.1%)	286 (37.5%)	762 (100%)
Control	473 (62.2%)	83 (10.9%)	205 (26.9%)	761 (100%)
Traffic and accident surveillance				
Piloted aircraft	569 (74.8%)	70 (9.2%)	122 (16.0%)	761 (100%)
Unmanned aerial vehicles	335 (44.0%)	158 (20.8%)	268 (35.2%)	761 (100%)
Autonomous unmanned aerial vehicles	348 (45.7%)	150 (19.7%)	264 (34.6%)	762 (100%)
Control	560 (73.7%)	54 (7.1%)	146 (19.2%)	760 (100%)
Fire fighting, monitoring, and management				
Piloted aircraft	559 (73.5%)	64 (8.4%)	138 (18.1%)	761 (100%)
Unmanned aerial vehicles	315 (41.4%)	138 (18.1%)	308 (40.5%)	761 (100%)
Autonomous unmanned aerial vehicles	325 (42.7%)	145 (19.0%)	292 (38.3%)	762 (100%)
Control	493 (64.8%)	61 (8.0%)	207 (27.2%)	761 (100%)
Emergency and disaster monitoring				
Piloted aircraft	571 (75.0%)	52 (6.8%)	138 (18.1%)	761 (100%)
Unmanned aerial vehicles	377 (49.5%)	91 (12.0%)	293 (38.5%)	761 (100%)
Autonomous unmanned aerial vehicles	391 (51.3%)	92 (12.1%)	279 (36.6%)	762 (100%)
Control	507 (66.6%)	76 (10.0%)	178 (23.4%)	762 (100%)
Search and rescue				
Piloted aircraft	635 (83.4%)	39 (5.1%)	87 (11.4%)	761 (100%)
Unmanned aerial vehicles	393 (51.6%)	114 (15.0%)	254 (33.4%)	761 (100%)
Autonomous unmanned aerial vehicles	395 (51.8%)	131 (17.2%)	236 (31.0%)	762 (100%)
Control	494 (64.9%)	75 (9.9%)	192 (25.2%)	761 (100%)
Geological surveying				
Piloted aircraft	486 (63.9%)	87 (11.4%)	188 (24.7%)	761 (100%)
Unmanned aerial vehicles	374 (49.1%)	77 (10.1%)	310 (40.7%)	761 (100%)
Autonomous unmanned aerial vehicles	381 (50.0%)	95 (12.5%)	286 (37.5%)	762 (100%)
Control	446 (58.5%)	80 (10.5%)	236 (31.0%)	762 (100%)
Atmospheric weather and climate assessment				
Piloted aircraft	450 (59.2%)	93 (12.2%)	217 (28.6%)	760 (100%)
Unmanned aerial vehicles	459 (60.3%)	65 (8.5%)	237 (31.1%)	761 (100%)
Autonomous unmanned aerial vehicles	487 (63.9%)	52 (6.8%)	223 (29.3%)	762 (100%)
Control	545 (71.6%)	67 (8.8%)	149 (19.6%)	761 (100%)
Oceanographic research				
Piloted aircraft	413 (54.3%)	109 (14.3%)	239 (31.4%)	761 (100%)
Unmanned aerial vehicles	336 (44.2%)	96 (12.6%)	329 (43.2%)	761 (100%)
Autonomous unmanned aerial vehicles	354 (46.5%)	105 (13.8%)	303 (39.8%)	762 (100%)
Control	412 (54.1%)	108 (14.2%)	241 (31.7%)	761 (100%)

Table 1 *(concluded).*

Application	Yes	No	Unsure	Totals
Cartography and mapping				
Piloted aircraft	520 (68.3%)	73 (9.6%)	168 (22.1%)	761 (100%)
Unmanned aerial vehicles	430 (56.5%)	67 (8.8%)	264 (34.7%)	761 (100%)
Autonomous unmanned aerial vehicles	460 (60.4%)	67 (8.8%)	234 (30.7%)	761 (100%)
Control	437 (57.5%)	84 (11.1%)	239 (31.4%)	760 (100%)
Survey and inspection of remote power lines and pipelines				
Piloted aircraft	467 (61.4%)	76 (10.0%)	218 (28.6%)	761 (100%)
Unmanned aerial vehicles	338 (44.4%)	94 (12.3%)	330 (43.3%)	762 (100%)
Autonomous unmanned aerial vehicles	351 (46.1%)	100 (13.1%)	311 (40.8%)	762 (100%)
Control	435 (57.2%)	76 (10.0%)	250 (32.9%)	761 (100%)
Aerial photography				
Piloted aircraft	619 (81.3%)	43 (5.7%)	99 (13.0%)	761 (100%)
Unmanned aerial vehicles	497 (65.3%)	63 (8.3%)	201 (26.4%)	761 (100%)
Autonomous unmanned aerial vehicles	490 (64.3%)	85 (11.2%)	187 (24.5%)	762 (100%)
Control	426 (56.0%)	98 (12.9%)	237 (31.1%)	761 (100%)
Mineral exploration				
Piloted aircraft	335 (44.0%)	126 (16.6%)	300 (39.4%)	761 (100%)
Unmanned aerial vehicles	245 (32.2%)	132 (17.3%)	384 (50.5%)	761 (100%)
Autonomous unmanned aerial vehicles	270 (35.4%)	162 (21.3%)	330 (43.3%)	762 (100%)
Control	461 (60.6%)	92 (12.1%)	208 (27.3%)	761 (100%)
Agricultural surveying				
Piloted aircraft	429 (56.4%)	102 (13.4%)	230 (30.2%)	761 (100%)
Unmanned aerial vehicles	328 (43.2%)	92 (12.1%)	340 (44.7%)	760 (100%)
Autonomous unmanned aerial vehicles	352 (46.1%)	122 (16.0%)	289 (37.9%)	763 (100%)
Control	431 (56.6%)	77 (10.1%)	254 (33.3%)	762 (100%)
Promotion and advertising				
Piloted aircraft	342 (44.9%)	191 (25.1%)	228 (30.0%)	761 (100%)
Unmanned aerial vehicles	135 (17.7%)	289 (38.0%)	337 (44.3%)	761 (100%)
Autonomous unmanned aerial vehicles	164 (21.5%)	307 (40.3%)	291 (38.2%)	762 (100%)
Control	450 (59.1%)	124 (16.3%)	187 (24.6%)	761 (100%)
Agricultural spraying				
Piloted aircraft	537 (70.6%)	74 (9.7%)	150 (19.7%)	761 (100%)
Unmanned aerial vehicles	238 (31.3%)	198 (26.0%)	325 (42.7%)	761 (100%)
Autonomous unmanned aerial vehicles	260 (34.1%)	187 (24.5%)	315 (41.3%)	762 (100%)
Control	323 (42.4%)	137 (18.0%)	301 (39.6%)	761 (100%)
Package delivery (e.g., delivering small online purchases like books)				
Piloted aircraft	332 (43.6%)	231 (30.4%)	198 (26.0%)	761 (100%)
Unmanned aerial vehicles	105 (13.8%)	370 (48.6%)	286 (37.6%)	761 (100%)
Autonomous unmanned aerial vehicles	132 (17.3%)	373 (49.0%)	257 (33.7%)	762 (100%)
Control	392 (51.5%)	138 (18.1%)	231 (30.4%)	761 (100%)

Note: Tabulated from Angus Reid Global (2014).

aerial vehicles / using autonomous unmanned aerial vehicles / empty for control] for each of the following purposes?" The results of this section of the interview data fit the tested hypothesis and a high degree of variance was reported across measured applications. Five of the measured applications (in hostage situations (68.6%), for finding missing persons (71.7%), for disaster response (71.4%), routine emergency response (fire, medical, etc.) (60.4%), and locating objects such as suspicious packages or potential explosives (61.4%)) found support from a majority of Canadians, while a majority were not opposed to any of the applications (see Table 3).

Although the use of UAVs by law enforcement does find support, as has been shown in previous studies of Canadian public opinion (see Phoenix Strategic Perspectives 2013), the range of support shown in our data reflects the complexity of the issue of support within the Canadian public.

Table 2. Support of UAV use in Canada by group.

	Support	Somewhat support	Somewhat oppose	Oppose	Totals
Law enforcement					
Piloted aircraft	461 (60.6%)	124 (16.3%)	120 (15.8%)	56 (7.4%)	761 (100%)
Unmanned aerial vehicles	329 (43.2%)	149 (19.6%)	160 (21.0%)	123 (16.2%)	761 (100%)
Autonomous unmanned aerial vehicles	324 (42.5%)	151 (19.8%)	144 (18.9%)	143 (18.8%)	762 (100%)
Control	410 (53.8%)	159 (20.9%)	121 (15.9%)	72 (9.4%)	762 (100%)
Government intelligence services/agencies					
Piloted aircraft	309 (40.6%)	172 (22.6%)	182 (23.9%)	98 (12.9%)	761 (100%)
Unmanned aerial vehicles	202 (26.5%)	134 (17.6%)	232 (30.4%)	194 (25.5%)	762 (100%)
Autonomous unmanned aerial vehicles	223 (29.2%)	147 (19.3%)	176 (23.1%)	217 (28.4%)	763 (100%)
Control	296 (38.9%)	167 (21.9%)	182 (23.9%)	116 (15.2%)	761 (100%)
Government border/coastal security organizations					
Piloted aircraft	459 (60.2%)	142 (18.6%)	120 (15.7%)	41 (5.4%)	762 (100%)
Unmanned aerial vehicles	374 (49.1%)	150 (19.7%)	134 (17.6%)	103 (13.5%)	761 (100%)
Autonomous unmanned aerial vehicles	371 (48.7%)	151 (19.8%)	129 (16.9%)	111 (14.6%)	762 (100%)
Control	384 (50.4%)	144 (18.9%)	155 (20.3%)	79 (10.4%)	762 (100%)
Private investigators					
Piloted aircraft	112 (14.7%)	165 (21.7%)	241 (31.7%)	242 (31.8%)	760 (100%)
Unmanned aerial vehicles	81 (10.6%)	98 (12.9%)	199 (26.1%)	383 (50.3%)	761 (100%)
Autonomous unmanned aerial vehicles	81 (10.6%)	112 (14.7%)	187 (24.5%)	382 (50.1%)	762 (100%)
Control	126 (16.6%)	163 (21.4%)	229 (30.1%)	243 (31.9%)	761 (100%)
Industry and private companies					
Piloted aircraft	167 (21.9%)	164 (21.6%)	246 (32.3%)	184 (24.2%)	761 (100%)
Unmanned aerial vehicles	95 (12.5%)	105 (13.8%)	200 (26.3%)	361 (47.4%)	761 (100%)
Autonomous unmanned aerial vehicles	101 (13.2%)	108 (14.2%)	214 (28.0%)	340 (44.6%)	763 (100%)
Control	157 (20.6%)	131 (17.2%)	246 (32.3%)	227 (29.8%)	761 (100%)
Individuals/hobbyists					
Piloted aircraft	174 (22.9%)	153 (20.1%)	222 (29.2%)	212 (27.9%)	761 (100%)
Unmanned aerial vehicles	106 (13.9%)	74 (9.7%)	200 (26.3%)	381 (50.1%)	761 (100%)
Autonomous unmanned aerial vehicles	97 (12.7%)	110 (14.5%)	181 (23.8%)	373 (49.0%)	761 (100%)
Control	122 (16.0%)	126 (16.5%)	217 (28.5%)	297 (39.0%)	762 (100%)
Universities and academic researchers					
Piloted aircraft	302 (39.7%)	178 (23.4%)	186 (24.4%)	95 (12.5%)	761 (100%)
Unmanned aerial vehicles	240 (31.5%)	162 (21.3%)	200 (26.3%)	159 (20.9%)	761 (100%)
Autonomous unmanned aerial vehicles	224 (29.4%)	191 (25.1%)	181 (23.8%)	166 (21.8%)	762 (100%)
Control	336 (44.2%)	173 (22.8%)	162 (21.3%)	89 (11.7%)	760 (100%)
Emergency responders (fire/ambulance)					
Piloted aircraft	593 (77.9%)	74 (9.7%)	71 (9.3%)	23 (3.0%)	761 (100%)
Unmanned aerial vehicles	502 (66.0%)	118 (15.5%)	91 (12.0%)	50 (6.6%)	761 (100%)
Autonomous unmanned aerial vehicles	482 (63.3%)	120 (15.8%)	91 (12.0%)	68 (8.9%)	761 (100%)
Control	487 (64.0%)	127 (16.7%)	103 (13.5%)	44 (5.8%)	761 (100%)
Journalists and media					
Piloted aircraft	185 (24.3%)	189 (24.9%)	234 (30.8%)	152 (20.0%)	760 (100%)
Unmanned aerial vehicles	89 (11.7%)	110 (14.5%)	203 (26.7%)	359 (47.2%)	761 (100%)
Autonomous unmanned aerial vehicles	83 (10.9%)	124 (16.3%)	202 (26.5%)	352 (46.3%)	761 (100%)
Control	214 (28.1%)	164 (21.6%)	201 (26.4%)	182 (23.9%)	761 (100%)

Note: Tabulated from Angus Reid Global (2014).

In general, these data uphold the trend of traditionally piloted aircraft finding the largest level of support, followed by UAVs and then autonomous UAVs. For traditionally piloted aircraft six applications found support from a majority of those polled, while five applications were supported by a majority if AUAVs were adopted.

Table 3. Law enforcement UAV support in Canada.

	Support	Somewhat support	Somewhat oppose	Oppose	Totals
To issue speeding tickets					
Piloted aircraft	178 (23.4%)	154 (20.2%)	188 (24.7%)	241 (31.7%)	761 (100%)
Unmanned aerial vehicles	149 (19.6%)	99 (13.0%)	193 (25.4%)	319 (42.0%)	760 (100%)
Autonomous unmanned aerial vehicles	140 (18.4%)	113 (14.8%)	157 (20.6%)	351 (46.1%)	761 (100%)
Control	283 (37.1%)	157 (20.6%)	165 (21.7%)	157 (20.6%)	762 (100%)
For crowd control at political demonstrations					
Piloted aircraft	258 (33.9%)	144 (18.9%)	174 (22.9%)	185 (24.3%)	761 (100%)
Unmanned aerial vehicles	223 (29.3%)	125 (16.4%)	158 (20.8%)	255 (33.5%)	761 (100%)
Autonomous unmanned aerial vehicles	206 (27.0%)	161 (21.1%)	152 (19.9%)	243 (31.9%)	762 (100%)
Control	265 (34.8%)	162 (21.3%)	161 (21.2%)	173 (22.7%)	761 (100%)
For personal identification at political demonstrations					
Piloted aircraft	171 (22.5%)	114 (15.0%)	206 (27.1%)	270 (35.5%)	761 (100%)
Unmanned aerial vehicles	167 (21.9%)	109 (14.3%)	155 (20.4%)	330 (43.4%)	761 (100%)
Autonomous unmanned aerial vehicles	146 (19.2%)	135 (17.7%)	176 (23.1%)	305 (40 %)	762 (100%)
Control	215 (28.2%)	149 (19.6%)	163 (21.4%)	235 (38.08%)	762 (100%)
For crowd control at sporting events					
Piloted aircraft	251 (33.0%)	155 (20.4%)	193 (25.4%)	162 (21.3%)	761 (100%)
Unmanned aerial vehicles	232 (30.4%)	138 (18.1%)	193 (25.3%)	199 (26.1%)	762 (100%)
Autonomous unmanned aerial vehicles	202 (26.5%)	154 (20.2%)	165 (21.7%)	241 (31.6%)	762 (100%)
Control	262 (34.4%)	168 (22.1%)	173 (22.7%)	158 (20.8%)	761 (100%)
For personal identification at sporting events					
Piloted aircraft	162 (21.3%)	125 (16.4%)	202 (26.5%)	272 (35.7%)	761 (100%)
Unmanned aerial vehicles	153 (20.1%)	84 (11.0%)	190 (25.0%)	334 (43.9%)	761 (100%)
Autonomous unmanned aerial vehicles	143 (18.8%)	115 (15.1%)	165 (21.7%)	338 (44.4%)	761 (100%)
Control	177 (23.3%)	154 (20.3%)	194 (25.5%)	235 (30.9%)	760 (100%)
In hostage situations					
Piloted aircraft	554 (72.8%)	91 (12.0%)	97 (12.7%)	19 (2.5%)	761 (100%)
Unmanned aerial vehicles	522 (68.6%)	107 (14.1%)	79 (10.4%)	53 (7.0%)	761 (100%)
Autonomous unmanned aerial vehicles	483 (63.3%)	103 (13.5%)	106 (13.9%)	71 (9.3%)	763 (100%)
Control	516 (67.8%)	116 (15.2%)	95 (12.5%)	34 (4.5%)	761 (100%)
In routine patrols					
Piloted aircraft	258 (33.9%)	155 (20.3%)	185 (24.3%)	164 (21.5%)	762 (100%)
Unmanned aerial vehicles	185 (24.3%)	155 (20.4%)	173 (22.7%)	248 (32.6%)	761 (100%)
Autonomous unmanned aerial vehicles	170 (22.3%)	162 (21.3%)	167 (21.9%)	263 (34.5%)	762 (100%)
Control	272 (35.7%)	166 (21.8%)	183 (24.0%)	140 (18.4%)	761 (100%)
For monitoring individuals during criminal investigations					
Piloted aircraft	374 (49.1%)	137 (18.0%)	170 (22.3%)	80 (10.5%)	761 (100%)
Unmanned aerial vehicles	320 (42.0%)	135 (17.7%)	159 (20.9%)	147 (19.3%)	761 (100%)
Autonomous unmanned aerial vehicles	310 (40.7%)	152 (19.9%)	132 (17.3%)	168 (22.0%)	762 (100%)
Control	439 (57.7%)	130 (17.1%)	137 (18.0%)	55 (7.2%)	761 (100%)
At the Pan AM games in 2015					
Piloted aircraft	354 (46.5%)	147 (19.3%)	165 (21.7%)	95 (12.5%)	761 (100%)
Unmanned aerial vehicles	284 (37.3%)	136 (17.9%)	168 (22.1%)	173 (22.7%)	761 (100%)
Autonomous unmanned aerial vehicles	288 (37.8%)	131 (17.2%)	161 (21.1%)	182 (23.9%)	762 (100%)
Control	329 (43.2%)	134 (17.6%)	174 (22.8%)	125 (16.4%)	762 (100%)
For finding missing persons					
Piloted aircraft	602 (79.1%)	67 (8.8%)	81 (10.6%)	11 (1.4%)	761 (100%)
Unmanned aerial vehicles	546 (71.7%)	97 (12.7%)	67 (8.8%)	51 (6.7%)	761 (100%)
Autonomous unmanned aerial vehicles	521 (68.4%)	91 (11.9%)	95 (12.5%)	55 (7.2%)	762 (100%)
Control	566 (74.3%)	83 (10.9%)	87 (11.4%)	26 (3.4%)	762 (100%)

Table 3 *(concluded).*

	Support	Somewhat support	Somewhat oppose	Oppose	Totals
For traffic collision reconstruction					
Piloted aircraft	388 (51.0%)	150 (19.7%)	152 (20.0%)	71 (9.3%)	761 (100%)
Unmanned aerial vehicles	349 (45.9%)	169 (22.2%)	136 (17.9%)	107 (14.1%)	761 (100%)
Autonomous unmanned aerial vehicles	329 (43.1%)	151 (19.8%)	168 (22.0%)	115 (15.1%)	763 (100%)
Control	392 (51.5%)	177 (23.3%)	125 (16.4%)	67 (8.8%)	761 (100%)
For disaster response					
Piloted aircraft	613 (80.6%)	63 (8.3%)	77 (10.1%)	8 (1.1%)	761 (100%)
Unmanned aerial vehicles	544 (71.4%)	113 (14.8%)	68 (8.9%)	37 (4.9%)	762 (100%)
Autonomous unmanned aerial vehicles	514 (67.5%)	111 (14.6%)	79 (10.4%)	58 (7.6%)	762 (100%)
Control	512 (67.3%)	108 (14.2%)	105 (13.8%)	36 (4.7%)	761 (100%)
Routine emergency response (fire, medical, etc.)					
Piloted aircraft	558 (73.2%)	81 (10.6%)	99 (13.0%)	24 (3.1%)	762 (100%)
Unmanned aerial vehicles	460 (60.4%)	127 (16.7%)	96 (12.6%)	78 (10.2%)	761 (100%)
Autonomous unmanned aerial vehicles	429 (56.4%)	124 (16.3%)	120 (15.8%)	88 (11.6%)	761 (100%)
Control	479 (62.9%)	119 (15.6%)	110 (14.4%)	54 (7.1%)	762 (100%)
Locating objects such as suspicious packages or potential explosives					
Piloted aircraft	481 (63.2%)	132 (17.3%)	121 (15.9%)	27 (3.5%)	761 (100%)
Unmanned aerial vehicles	467 (61.4%)	134 (17.6%)	94 (12.4%)	66 (8.7%)	761 (100%)
Autonomous unmanned aerial vehicles	444 (58.3%)	138 (18.1%)	99 (13.0%)	81 (10.6%)	762 (100%)
Control	475 (62.4%)	120 (15.8%)	122 (16.0%)	44 (5.8%)	761 (100%)
Automated-license plate recognition					
Piloted aircraft	224 (29.5%)	136 (17.9%)	193 (25.4%)	207 (27.2%)	760 (100%)
Unmanned aerial vehicles	214 (28.1%)	113 (14.8%)	194 (25.5%)	241 (31.6%)	762 (100%)
Autonomous unmanned aerial vehicles	202 (26.5%)	134 (17.6%)	164 (21.5%)	262 (34.4%)	762 (100%)
Control	303 (39.8%)	142 (18.7%)	177 (23.3%)	139 (18.3%)	761 (100%)

Note: Tabulated from Angus Reid Global (2014).

With regard to UAVs specifically, over 2/3 of those polled reported their support for the use of UAV for finding missing persons (71.7%), disaster response (71.4%), and hostage situations (68.6%), while locating dangerous objects (61.4%) and routine emergency response (60.4%) applications by law enforcement scored lower, but still remained supported by the majority of those polled. Each scored quite highly, noting the public's support for applications that are limited to particular events in which individuals are in need of assistance. These data also show, however, that as the law enforcement applications move away from specific one-time-emergencies and the delivery of assistance, or aid, to persons in distress, support generally falls. At the lowest end of the spectrum were applications that involved the tracking, monitoring, and identifying of individuals who were not engaged in criminal acts, as well as applications that integrated UAV technologies into the routine, or daily work, of law enforcement. At this low end of support, we find the issuance of speeding tickets (19.6%), identification at sporting events (20.1%), identification at political demonstrations (21.9%), routine patrols (24.3%), and automated license plate recognition (28.1%). As a result, these data demonstrate a crucial divide in public support for UAV use, between the disaster or emergency uses of UAV technology by police forces, and the adoption of UAV technology into the routine everyday actions of surveillance, identification, and monitoring by policing organizations.

The incorporation of demographic data also demonstrates how trends in support vary across various demographic variables— in this case, gender, party choice, income, education, age, region, home ownership, employment standards, and marital status. As discussed in the methodology section, an ordered logistic regression was carried out to assess how various demographic factors related to levels of support for UAV use in law enforcement (see Table 4).

Table 4. Ordered logistic regression results: UAV use in law enforcement.

	Odds ratio	Std. err.
Gender		
Male	0.789***	(0.055)
Party choice		
Conservative	1.476***	(0.163)
Liberal	1.076	(0.132)
NDP	1.085	(0.118)
Green	1.488	(0.297)
Quebecois	1.109	(0.200)
Other	0.871	(0.217)
Age group		
18–34	0.786	(0.102)
35–54	0.897	(0.095)
Annual income		
25–35 000$	0.999	(0.151)
35–50 000$	1.077	(0.148)
50–75 000$	1.252	(0.176)
75–100 000$	1.077	(0.163)
100–125 000$	1.249	(0.218)
>125 000$	1.461*	(0.250)
Don't know	0.962	(0.139)
Education		
High school	1.214	(0.155)
Some college	1.034	(0.156)
College	1.187	(0.164)
Some university	1.150	(0.204)
Undergraduate	0.931	(0.139)
Some graduate	1.411	(0.330)
Post graduate	1.036	(0.183)
Region		
Alberta	1.235	(0.174)
Saskatchewan	1.321	(0.249)
Manitoba	1.516*	(0.300)
Ontario	1.236	(0.130)
Quebec	1.068	(0.130)
Atlantic Provinces	1.512**	(0.221)
Home ownership		
Rent	1.002	(0.087)
Other	0.741	(0.156)
Employment status		
Part time	0.998	(0.122)
Student	1.001	(0.174)
Work-from-home	0.832	(0.121)
Retired	1.233	(0.137)
Looking	1.178	(0.194)
Medical leave	0.819	(0.142)
Other	0.870	(0.215)

Table 4 *(concluded).*

	Odds ratio	Std. err.
Marital status		
Common law	0.947	(0.116)
Civil partnership	1.292	(0.314)
Married	1.503***	(0.164)
Separated	1.143	(0.240)
Divorced	1.266	(0.193)
Widowed	1.762**	(0.373)
Kids	1.022	(0.084)
Observations	2930	
R-squared (pseudo)	0.0167	

Note: Standard errors reported in parentheses. Tabulated from Angus Reid Global (2014). Stars indicate level of statistical significance: $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

The demographic variables found to have a statistically significant impact on respondents' answers are male, Conservative, and married. Coefficient estimates indicate that men are 0.79 times more likely than females to report higher levels of support for the use of UAVs for law enforcement applications. Respondents who identify as having voted Conservative in the last election are 1.48 times more likely to answer at a higher level on the support scale, and respondents who are married are 1.50 times more likely to answer higher on the scale of support relative to individuals with other marital statuses. These coefficient estimates are statistically significant at the 99.99% confidence level.

The demographic characteristic Atlantic provinces and widowed report statistically significant coefficients at the 99% confidence level. Individuals located in the Atlantic provinces are 1.51 times more likely to answer higher on the scale than individuals in other provinces, while those who identified as widowed are 1.76 times more likely to answer at a higher level on the support scale than individuals with other marital statuses, with the exemption of those who identified as married.

Three additional variables in this regression show some relationship (significant at the 95% confidence level, or higher) to determining support levels for UAVs including; income greater than $125 000 per year, and the regions of Manitoba and Ontario. Individuals who have an income of greater than $125 000 per year are 1.46 times more likely to answer at a higher level on the support scale than individuals in other income brackets, while individuals located in Manitoba and Ontario are 1.52 and 1.24 times, respectively, more likely to answer at a higher level on the scale than individuals in other provinces.

Tests of joint significance were also run for each demographic variable group and in relations to levels of support for law enforcement use of UAVs, these tests show that marital status is statistically highly significant at the 99.9% confidence level, and voting choice is significant at the 99% confidence level.

UAV use by private corporations and industry

As a means of investigating if specific applications significantly impact support or opposition within Canadian public opinion regarding private corporations and industry, support for the adoption of UAV was tested in a similar way as law enforcement. Although private corporations and industry found less support in general, again the hypothesis that this study tested regarding the importance of specific applications was also found to be supported. Again, a 10 point scale was used in the interviewing of participants, where one meant that they opposed completely and 10 meant that they supported these applications completely. Participants were asked the following: "this question is about Industry and Private Companies in Canada collecting or identifying information [using piloted aircraft / using unmanned aerial vehicles / using autonomous unmanned aerial vehicles / empty for control] – to what extent do you support or oppose Industry and Private Companies in Canada collecting or identifying information [using piloted aircraft / using unmanned aerial vehicles / using autonomous unmanned aerial vehicles / empty for control] for each of the following purposes?" This question was used to test the eight specified applications of: (*i*) for market research

and advertising; (*ii*) for corporate security purposes; (*iii*) for private security purposes; (*iv*) for personal security purposes; (*v*) to investigate, survey, and patrol mining, fishing, or oil extraction areas; (*vi*) agricultural surveying; (*vii*) mineral exploration; and (*viii*) survey and inspection of remote power lines and pipelines. The results from the earlier analysis of support for use by group identified less support for industry when compared to government uses of UAV, and the lower support scores for these applications remained consistent with that result (see Table 2). None of the eight measured applications found support from a majority of those polled, though the applications that found the greatest level of support were survey and inspection of remote power lines and pipelines (47.0%), the patrolling of mining, fishing or oil extraction areas (34.1%), and mineral exploration (31.4%).

The data from Table 5 highlights that, of the applications taken up by UAVs deployed by private corporations and industry, those that receive more public support are related to the monitoring, or oversight, of private property, than those related to private security.

In contrast, private corporations or industry applications that related to the collection of personal information for the purposes of private or personal security found much lower levels of support, each recording 16.6% and 18.0% support, respectively. In addition to these distinctions, the lowest level of support regarding UAV use in Canada was related to the private corporation or industry application market research and advertising, which only found support from one in 10 Canadians. These data indicate a marked difference in measured support as it relates to the polled applications, with the highest levels of support existing for applications directed towards private property, and that support fell away from applications that collected data about the general public.

Further analysis of the public opinion data identified again that trends in support vary across various demographic variables. In analyzing the demographic variables as they relate to support for UAV use by private corporations and industry, this category finds the highest number of variables indicating some level of significance across all categories (see Table 6).

The demographic variables age group 18–34, income greater than $125 000 per year, and region Quebec are all found to have a statistically significant impact on respondents' answers at the 99.9% confidence level. Respondents aged 18–34 are 0.61 times more likely to answer at a higher level on the support scale than individuals in others age groups. Coefficient estimates indicate that individuals with an income greater than $125 000 annually are 1.74 times more likely than those in other income brackets to answer at a higher level of the scale of support, while respondents in Quebec are 1.74 times more likely to respond at a higher level on the scale than individuals in other regions.

At the 99% confidence level, the demographic characteristics Conservative, and Saskatchewan and Atlantic province regions, each show statistically significant coefficients. Individuals who voted Conservative in the last federal election are 1.18 times more likely to answer at a higher level on the scale than individuals who voted for other parties in terms of their support for UAV use by private corporations and industry. The regions of Saskatchewan and the Atlantic provinces each have coefficients indicating that individuals from these provinces are 1.68 and 1.51 times, respectively, more likely to vote at a higher level on the support scale than individuals in other regions.

The final group of variables that show some relationship (significant at the 95% confidence level, or higher) to determining support levels for UAVs are: (*i*) male, (*ii*) some university education, (*iii*) undergraduate degree, (*iv*) home ownership other, (*v*) retired employment status, and (*vi*) common law marital status. Males are 1.18 times more likely than females to answer at a higher level on the scale of support, while the coefficients for individuals with some university education and a completed undergraduate education are 0.67 and 0.69 times, respectively, more likely to answer at a higher level on the scale of support than individuals with other levels of educations. Individuals who have marked their home ownership category as "other" are 0.60 times more likely to respond at a higher level on the scale of support than other home ownership categories. Retired individuals are 1.28 times more likely to answer at a higher level on the scale than other employment statuses. And lastly, respondents whose marital status is common law are 0.74 times more likely to respond as a higher level on the scale than individuals with other marital statuses.

Tests of joint significance for the various demographic variables indicate that the age group and region of a respondent is statistically highly significant, at the 99.9% confidence level, indicating a relationship with level of support for UAV use by private corporations and industry. At the 99% confidence level, party choice in the last federal elections shows a strong relationship with determining support levels, while tests of joint significant for the income, education, and home ownership

Table 5. Support of private corporation and industry use.

	Support	Somewhat support	Somewhat oppose	Oppose	Totals
For market research and advertizing					
Piloted aircraft	118 (15.5%)	143 (18.8%)	241 (31.7%)	259 (34.0%)	761 (100%)
Unmanned aerial vehicles	78 (10.2%)	83 (10.9%)	179 (23.5%)	421 (55.3%)	761 (100%)
Autonomous unmanned aerial vehicles	80 (10.5%)	101 (13.2%)	178 (23.3%)	404 (52.9%)	763 (100%)
Control	126 (16.6%)	151 (19.8%)	238 (31.3%)	246 (32.3%)	761 (100%)
For corporate security purposes					
Piloted aircraft	188 (24.7%)	141 (18.5%)	238 (31.3%)	194 (25.5%)	761 (100%)
Unmanned aerial vehicles	123 (16.2%)	142 (18.7%)	199 (26.1%)	297 (39.0%)	761 (100%)
Autonomous unmanned aerial vehicles	127 (16.7%)	139 (18.2%)	194 (25.5%)	302 (39.6%)	762 (100%)
Control	163 (21.4%)	185 (24.3%)	211 (27.7%)	203 (26.6%)	762 (100%)
For private security purposes					
Piloted aircraft	173 (22.7%)	153 (20.1%)	206 (27.1%)	229 (30.1%)	761 (100%)
Unmanned aerial vehicles	126 (16.6%)	126 (16.6%)	180 (23.7%)	329 (43.2%)	761 (100%)
Autonomous unmanned aerial vehicles	124 (16.3%)	135 (17.7%)	190 (24.9%)	313 (41.1%)	762 (100%)
Control	156 (20.5%)	141 (18.5%)	243 (31.9%)	221 (29.0%)	761 (100%)
For personal security purposes					
Piloted aircraft	178 (23.4%)	134 (17.5%)	224 (29.4%)	225 (29.6%)	761 (100%)
Unmanned aerial vehicles	137 (18.0%)	126 (16.6%)	175 (23.0%)	323 (42.4%)	761 (100%)
Autonomous unmanned aerial vehicles	120 (15.7%)	151 (19.8%)	181 (23.8%)	310 (40.7%)	762 (100%)
Control	182 (23.9%)	166 (21.8%)	215 (28.3%)	198 (26.0%)	761 (100%)
To investigate, survey and patrol mining, fishing or oil extraction areas					
Piloted aircraft	336 (44.4%)	166 (21.8%)	176 (23.1%)	84 (11.0%)	762 (100%)
Unmanned aerial vehicles	259 (34.1%)	176 (23.2%)	171 (22.5%)	154 (20.3%)	760 (100%)
Autonomous unmanned aerial vehicles	269 (35.3%)	150 (19.7%)	183 (24.0%)	160 (21.0%)	762 (100%)
Control	243 (32.0%)	162 (21.3%)	194 (25.5%)	161 (21.2%)	760 (100%)
Agricultural surveying					
Piloted aircraft	359 (47.1%)	156 (20.5%)	176 (23.1%)	71 (9.3%)	762 (100%)
Unmanned aerial vehicles	272 (35.7%)	198 (26.0%)	160 (21.0%)	131 (17.2%)	761 (100%)
Autonomous unmanned aerial vehicles	296 (38.8%)	164 (21.5%)	175 (22.9%)	128 (16.8%)	763 (100%)
Control	218 (28.6%)	166 (21.8%)	221 (29.0%)	156 (20.5%)	761 (100%)
Mineral exploration					
Piloted aircraft	292 (38.4%)	166 (21.8%)	195 (25.6%)	108 (14.2%)	761 (100%)
Unmanned aerial vehicles	239 (31.4%)	173 (22.7%)	188 (24.7%)	162 (21.3%)	762 (100%)
Autonomous unmanned aerial vehicles	255 (33.4%)	175 (22.9%)	170 (22.3%)	163 (21.4%)	763 (100%)
Control	209 (27.5%)	184 (24.2%)	208 (27.3%)	160 (21.0%)	761 (100%)
Survey and inspection of remote power lines and pipelines					
Piloted aircraft	407 (53.5%)	137 (18.0%)	158 (20.8%)	59 (7.8%)	761 (100%)
Unmanned aerial vehicles	358 (47.0%)	147 (19.3%)	142 (18.6%)	115 (15.1%)	762 (100%)
Autonomous unmanned aerial vehicles	352 (46.2%)	162 (21.3%)	144 (18.9%)	104 (13.6%)	762 (100%)
Control	280 (36.8%)	171 (22.5%)	182 (23.9%)	127 (16.7%)	760 (100%)

Note: Tabulated from Angus Reid Global (2014).

variables all show some relationship in determining support levels for UAV use by private companies and industry at the 95% confidence level, or higher.

UAV use by border or coastal security agencies and organizations

This study's third set of questions relate to the collection of data by UAV along and across the Canada–US border, as well as patrols across the Canadian Arctic coastal territories. The goal of these questions was to gauge public opinion with regard to the application of UAVs and to determine if

Table 6. Ordered logistic regression results: UAV use by private corporations and industry.

	Odds ratio	Std. err.
Gender		
Male	1.177*	(0.082)
Party choice		
Conservative	1.376**	(0.151)
Liberal	1.224	(0.150)
NDP	0.921	(0.100)
Green	1.297	(0.260)
Quebecois	1.265	(0.233)
Other	1.222	(0.299)
Age group		
18–34	0.610***	(0.080)
35–54	0.764**	(0.081)
Annual income		
25–35 000$	1.213	(0.179)
35–50 000$	1.319*	(0.177)
50–75 000$	1.140	(0.156)
75–100 000$	1.165	(0.175)
100–125 000$	1.368	(0.236)
>125 000$	1.738**	(0.293)
Don't know	1.105	(0.157)
Education		
High school	0.964	(0.120)
Some college	0.844	(0.125)
College	0.862	(0.116)
Some university	0.668	(0.116)
Undergraduate	0.688*	(0.102)
Some graduate	0.925	(0.211)
Post graduate	0.690*	(0.122)
Region		
Alberta	1.058	(0.147)
Saskatchewan	1.677**	(0.318)
Manitoba	1.249	(0.242)
Ontario	0.954	(0.101)
Quebec	1.743**	(0.215)
Atlantic Provinces	1.507**	(0.217)
Home ownership		
Rent	1.039	(0.089)
Other	0.600**	(0.124)
Employment status		
Part time	0.907	(0.108)
Student	1.194	(0.203)
Work-from-home	1.207	(0.175)
Retired	1.277*	(0.140)
Looking	1.131	(0.181)
Medical leave	0.865	(0.147)
Other	1.219	(0.295)

Table 6 *(concluded).*

	Odds ratio	Std. err.
Marital status		
Common law	0.740*	(0.090)
Civil partnership	1.033	(0.253)
Married	1.015	(0.111)
Separated	1.151	(0.236)
Divorced	0.927	(0.140)
Widowed	1.004	(0.203)
Kids	1.107	(0.090)
Observations	2930	
R-squared (pseudo)	0.0115	

Note: Standard errors reported in parentheses. Tabulated from Angus Reid Global (2014). Stars indicate level of statistical significance: $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

there was a reported variance between support for specific border or coastal applications. The specific question asked in this study was worded as follows:

> this question is about Government Border/Coastal Security Organizations in Canada collecting or identifying information [using piloted aircraft / using unmanned aerial vehicles / using autonomous unmanned aerial vehicles / empty for control] – to what extent do you support or oppose Government Border/Coastal Security Organizations in Canada collecting or identifying information [using piloted aircraft / using unmanned aerial vehicles / using autonomous unmanned aerial vehicles / empty for control] for each of the following purposes?

Those who were polled were again asked to rate their degree of support or opposition on a 10 point scale. Of the six applications that were polled, three, to help with search and rescue (75.3%), Canadian Border Services for border patrol, including the patrolling of the Arctic (53.8%), and Canadian government for patrolling along the US–Canadian border (51.3%), found support from a majority of Canadians, while none found opposition from a majority (see Table 7).

The applications that found the lowest levels of support were that of the United States Government patrolling across the US–Canadian border (37.1%), the Canadian government patrolling across the US–Canadian Border (42.9%), and the United States for patrolling along the US–Canadian border (45.9%).

Further analysis of the public opinion demographic data again demonstrates that trends in support vary across various measured variables. In particular, the demographic variables found to have a statistically significant impact on respondents' answers are Conservative, age group 18–34, and income greater than $125 000 annually (see Table 8).

Coefficient estimates indicate that individuals who voted Conservative in the last federal election are 1.80 times more likely to answer at a higher level on the support scale. Respondents aged 18–34 are 1.80 times more likely to answer higher on the scale of support than individuals in other age categories, while respondents with an income of greater than $125 000 per year are 2.34 times more likely than individuals in other income brackets to answer at a higher level on the scale.

The last three variables in this regression that show some relationship to determining support levels for UAVs (significant at the 95% confidence level, or higher) Liberal, Green, income $75 000–$100 000, and married. Individuals who voted for the Liberal Party in the last federal election are 1.33 times and those who voted for the Green Party are 1.50 times more likely to answer at a higher level on the scale than individuals who voted for other parties, while respondents who have an income of $75 000–$100 000 per year are 1.47 times more likely to answer at a higher level on the support scale. Additionally, individual respondents whose marital status is married are 1.29 times more likely to respond with higher levels of support than those with other reported marital statuses. Tests of joint significance echo the results of the coefficient results where the demographic characteristic of party choice is statistically significant in determining levels of support at the 99.9% confidence level. Age group and income variables are also significant in determining levels of support for

Table 7. Support for UAV use by government border or coastal security organizations.

	Support	Somewhat support	Somewhat oppose	Oppose	Totals
To help with search and rescue					
Piloted aircraft	605 (79.5%)	57 (7.5%)	88 (11.6%)	11 (1.4%)	761 (100%)
Unmanned aerial vehicles	573 (75.3%)	80 (10.5%)	70 (9.2%)	38 (5.0%)	761 (100%)
Autonomous unmanned aerial vehicles	528 (69.2%)	87 (11.4%)	97 (12.7%)	51 (6.7%)	763 (100%)
Control	517 (67.9%)	105 (13.8%)	97 (12.7%)	42 (5.5%)	761 (100%)
Canadian Border Services for border patrol, including the patrolling of the Arctic					
Piloted aircraft	475 (62.4%)	120 (15.8%)	126 (16.6%)	40 (5.3%)	761 (100%)
Unmanned aerial vehicles	409 (53.8%)	144 (18.9%)	118 (15.5%)	89 (11.7%)	760 (100%)
Autonomous unmanned aerial vehicles	403 (52.9%)	125 (16.4%)	130 (17.1%)	104 (13.6%)	762 (100%)
Control	436 (57.3%)	130 (17.1%)	128 (16.8%)	67 (8.8%)	761 (100%)
United States Government for patrolling ALONG the US/Canadian border					
Piloted aircraft	410 (53.9%)	119 (15.6%)	158 (20.8%)	74 (9.7%)	761 (100%)
Unmanned aerial vehicles	349 (45.9%)	132 (17.3%)	136 (17.9%)	144 (18.9%)	761 (100%)
Autonomous unmanned aerial vehicles	336 (44.1%)	126 (16.5%)	150 (19.7%)	150 (19.7%)	762 (100%)
Control	364 (47.8%)	124 (16.3%)	134 (17.6%)	139 (18.3%)	761 (100%)
United States Government for patrolling ACROSS the US/Canadian border					
Piloted aircraft	311 (40.8%)	129 (16.9%)	162 (21.3%)	160 (21.0%)	762 (100%)
Unmanned aerial vehicles	282 (37.1%)	122 (16.0%)	119 (15.6%)	238 (31.3%)	761 (100%)
Autonomous unmanned aerial vehicles	272 (35.7%)	120 (15.7%)	147 (19.3%)	223 (29.3%)	762 (100%)
Control	302 (39.6%)	111 (14.6%)	156 (20.5%)	193 (25.3%)	762 (100%)
Canadian Government for patrolling ALONG the US/Canadian border					
Piloted aircraft	462 (60.8%)	105 (13.8%)	142 (18.7%)	51 (6.7%)	760 (100%)
Unmanned aerial vehicles	391 (51.3%)	141 (18.5%)	119 (15.6%)	111 (14.6%)	762 (100%)
Autonomous unmanned aerial vehicles	385 (50.6%)	129 (17.0%)	131 (17.2%)	116 (15.2%)	761 (100%)
Control	426 (56.0%)	124 (16.3%)	140 (18.4%)	71 (9.3%)	761 (100%)
Canadian Government for patrolling ACROSS the US/Canadian border					
Piloted aircraft	371 (48.7%)	122 (16.0%)	153 (20.1%)	116 (15.2%)	762 (100%)
Unmanned aerial vehicles	326 (42.9%)	121 (15.9%)	132 (17.4%)	181 (23.8%)	760 (100%)
Autonomous unmanned aerial vehicles	314 (41.2%)	119 (15.6%)	143 (18.8%)	186 (24.4%)	762 (100%)
Control	356 (46.8%)	134 (17.6%)	150 (19.7%)	121 (15.9%)	761 (100%)

Note: Tabulated from Angus Reid Global (2014).

UAV use by boarder and coastal organizations at the 99% and 95%, or higher, confidence intervals, respectively.

UAV visibility and data collection

The final section of the public opinion survey was assigned to investigate the degree of support for the cross-border sharing of collected data and the physical visibility UAVs that are collecting these data. In particular, these questions identify the impact of specific technologies and data collection practices on public opinion in Canada regarding the use of UAV. Participants were asked to rate their support for a series of technologies and data collection practices with the following question: "regardless of who collects the information, or for what purpose, to what extent do you support or oppose [using piloted aircraft / using unmanned aerial vehicles / using autonomous unmanned aerial vehicles / empty for control] in each of the following scenarios?" In each of the four measured cases a majority of Canadians opposed the use of UAV technologies to collect information in this way (see Table 9).

Like the other polled questions, traditionally piloted aircraft found more support than UAV or AUAV for collecting data in these ways, and significant variation was reported between the practices and technologies polled. These data do show that Canadian public opinion is quite clear in its opposition to technologies that can either capture their data from such a height that they cannot be readily

Table 8. Ordered logistic regression results: UAV use by government boarder or coastal security organizations.

	Odds ratio	Std. Err.
Gender		
Male	1.012	(0.071)
Party choice		
Conservative	1.804***	(0.201)
Liberal	1.328*	(0.163)
NDP	1.091	(0.119)
Green	1.500*	(0.305)
Quebecois	1.039	(0.189)
Other	0.805	(0.202)
Age rollup		
18–34	1.795***	(0.233)
35–54	1.429*	(0.149)
Annual income		
25–35 000$	1.257	(0.192)
35–50 000$	1.303	(0.178)
50–75 000$	1.272	(0.178)
75–100 000$	1.465**	(0.221)
100–125 000$	1.359	(0.237)
>125 000$	2.036**	(0.351)
Don't know	1.102	(0.159)
Education		
High school	0.994	(0.126)
Some college	0.853	(0.129)
College	0.926	(0.128)
Some university	0.815	(0.145)
Undergraduate	0.852	(0.127)
Some graduate	0.960	(0.218)
Post graduate	0.796	(0.142)
Region		
Alberta	1.079	(0.152)
Saskatchewan	1.258	(0.240)
Manitoba	1.248	(0.248)
Ontario	1.122	(0.119)
Quebec	1.261	(0.155)
Atlantic Provinces	1.173	(0.171)
Home ownership		
Rent	1.060	(0.093)
Other	0.793	(0.164)
Employment status		
Part time	0.878	(0.107)
Student	1.052	(0.182)
Work-from-home	0.853	(0.124)
Retired	1.107	(0.123)
Looking	1.014	(0.166)
Medical leave	0.913	(0.157)
Other	0.764	(0.185)

Table 8 *(concluded).*

	Odds ratio	Std. Err.
Marital status		
Common law	1.039	(0.128)
Civil partnership	1.316	(0.324)
Married	1.286	(0.142)
Separated	1.200	(0.248)
Divorced	1.156	(0.177)
Widowed	1.329	(0.281)
Kids	1.022	(0.084)
Observations	2930	
R-squared (pseudo)	0.0183	

Note: Standard errors reported in parentheses. Tabulated from Angus Reid Global (2014). Stars indicate level of statistical significance: $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

Table 9. UAV visibility and the sharing of collected data.

	Support	Somewhat support	Somewhat oppose	Oppose	Totals
Using an aerial vehicle that is flying so high, or is so small, that you cannot see it					
Piloted aircraft	124 (16.3%)	90 (11.8%)	215 (28.3%)	332 (43.6%)	761 (100%)
Unmanned aerial vehicles	108 (14.2%)	102 (13.4%)	169 (22.2%)	383 (50.3%)	762 (100%)
Autonomous unmanned aerial vehicles	105 (13.8%)	97 (12.7%)	170 (22.3%)	389 (51.1%)	761 (100%)
Control	125 (16.4%)	96 (12.6%)	189 (24.8%)	351 (46.1%)	761 (100%)
Using an aerial vehicle that can "see" into your home through the use of infrared sensors					
Piloted aircraft	54 (7.1%)	47 (6.2%)	124 (16.3%)	537 (70.5%)	762 (100%)
Unmanned aerial vehicles	41 (5.4%)	44 (5.8%)	86 (11.3%)	589 (77.5%)	760 (100%)
Autonomous unmanned aerial vehicles	45 (5.9%)	47 (6.2%)	92 (12.1%)	578 (75.9%)	762 (100%)
Control	56 (7.4%)	63 (8.3%)	123 (16.2%)	519 (68.2%)	761 (100%)
And then sharing your data with the United States government or US Department of Homeland Security					
Piloted aircraft	94 (12.4%)	73 (9.6%)	154 (20.2%)	440 (57.8%)	761 (100%)
Unmanned aerial vehicles	90 (11.8%)	68 (8.9%)	114 (15.0%)	489 (64.3%)	761 (100%)
Autonomous unmanned aerial vehicles	67 (8.8%)	76 (10.0%)	125 (16.4%)	494 (64.8%)	762 (100%)
Control	107 (14.1%)	89 (11.7%)	140 (18.4%)	424 (55.8%)	760 (100%)
And then sharing your data with the Canadian government					
Piloted aircraft	114 (15.0%)	89 (11.7%)	156 (20.5%)	403 (52.9%)	762 (100%)
Unmanned aerial vehicles	103 (13.5%)	75 (9.9%)	156 (20.5%)	427 (56.1%)	761 (100%)
Autonomous unmanned aerial vehicles	92 (12.1%)	78 (10.2%)	145 (19.0%)	447 (58.7%)	762 (100%)
Control	138 (18.1%)	127 (16.7%)	184 (24.2%)	312 (41.0%)	761 (100%)

Note: Tabulated from Angus Reid Global (2014).

seen, or gather information from inside of their homes with technologies such as infrared cameras. Opposition was also clear to the sharing of these data with government— either domestic or foreign.

Conclusion

The range in support for the adoption of UAV technology for the collection of surveillance data questions the validity of any blanket statement regarding Canadian public opinion, particularly one professing simple support or opposition to the use of UAV technology. The preceding data show that the tested hypothesis was correct, in that "who" is operating the UAV and for what purpose

significantly impacts the level of support for UAV use within the general Canadian population. As such, categorizing people's opinions as wholly positive or negative in the debate regarding UAV use is overly reductive, and that a nuanced explanation is required to properly portray Canadian public opinion regarding UAV data collection. The specific application that the UAV is being used for, as well as the specific institution, and an individual's demographic background are all crucial factors in determining public support or opposition for the deployment of UAVs for Canadians. However, despite this complexity, we can confidently make some important generalizations regarding the application of UAV technologies and public opinion in Canada.

First, the adoption of UAV technologies works to reduce the degree of support for data collection within the Canadian general public almost across the board. Data gained from this study's set of questions strongly asserts this finding, because lower levels of support were found for UAV technologies when they were compared with the same data collection applications conducted by traditionally piloted craft. This impact on support went so far as to push some applications or groups from a position of support within the majority of respondents, to one in which less than 50% remained supportive. In moving forward into these areas, operators may be interested in working with the general public to alleviate these concerns. Second, the adoption of UAV technology for law enforcement did find support, but this support was limited to applications in which a specific event triggered the use of UAV technology. In particular, support was found to be tied to the delivery of aid to persons in need, such as in cases of emergency, search and rescue, and in hostage situations. Support fell drastically when UAV use was suggested for applications that were seen as "routine", or day-to-day policing tasks, or when these technologies were directed at the mass monitoring and identification of individuals, such as the issuance of speeding tickets or the scanning of license plates in the first case, and the identification of people at sporting events or at political rallies in the latter. Third, the adoption of UAV technologies finds more support for applications directly related to the monitoring, oversight, or research of owned or risk-associated, property, such as the monitoring of private property or risk-related infrastructure, such as oil pipelines. When asked about UAV being adopted by private corporations or industry for the purposes of private security or marketing and advertising, public support fell away considerably, denoting these as specific areas that found open opposition within the polled population. Lastly, the adoption of UAV technology for the patrolling of the Arctic and border are supported, though greater support exists when those applications were tied to cases of emergency, such as search and rescue, than for routine practices of surveillance. Fifth, UAV technologies are not supported when their capacity to gather data puts them outside of the visible range of those whose data are being collected, or when the collection technology is capable of "seeing" into people's private homes. Finally, within the Canadian public there is very little support for the sharing of collected data across government agencies or with foreign governments.

While members of the public may not be aware of all the various current uses of aircraft to collect data, support wanes in nearly every case that an UAV is deployed instead of a traditionally piloted aircraft, however, this research notes that public opinion is highly nuanced and specific to variables such as application and institution. In short, the public's support for UAVs being used for search and rescue efforts should not be taken as blanket approval for all UAV applications across all groups and organizations; just as the public's lack of support for UAVs in issuing traffic tickets should not be taken as blanket opposition to this new technology. Therefore, although the Canadian public may not be aware of all of the currently approved applications of UAVs, there are some clear distinctions between supported and opposed use, and it is these factors that should be taken into consideration as government and industry move forward in the development of future legislation, policy, and regulation.

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