Volume 3 • Issue 1

Journal of Election Administration, Research & Practice

blending theory and practice
to advance the field

December 2024

Reflections on Practice
Research & Policy Briefs
Book and Product Reflections

Editorial Team

ISSN 2835-5962

Election Center
403 W Grand Pkwy S, Suite F, #404
Katy, TX 77494
281.396.4309
services@electioncenter.org

Cover Design: Anne Schroeder

A Partnership of the Institute for Election Administration, Research & Practice at the National Association of Election Officials

Editorial Board

Table of Contents

Executive Director's Introduction

Dear Colleagues, Members, Partners, and Friends,

To introduce Volume 3, Issue 1, it is essential to acknowledge the efforts that the election community has mounted since the last issue. One of the cornerstones of *JEARP* is timely review and publication to remain at the cutting edge on the issues facing the field. As a praxis journal, it is also necessary to recognize the heroic lift that this professional community has made since 2020. Working in an environment of tanking public trust grounded in baseless claims of fraud and at times under the unprecedented threat of personal security and weather disasters, election officials have once again risen to the challenge. This issue is dedicated to them and to all their partners for a job well done (again!). Their first-hand accounts – shared in press briefings, news articles, and on webinars – continue to demonstrate professionalism and resilience in the face of record turnout, last minute legislative changes and court rulings, and weather-related disasters. They found new poll sites, recruited new volunteers, and partnered with law enforcement and local leaders in their communities. Along the way they forged new relationships that will make things smoother the next time and can be leveraged to meet new challenges.

The personal and professional resilience of 2024 continues to showcase election officials as the best type of public servant. Their knowledge and efforts made it possible for people all over the country to exercise their civic duty in uncertain times. Their work shines a positive light on the professional community housed by The Election Center – how they engage in local communities, how they show what it takes for democracy to work, and how they further the fundamental idea that the results of a fair process are fair, regardless of who wins. In 2020, new partnerships were fostered with federal offices and state and local agencies. What we know from public administration research is that such partnerships build networks which can contribute to trusting relationships and the development of new information. The information that emerges from these networks – whether that be concepts for new policy, best practices, or pilot programs – is discussed and vetted by the field and deemed relevant and useful by the field. And this information leads to new tools and new questions. It becomes a resource in itself, and this is the process of building capacity and resilience, so offices are better positioned to engage in the next challenge. In this way, working under the microscope that was 2020 paved the way for seeing new fruits of professionalization in 2024.

The work in this volume illustrates some of those challenges and issues that are shaping the field today. Policy reflections and practitioner responses address several critical topics of this election cycle including weather disruptions, poll worker training, and auditing the process. A collection of comprehensive research papers provides cutting edge information and analysis on the state of research on election administration and election science, giving the field a clear roadmap of what we know and what we need to know about research and practice. Each of these articles takes one more step in creating knowledge for the profession. I encourage you to read and consider this material and the entire journal in three ways: first, as an active member of the community. How does this information strike you? Does it resonate with your experience? Second, consider the material as a potential contributor to the conversation. What can you add from your practical experience or your research?

Your voice is what will push this publication and election administration to achieve its full potential. Third, how can this material help us in our community efforts to rebuild trust with the electorate?

We look forward to sharing your perspectives.

Kathleen Hale, J.D., Ph.D.
Executive Director
The Election Center

The State of Risk-Limiting Audit Implementation

Ginny Vander Roest, *Voting Works*[1]

In 2017, Colorado became the first state to implement risk-limiting audits (RLAs), a type of post-election tabulation audit. While RLAs are considered the gold standard of tabulation audits, other states and counties interested in implementing them knew their tabulation processes would not allow them to conduct RLAs in the same manner as Colorado. In the last four years, many states have successfully worked through those differences and are now conducting their own RLAs. Their efforts are paving the way for easier adoption in every state, and some states may not even require a change in legislation.

Risk-limiting audits use a statistical sampling method to select ballots or batches of ballots for audit to ensure the tabulated outcome is correct to a desired level of statistical significance. The audit requires more ballots or batches to be sampled when contest margins are small and fewer when contest margins are larger. There are a few different types of RLAs, and new types are being designed as implementation challenges are revealed. The RLA type most piloted is ballot polling. Ballot polling requires a strong chain of custody and inventory of the audit trail through paper ballots. It allows any jurisdiction, regardless of voting method or voting equipment, to conduct an RLA.

A handful of states that started with ballot polling have since moved to piloting or implementing the batch-comparison RLA type. Like ballot polling, batch comparison requires a strong chain of custody and inventory of the audit trail as well as a record of the candidate vote totals by batch. Batches can be as simple as all ballots for a specific precinct since all voting systems provide candidate totals for this type. Batches can also be more complex like large early voting batches or random batches of ballots from any precinct run through a high-speed tabulator, though not all voting systems provide this easily.

The last RLA type in this discussion is ballot comparison. Ballot comparison also requires strong chain of custody and inventory of the audit trail as well as keeping each ballot in the order it was scanned, preferably with a unique identifier printed on the ballot at the time of scanning. Only high-speed tabulators are capable of producing the cast vote record linked to a physical ballot.

As states have worked through the implementation of these RLA types, they have been met with various challenges. Implementation in Colorado took eight years; many jurisdictions have been forced to move more quickly due to legislative directives. Most states have struggled to ensure all jurisdictions participate without a legal mandate, and many are implementing RLAs while also maintaining a traditional audit program – usually a tabulation review of a fixed percentage of ballots – or implementing various new audit programs.

In 2018 and 2019, Michigan, Georgia, Pennsylvania, Rhode Island, and Virginia began piloting ballot-polling RLAs by working with experts in the field and conducting small-scale pilots. Different counties and jurisdictions verified the process worked on every paper ballot tabulation system and was truly implementable in states with tabulation methods different from Colorado's central count system.

---

[1] Ginny Vander Roest is an implementation manager at Voting Works.

These pilots proved to be very successful and pushed each state to pilot statewide RLAs in the 2020 elections.

Pilot programs are a valuable and necessary part of the process when implementing RLAs. However, the success of local pilots in these states did not reveal enough about the process to show how it would scale when conducted statewide by all counties or jurisdictions simultaneously. More challenges would be discovered, making it important to keep the pilot label, if not already required by law, for the 2020 elections. The most significant lesson learned in 2020 was statewide implementation of RLAs could be done, not only with just one or two years of piloting but also during the height of the pandemic. Did these audits meet every high standard of an RLA? Not quite, but they were not far off and were better than any existing auditing methods. Presidential primaries ended up being ideal first-time statewide pilots with fairly wide contest margins providing a smaller number of ballots to review and a fairly light workload for any jurisdiction selected.

The November 2020 general election was quite different from the primary in most of the pilot states. Contest margins were much closer, and in Georgia, the winning margin was only 11,779 votes or .23 percent, the closest margin in the country. Ballot-polling RLAs quickly become a challenge when margins are under 2 percent. In Georgia the sample size was over 1 million of the 5 million ballots tabulated. At that large of a number, a full hand tally was more efficient to ensure the outcome was verified. A full hand count is essentially a risk-limiting audit with no risk limit. While Michigan's and Pennsylvania's contest margins were not as close as Georgia's, they still required somewhat burdensome sample sizes.

In 2021, Georgia, Pennsylvania, and Michigan started piloting batch comparison audits. Rhode Island's pilot began even earlier. Batch comparison was less understood at that time, as there was no public calculator as there is now, to calculate sample sizes and provide states with an idea of what their typical sample sizes might be. Batch comparison also has the potential to cause a large workload in a small election because sample sizes do not change based on the number of ballots or batches in a jurisdiction. A contest with a 10 percent margin and a 5 percent risk limit will require 32 batches of ballots to be reviewed whether there are 32 batches or 1,000 batches. RLAs are more efficient the larger the election.

Batch comparison audits also scale up more easily than ballot polling audits. For example, Georgia's 2020 Presidential race, with its .23 percent margin, would have required 1,274 batches to be audited, far fewer than the approximately 13,000 batches typically received in Georgia's general elections. Batch comparison audits provide more intuitive results that are much closer to traditional audits. Tabulated batch totals are compared with the audit board's hand count, allowing election officials and the public to see matches and discrepancies easily.

Given this information, Georgia, Pennsylvania, Michigan, and Rhode Island chose to move to batch comparison for the November 2022 general election. Virginia continued to use ballot polling as its contest margins generally allow for an efficient RLA. Of course, the margins in these states were a little larger than 2020, but they proved that a larger workload was still manageable.

In fact, Georgia chose to select more batches than those selected in the RLA. Once RLA batches were drawn, the selection tool drew additional batches, so at least two batches — one ballot-marking device-marked and one hand-marked — were selected in each county. Georgia's original

RLA sample size was 36 batches across 159 counties with 292 additional batches selected. Similarly, Michigan randomly selected additional batches for audit based on its legacy performance audit selection requirements. In just two general election cycles, these states have managed to implement the majority of RLA requirements. There are still tweaks to make and additional transparency measures to pursue, but they have built their own confidence through the process of piloting and will only improve over time.

There are likely many states that currently conduct traditional audits that could roll out batch-comparison RLAs – and maybe some extra batch selection – with very little change to current processes. This is especially true in states with wide margins sampling more than 2 percent of batches. While all of this was happening, Nevada, Washington, and some California counties have been piloting ballot comparison successfully. These states are heavily vote-by-mail with considerable practice in managing ballots, including being able to find any exact ballot the voting system tabulated. This is no small task and should not be excluded from the conversation of RLA progress. Significant progress has been made in all RLA implementations in just four years.

This paper only skims the surface of RLA requirements, lessons learned, and pros and cons of implementing each type of RLA. While detailed information about RLAs can be found at risklimitingaudits.org, the author recommends starting a conversation with election officials from one or a few of the states mentioned in this paper. Furthermore, it needs to be mentioned pilots have also been conducted in Connecticut, North Carolina, Ohio, South Carolina, Texas, and Boone County, Missouri. Most of these places are just starting to explore RLA feasibility.

You Can't Fix Your Roof When It's Raining: Climate-Proofing Elections

Taylor Dimsdale, *Fors Marsh*[1]
Doug Chapin, *Fors Marsh*[2]

Abraham Lincoln is famous for saying "the ballot is stronger than the bullet." But is it stronger than hurricanes, floods and wildfires?

Throughout history most elections have generally been spared from the effects of severe weather. November falls at the tail end of hurricane season and after the worst of wildfire season has passed. But when disaster does strike during an election, it matters. Superstorm Sandy made landfall just a few days before the 2012 election – and participation was significantly lower[3] in areas affected than those spared. The 1985 Election Day Floods in western Virginia, known locally as the Killer Floods, brought 20 inches of rain in some areas and very low voter turnout.[4]

Natural disasters do not just have an impact on election day. Disasters can affect voter registration as people are displaced for months, if not years, at a time – as they were across numerous states following Hurricane Katrina. Hurricane Michael hit Florida in October 2018 resulting in shifts to vote casting through expanded early voting and more voting sites.[5]

Communities do not bear these risks equally. Climate impacts are often worst in low-income communities that are less resilient to disasters and have fewer resources to respond and recover.[6] As a result, the most at-risk groups are also the most likely to have their right to vote threatened.

Unfortunately, the threat of climate disruptions is only growing, and extreme weather will become more of a problem for election officials as climate change supercharges disaster risk. Global temperature rise is leading to more frequent and severe storms and is creating warmer and drier conditions that lead to longer, more extreme fire seasons[7] that are more likely to overlap with election day. Additionally, other dangerous weather events like extreme rainfall periods are also lasting longer.[8]

---

[1] Taylor Dimsdale is a senior climate fellow at Fors Marsh, a community-focused research firm based in Arlington, Virginia.
[2] Doug Chapin is a senior election fellow at Fors Marsh, a community-focused research firm based in Arlington, Virginia.
[3] https://www.eac.gov/sites/default/files/event_document/files/Robert-Stein-Election-Administration-during-Natural-Disasters-and-Emergencies_.pdf
[4] https://www.wfxrtv.com/weather/36-years-later-looking-back-on-the-election-day-flood-of-1985/ See also: https://nationalfloodservices.com/blog/lessons-from-the-past-how-natural-disasters-and-elections-collide/
[5] https://www.mypanhandle.com/news/changes-made-to-voting-because-of-hurricane-michael/
[6] https://www.epa.gov/climateimpacts/climate-change-and-health-socially-vulnerable-people
[7] https://www.noaa.gov/noaa-wildfire/wildfire-climate-connection
[8] Pfleiderer, P., Schleussner, CF., Kornhuber, K. *et al.* Summer weather becomes more persistent in a 2 °C world. *Nat. Clim. Chang.* **9**, 666–671 (2019). https://doi.org/10.1038/s41558-019-0555-0

Is anything being done? Yes and no. On the positive side, most states have some measures[9] in place for contingencies. Deadlines can be extended, and elections can even be postponed. California has mobile voting units it can deploy.[10] Colorado, Oregon, Washington, and other states automatically mail ballots to voters which can be submitted outside the jurisdiction in which a voter is registered.[11]

Policymakers are also increasingly recognizing the threat and encouraging officials to respond accordingly. The Election Assistance Commission's guidebook for state and local election officials suggests that officials hold brainstorming sessions on worst-case disaster scenarios and develop an action plan for each scenario.[12] The National Association of Secretaries of State launched a Task Force on Emergency Preparedness for Elections following Superstorm Sandy.[13] These efforts are helpful but mostly synthesize existing contingency plans and state laws rather than break new ground on climate resilience.

The problem is climate-related election disruptions are no longer rare events. In most places, current plans do not go far enough given the scale of the problem and the growing risk. Atmospheric expert Sarah Tessendorf has referred to climate change as a non-stationary risk:

> what used to be normal is not normal anymore. It means that our climate system can no longer be considered stationary. The extremes in our climate system of the past, can no longer be considered the outer limits of what our current and future climate system can exceed.[14]

As a result, most current policies and contingency plans - and not just in the election realm - do not fully grapple with the full range of potential climate-related scenarios nor do they address extreme weather events which are increasing in frequency and severity.

There are blueprints for moving forward, though. The International Institute for Democracy and Electoral Assistance (IDEA) offers some useful recommendations for election offices; specifically, they should adopt risk management frameworks so there is a systematic process in place to identify, minimize and eliminate the most significant risks.[15] Sometimes the only option is for officials to be able to react quickly. However, they also need to be more proactive in building resilience to fortify elections against climate threats.

---

[9] https://www.motherjones.com/politics/2020/11/whats-the-plan-if-a-natural-disaster-strikes-on-election-day-its-complicated/

[10] https://www.npr.org/2020/10/29/928316561/votemobile-helps-california-wildfire-victims-and-seniors-cast-their-ballots

[11] https://www.globe.gov/web/saraht/home/blog/-/blogs/non-stationarity-new-vocabulary-for-a-changing-climate

[12] https://www.eac.gov/sites/default/files/eac_assets/1/1/Quick%20Start%20Guide%20-%20Contingency%20and%20Disaster%20Planning.pdf

[13] https://www.nass.org/sites/default/files/Election%20Cybersecurity/report-NASS-emergency-preparedness-elections-apr2017.pdf

[14] https://www.globe.gov/web/saraht/home/blog/-/blogs/non-stationarity-new-vocabulary-for-a-changing-climate

[15] https://www.idea.int/publications/catalogue/protecting-elections-risk-management-resilience-building-and-crisis

International IDEA also calls for more interagency cooperation and cooperation among governments at the federal, state and local levels. There should be clear lines of authority and responsibility for which part of government is tasked with managing which risk. Furthermore, and critically, International IDEA calls for strategic communication plans, so citizens understand what steps are being taken to address the disaster and why.[16] In short, the best policy on climate resilience is only as good as the ability of the public to understand and support it.

What should state and local election officials do? Quite simply, they should take urgent steps to ensure they are not caught off-guard the next time a climate disaster strikes. Priority actions should include:

- Evaluating existing rules, procedures and disaster management plans to identify gaps;
- Comparing plans in other regions to identify best practices;
- Analyzing risk to better understand the key climate and disaster risks their areas are facing;
- Developing a risk management framework by setting out strategic objectives;
- Examining conditions and likely responses to prepare for worst-case scenarios; and
- Investing proactively in resilience to avoid and minimize costs after a climate event.

The cost of climate-driven disasters can be measured in the value of homes and infrastructure destroyed and lives lost or thrown off course for months or years. As the risk continues to rise, climate disruptions could also prevent citizens from participating in elections. For that reason, a serious and thoughtful commitment to preparedness and resilience is an investment not just in the safety of our communities but also in the health of our democracy. John F. Kennedy once remarked, "The time to repair the roof is when the sun is shining." Facing a new normal of frequent climate disruptions, it makes sense not to wait until it is raining.

[16] Ibid.

How Election Departments Can Reduce the Disruptions of Staff Turnover

David Levine, *Independent Election Integrity and Management Consultant*[1]
Kurt Sampsel, *PEN America*[2]

In 2020, in the midst of a once-in-a-lifetime pandemic, election officials administered a secure and accurate presidential election with higher voter turnout as a percentage of the eligible population than any since 1908.[3,4] Despite these administrative victories, unsupported allegations of election malfeasance brought about a wave of pressure, harassment, and abuse against election officials. In response, scores of public servants have departed the profession since 2020.[5,6]

The result is a significant loss of expertise and institutional knowledge. A Brennan Center survey found that 12 percent of local election officials began their service after the 2020 election cycle.[7] A Boston Globe review of six states — Arizona, Georgia, Massachusetts, Michigan, Pennsylvania, and Wisconsin — found an approximately 30 percent increase in turnover among election officials since 2020.[8] Another 11 percent of current officials say they are very or somewhat likely to leave before November 2024.[9] If those officials follow through and depart, large swaths of America are likely to have future elections administered by newly appointed officials who are inexperienced, which could have serious implications for the voter experience.

For example, during the 2022 General Election in Luzerne County, Pennsylvania, printing problems in the county's ballot-on-demand system disrupted voting processes, consumed election officials' precious time and energy on Election Day, and even resulted in a temporary stoppage in voting at a few polling locations.[10] A subsequent report from the county's district attorney suggested

---

[1] David Levine is an independent election integrity and management consultant with over a decade of experience in election administration. He is also an adjunct professor at George Mason University and has been a leading voice in the field of election security.
[2] Kurt Sampsel is senior program manager, Disinformation and Community Engagement at PEN America and spent eight years supporting election administration in his role at Center for Tech and Civic Life.
[3] "Joint Statement from Elections Infrastructure Government Coordinating Council & the Election Infrastructure Sector Coordinating Executive Committees," Cybersecurity and Infrastructure Security Agency, November 12, 2020.
[4] Schaul, Kevin, Kate Rabinowitz, and Ted Mellnik, "2020 Turnout Is the Highest in over a Century," Washington Post, November 5, 2020.
[5] Paul Gronke and Paul Manson, "The State of Election Administration in 2022," Democracy Fund, November 2, 2022.
[6] *Final Report of the Select Committee to Investigate the January 6th Attack on the United States Capitol*, Washington: U.S. Government Publishing Office, 2022.
[7] Ruby Edlin and Lawrence Norden, "Poll of Election Officials Shows High Turnover Amid Safety Threats and Political Interference," Brennan Center for Justice, April 25, 2023.
[8] Jess Bidgood, "America's Election Workers Are Leaving in Droves," The Boston Globe, October 23, 2022.
[9] Edlin and Norden, "Poll of Election Officials Shows High Turnover Amid Safety Threats and Political Interference."
[10] "Public Report on 2022 General Election Investigation," Luzerne County District Attorney's Office, June 14, 2023.

the problems related to printing and paper were due to "the constant turnover in supervisors and workers" and a "lack of institutional knowledge" in the election department, noting that the county's acting elections director had been in her position for less than four months.[11]

To be clear, in any process as complex and decentralized as the U.S. election administration system, administrative mistakes are to be expected, and they are not in themselves evidence of maladministration or failures of public service.[12] Elections are people-powered, and people — even smart, dedicated ones — sometimes make mistakes. In an ideal scenario, these mistakes serve as learning experiences for staff by bringing to light sensitive details and processes that merit attention in the future.

Still, the election administration field should be committed to reducing administrative errors as much as possible. Doing so makes the already stressful process of running an election more tolerable for hard-working officials and helps inspire trust in the election system among the public. With the preceding in mind, it is critical that state and local election officials have plans in place to mitigate the impact of any office departures on their ability to successfully conduct elections. Using evidence-based research and examples from various states and localities, this paper suggests actions that departing employees, election department leaders, and others can take to ensure that election offices can effectively weather staff turnover and still conduct successful elections.

Guidance for the Departing Employee

The way an election employee manages his or her departure can have a significant impact on the election office's operations and the voting experience. If you are leaving your position — particularly if you are resigning voluntarily and have time to plan — there are steps you should consider to support a smooth transition and avoid disruption.

Think about your departure timeline

Start by planning when you will vacate your position. How much time do you have between now and then? You will need to be realistic about what you can accomplish and set priorities. Because staff departures put stress on an organization, if at all possible, you should consider a generous offboarding period to help make the transition smoother — especially if you are in a leadership position.

On April 16, 2023, Heider Garcia, former elections administrator for Tarrant County, Texas, announced his resignation, citing differences with a newly elected Tarrant County judge. Following five years of election challenges, audits, and even death threats, Garcia could easily have been forgiven for leaving his post in a hurry. Instead, Garcia announced that his last day would be more than two

[11] Ibid.

[12] David Levine and Krystyna Sikora, "Countering the Weaponization of Election Administration Mistakes," *Alliance For Securing Democracy* (blog), July 6, 2023.

months later to allow "sufficient time to complete all work related to the May 6 Joint Elections, any potential runoff elections in June and a smoother handover of the operation."[13]

Garcia's decision to stay for another two months must have been a difficult one, but he made his motivation for his timeline clear, explaining that it was his "utmost priority to guarantee operational continuity of the department before my departure."

Because Garcia chose a generous offboarding period, it is more likely the initiatives he established will endure. For instance, during his tenure he was lauded for his willingness to actively welcome in and engage with those who falsely believe the 2020 election was stolen rather than fighting back.[14] This approach included giving tours of the election office on a moment's notice to show the process to skeptics.[15] Thanks to his choices, Garcia's staff and successor will be better positioned to carry on priorities like these in his absence.

Make a game plan with your supervisor

When departing employees announce their departure without a plan for what should happen next, the result is uncertainty. For example, when persistent harassment, allegations, and threats led the entire Buckingham County, Virginia, elections staff to quit on short notice in early 2023, Buckingham's election office was initially unable to function.[16] There was no one to process voter registration applications, certify candidate paperwork, or even open incoming mail.

If you are preparing to leave your role, you can help avoid what occurred in Buckingham County by outlining a game plan with your manager.[17] That way, the two of you can work together to address questions about what will happen to your portfolio of work, your team, and the election department more broadly. Hearing you are departing may upset your colleagues, but if you emphasize that you have a plan, they will appreciate that you considered their needs.

Your succession game plan could be long or short, complex or simple, depending on your election department's needs and your capacity. To get started, consider questions like these:

- What are the most sensitive aspects of your work? Who should be involved in making sure they are handled when you leave?
- What kinds of historical, technical, and interpersonal knowledge could be lost when you leave? How can you share it with others?
- Who reports to you or relies upon you? How will their needs be handled when you leave?
- Which projects will remain unfinished or incomplete when you leave? What decisions are still in progress? Who will carry them forward?

---

[13] Natalia Contreras, "Tarrant County's Lauded Elections Chief Resigns, Citing Differences with New County Executive," *The Texas Tribune*, April 17, 2023.

[14] Ibid.

[15] Natalia Contreras, "How This Texas Election Official Is Winning Voters' Trust," *Votebeat Texas*, November 14, 2022.

[16] Jane C. Timm, "Hounded by Baseless Voter Fraud Allegations, an Entire County's Election Staff Quits in Virginia," *NBC News*, April 10, 2023.

[17] Carolyn O'Hara, "What to Do After You Tell Your Boss You're Leaving," *Harvard Business Review*, August 11, 2016.

- To what extent is your team prepared to implement new or proposed legislation? What ideas would you suggest?
- What suggestions do you have for shifting responsibilities to others? Which responsibilities should go to which people?
- How accurate is your job description? Which updates might make it easier for your election department to hire a successor?

Once you've reflected on questions like these, share your thoughts with your supervisor for feedback.

Plan your announcement

Your supervisor should be the first person with whom you share your departure news, and as part of your game plan, consider how, when, and with whom you will share your announcement. Hearing about your departure is likely to be disruptive, so it makes sense to start by sharing with a small group of people who need to know and expand outward. Consider an order like this, tailored for your circumstances:

- Start with your supervisor,
- Talk to human resources and other leaders who need to know,
- Communicate with your direct reports, if any,
- Tell colleagues with whom you have worked most closely or longest,
- Share the news with your department or division,
- Share the news with the full office staff,
- And finally, share the news with the public.

Regardless of specific individuals, you can plan your announcement by reflecting on three basic questions. First, who needs to know? Next, who might be upset if the news is not delivered personally? Finally, who should know or can know but probably would not be upset the news was not delivered personally?

Start setting boundaries and delegating responsibilities

After you have worked on a game plan with your supervisor, it is important to begin delegating tasks and setting boundaries to avoid getting involved in work you will not have time to complete. With your supervisor and colleagues, be clear about what you feel you can and cannot take on. If you need to say no to someone who does not know you are leaving, simply state that you do not have capacity without elaborating. During your offboarding period, when you are asked to take on new tasks, be vigilant about redirecting work to the right people.

As your departure date nears, you should be focused less on ongoing activities and future decisions and more on implementing your offboarding plan — in part to ensure that others are ready to take over ongoing tasks and start making decisions without you. One example of successfully setting boundaries and delegating can be seen in Wake County, North Carolina, where former elections director Gary Sims retired in May 2023 after 34 years of government service. Sims accomplished

important things in his tenure, including implementing new voting equipment. When he decided to leave elections, he went to great efforts to ensure that others — particularly his former deputy, Olivia McCall — became steadily more involved in ongoing work and gained practice with decision-making before he left. [18]

"Olivia has been my right hand for many years," Sims explained, "and she is included in every single thing I do and the direction this office moves in. Trust is key, and I trust her to carry on in something I have devoted so much of my life to."

Of course, developing trust and delegating responsibilities does not come easily. Resources like the delegation worksheet developed by The Management Center could help you think through the process more deliberately. With all the pressures facing election departments, preparing your colleagues or successor has never been more important.[19,20]

Help build confidence among your team members

Logistics like making offboarding plans and delegating responsibilities are vital to an effective departure, but you should also attend to the emotional aspects of your exit. During a fearful time, one way to do this is to build up your colleagues' confidence by reminding them of what you have achieved together — whether it is conducting a safe election during the pandemic, implementing new voting equipment, or weathering other storms.

Another way to build confidence is to set up systems to make your colleagues not just *be* prepared but also *feel* prepared for your departure. Consider the example of Neal Kelley, former registrar of voters for Orange County, California. In November 2021, Kelley announced that he would retire in March 2022 after nearly 20 years overseeing Orange County's elections. Announcing his retirement that far in advance gave Orange County election staff and elected officials plenty of time to find a replacement for Kelley and prepare for the June 2022 statewide primary. Beyond providing a generous amount of notice, he went to great lengths to ensure his team was prepared for the transition. For example, he gave Orange County CEO Frank Kim advice on how to reach out to other registrars and offered to help identify outstanding candidates.[21] In early 2022, his office announced a pilot program that would include barcode scanners at nine ballot drop locations so that voters could scan their ballot envelope as they drop it off, an ambitious move that could perhaps make processes smoother for his successors.[22] Actions like these can help your colleagues feel comfortable with the transition and even excited about the future.

---

[18] M. Mindy Moretti, "A Key, a Map, and a Bible," *Electionline*, May 18, 2023.
[19] Jasmine Gallup, "Local Boards of Elections Face Harassment, Influx of Public Records Requests, Spread of Disinformation," *INDY Week*, May 10, 2023.
[20] The Management Center, "Delegation Worksheet," September 30, 2021.
[21] Nick Gerda, "OC's Longtime Elections Chief Neal Kelley Is Retiring," Voice of OC, November 10, 2021.
[22] "Orange County, CA Elections to Pilot Additional Ballot Tracking Technology," OC Vote, February 23, 2022.

Guidance for the Election Department

While there are many actions a departing employee can take to support continuity of operations, the election department as an organization can take steps to help minimize turnover and, when it does occur, make staff transitions less disruptive. The following are steps election department leaders and managers can take at the level of organizational systems, practices, and culture to address turnover.

Prepare election offices and their leaders to withstand turnover

Organizations best prepared for crises are those designed to weather stress, and election offices are no different. As a first step, consider whether your office's leadership and management structures are effective. One idea that could help ensure that leadership and management structures are sufficient is to integrate succession planning with employee development programs, so election officials can, if necessary, run successful elections while learning how they operate. Since 2020, the top election officials in at least 10 of Nevada's 17 counties have changed, and several of those departures occurred in the months leading up to the 2022 midterms. With turnover like this, there was a need in Nevada for consistent, large-scale support for new officials. In response, Nevada Secretary of State Cisco Aguilar, who took office in January 2023, promoted a bill that would mandate that his office delivers biennial training and a procedures manual to local officials, both of which could help address challenges stemming from turnover.[23]

An effective leadership training program can position employees to perform at a high level and be ready to take on new skills and responsibilities.[24] If election officials can work with other departments in their government or peers in nearby jurisdictions to set up employee development programs, this could help ensure that the staff can continue to administer free and fair elections, in turn helping to preserve the voter experience and maintain trust.

Establish cross-training

At a systems level, cross-training is an effective tool for cultivating resilience among election department staff. Cross-training involves teaching an employee who is hired to perform one job function the skills required for other job functions. To be most impactful, cross-training should go further than simply encouraging your staff members occasionally to observe each other's work in case of sickness or vacation. It should also entail identifying the tasks and skills needed in a specific area of the election office with the goal that, ultimately, any number of different employees could function in that area if needed. Then, repeat the process throughout the organization.

In North Carolina, due in part to turnover, the State Board of Elections has begun putting greater emphasis on ensuring that its county election directors have comprehensive knowledge of operations across the department with the goal of preparing directors to keep their offices running regardless of who departs.[25] This includes requiring new directors to complete a week-long training program covering the full scope of election operations like processing voter registrations, conducting

[23] "Nevada Elections Head Pushes Training, Manual Amid Turnover," *U.S. News*, March 3, 2023.
[24] Eben Harrell, "Succession Planning: What the Research Says," *Harvard Business Review*, December 1, 2016.
[25] M. Mindy Moretti, "A Key, a Map, and a Bible."

voter roll maintenance, and budgeting. The State Board also hosts huddles twice per month to provide legislative and legal updates, review procedures, and facilitate trainings from partners like the U.S. Postal Service and the Cybersecurity and Infrastructure Security Agency (CISA).

Understandably, you may question the idea of cross-training employees out of an assumption that it puts pressure on them or makes their jobs harder. While it is true learning more competencies takes greater effort, cultivating a wider range of knowledge and skills also benefits workers' professional development and employment prospects. Cross-trained employees are not only a more valuable asset for your election department, but they are also stronger candidates for a wider range of jobs inside or outside your organization.

Help departing employees transfer their knowledge

Of course, even if you develop systems for resiliency, staff members will depart from their roles. Turnover is a normal part of any organization. When staff members announce their departure, they should develop a game plan for their offboarding period, as emphasized earlier, but election office leaders should make a plan of their own for how to transfer the knowledge from the departing employee and identify to whom to transfer the knowledge along a timeline.[26] The following sections share recommendations for making the processes of knowledge transfer as smooth and effective as possible.

Identify the information that needs to be transferred

When you hear an employee plans to depart, you should identify the information and knowledge needed to be shared with others. It is particularly important to determine how much of the departing employee's knowledge has never been documented. In other words, think about what information cannot be found in existing training materials or guides. This information will inform the learning plans for the election office and the departing employee's successor. The less knowledge the departing employee has shared with others, the more time will be needed to pass it along. Reflecting on questions like these may help you identify the unique, undocumented knowledge your departing employee may hold:

- How long has the employee been in the role? What has changed since then?
- On what topics is the departing employee a go-to person when people have questions?
- How did the employee learn the information? Can this be reproduced?

During this process, you may find the departing employee is reluctant to share knowledge. In that instance, emphasize the importance of the employee's work and praise the employee's accomplishments or try to focus the employee on only one or two top areas to make knowledge transfer less intimidating.

---

[26] Rebecca Knight, "The Right Way to Off-Board a Departing Employee," *Harvard Business Review*, January 15, 2016.

Create shadowing opportunities

If the offboarding period is generous, the elections office should consider creating an action plan of learning, whereby the departing employee is paired with one or more learners to observe the employee in action, develop new skills, and receive feedback. For instance, imagine that the departing employee is one of the most experienced at training poll workers. The learner might sit in on poll worker training to observe how the departing staff member trains workers or attend a meeting to observe how the departing employee might solicit input from colleagues. Of course, depending on the phase of the election cycle, you may need to use simulations or a dry run if the activity in question does not fall naturally on the calendar. After a period of shadowing, give successors a series of mini experiences, so they can try the tasks on their own.

Emphasize team learning

If the offboarding period is brief, if you have not identified a successor, or if you want several people to learn from the departing employee, consider scheduling a team learning session in which the departing employee shares stories about managing problems and crises. Conducting this kind of exploratory question-and-answer session with a skilled facilitator can reveal insights into the expert's thought process and help team members absorb information. Consider questions like these to ensure effective knowledge transfer:

- How did you learn what you know?
- What do you read? What websites do you visit?
- Who did you consult before you made this decision?
- What alternatives did you consider?

Document knowledge in a usable format

In addition to, or instead of, person-to-person learning experiences, encourage the departing employee to create and/or update written documentation before leaving. One benefit of documentation is the departing employee can work on it gradually. On the other hand, writing can be time-consuming, and some aspects of the job may be difficult to capture in text. Consider documentation that does not require a lot of writing. The outgoing employee could:

- Create a brief learning log about a given activity that could be transcribed into a database or slide deck,
- Use a phone to record a video showing key steps in a process like storing ballots,
- Use Zoom's screen share and record features to record a video showing how to use a computer program or system like your voter registration database,
- Or condense knowledge down into a set of bullet points or numbered steps

Focus on the relationship

The previous sections shared steps you can take to boost resilience, empower employees, and transfer departing staff members' knowledge during a time of high turnover in election administration. In

addition to these actions, remember to focus on the relationship with the departing employee. While you may be disappointed your employee is leaving, remember that the process is likely difficult for the employee, as well, so set the right tone during the offboarding process. Offer to help, show appreciation for the employee's work, and make plans to keep in touch. You might go to the employee with the occasional question, engage the employee as a consultant, or hire the employee back someday. Doing this is not only professional, but it could also encourage the employee to share knowledge before departing.[27]

For example, Lisa Marra, a fierce defender of election integrity, resigned as elections director in Cochise County, Arizona, amidst a threatening work environment after protecting the midterm election results from an illegal ballot count plan.[28, 29] Cochise County's treatment of Marra likely foreclosed the possibility of the county maintaining a relationship with her, but Marra's relationship with the Arizona Secretary of State is a different matter. While the Secretary of State's Office did not directly employ Marra when she worked in Cochise County, it oversaw her efforts and stood by her work, including after she departed Cochise County. This likely contributed to Marra joining the Secretary of State's Office as deputy director of elections in March 2023.[30, 31] Marra's extensive history of administering and defending elections will no doubt help the state election authority work smoothly with the state's 15 counties to defend Arizona elections from bad-faith actors.[32] Election officials often joke about catching the "elections bug." For many, that dedication does not go away when they leave a job, even if their departure was stressful. For that reason, maintaining positive relationships is important.

Guidance for other stakeholders

Turnover is one of the biggest challenges facing the election administration field today. However, with patience, planning, and thoughtfulness, departing officials and leaders of election departments can help reduce the stress and disruption caused by staff transitions.

While this article shares recommendations focused within the walls of an election office, there are important roles to be played by others, as well, including vendors and state associations.

---

[27] Dorothy Leonard, "How to Prevent Experts from Hoarding Knowledge," *Harvard Business Review*, December 18, 2014.

[28] Jen Fifield, "Elections Director in Arizona County Resigns after Protecting Ballots from Republican Officials," *Votebeat Arizona*, January 25, 2023,

[29] "On the Frontlines: Responding to the Threat of Election Misinformation," Oversight Committee Democrats, 2022.

[30] Gloria Oladipo, "Arizona Secretary of State Sues after Republican Officials Refuse to Certify County Election Results," *The Guardian*, November 29, 2022,

[31] "ICYMI: Secretary Calls Attention To Election Worker Exodus," Arizona Secretary of State, January 31, 2023,

[32] Jen Fifield, "Cochise County's Elections Director Resigns after Protecting Midterm Ballots from Republican Officials," *Arizona Mirror*, January 26, 2023.

The role of vendors

Election equipment and materials vendors have a key role to play in supporting continuity of election processes. The fact is, in today's climate of high turnover in elections, vendor representatives will often find themselves longer tenured and more experienced than the election officials with whom they are working. To better support election departments, vendors should keep up to date with staff changes, offer on-demand training for new staff, and take proactive steps to ensure election offices have what they need to serve voters effectively.

Vendor representatives can best help election officials by leaning into their strengths - their knowledge of the company's products and specifications. For instance, during the 2022 general election in Luzerne County, Pennsylvania, confusion regarding the specific weight of paper best suited for the county's ballot-on-demand printers consumed a great deal of officials' attention on election day.[33] If the vendor had provided clearer guidance about paper weight and storage specifications in advance, the problems could have been avoided. Because vendors know their products better than anyone, they have a responsibility to set up election officials for success.

The role of state associations

In their role affirming the election profession, state associations can also support staff resilience and contingency planning. For instance, the Michigan Association of Municipal Clerks started a mentorship program in 2022 to help respond to clerk turnover.[34] Clerks can sign up as mentees and get paired with a more experienced or established counterpart, allowing officials who are new or struggling to get support from knowledgeable peers. Helping election officials feel less alone during difficult times has value in any state, but it may be especially important in a state like Michigan, whose municipal-level election administration has clerks in many small municipalities working as part of a tiny staff or sometimes even a staff of one.

Closing

Ultimately, while working to address turnover in the election profession is most obviously about continuity of operations, it is also about much more than that. Creating systems to boost resiliency and reduce the stress of staff transitions is about taking care of the people with whom you work. It is about promoting and maintaining high standards of public service for voters, inspiring trust and confidence among the public, and demonstrating the robustness of American democracy. People may come and go, but the local systems of democracy are resilient if you help make them that way.

[33] "Public Report on 2022 General Election Investigation," Luzerne County District Attorney's Office.
[34] "Michigan Association of Municipal Clerks," Accessed July 14, 2023.

Mapping Election Administration and Election Science: Seven White Papers Explore Research and Practice

Charles Stewart III, *Massachusetts Institute of Technology*[1]

Over the past two decades, concerns about the nuts and bolts of election administration, from technological failures in the 2000 Florida recount to mail ballot processing speeds in 2020, have prompted efforts to understand problems with voting so that voters would benefit. The MIT Election Data and Science Lab (MEDSL),[2] supported by the Election Trust Initiative,[3] has initiated the Mapping Election Administration and Election Science project to bridge the gap between practitioners and researchers, fostering evidence-based improvements in election administration.[4]

As a first step, MEDSL held a convening at MIT in late September 2023 where the current state of the field's research was assessed, and priorities were discussed about building robust partnerships of researchers and practitioners who would work together to encourage evidence-based improvements to election administration. A special issue of the *Journal of Election Administration, Research, and Practice* is forthcoming to dive deeply into what was shared and discussed. Here is provided a sampling of what has been learned so far and what might be accomplished in the years to come.

Cataloguing what research tells us about best practices

A starting point for this endeavor has been seven white papers that have surveyed what is known about research-based best practices in seven areas of election administration:

- Voting in person[5]
- Voting by mail[6]
- Voting registration accuracy and security[7]
- Poll worker and election official recruitment, training, and retention[8]
- Usability and accessibility[9]
- Audits and validating election results[10]
- Communicating with voters to build trust in the system[11]

---

[1] Kenan Sahin Distinguished Professor of Political Science at the Massachusetts Institute of Technology (MIT) and the founding director of the MIT Election Data and Science Lab.

[2] https://electionlab.mit.edu/.

[3] https://www.electioninitiative.org/.

[4] https://electionlab.mit.edu/research/projects/mapping-election-science

[5] https://electionlab.mit.edu/research/projects/mapping-election-science/white-papers/voting-in-person.

[6] https://electionlab.mit.edu/research/projects/mapping-election-science/white-papers/vote-by-mail.

[7] https://electionlab.mit.edu/research/projects/mapping-election-science/white-papers/voter-registration.

[8] https://electionlab.mit.edu/research/projects/mapping-election-science/white-papers/election-officials-poll-workers.

[9] https://electionlab.mit.edu/research/projects/mapping-election-science/white-papers/usability-accessibility.

[10] https://electionlab.mit.edu/research/projects/mapping-election-science/white-papers/election-auditing.

[11] https://electionlab.mit.edu/research/projects/mapping-election-science/white-papers/voter-trust.

These white papers showcase knowledge accumulated over the past two decades, revealing varying levels of research depth and engagement across the researcher-practitioner divide. In-person voting is an example of an area that benefits from extensive research and active involvement of officials. Research has established that voters facing long lines are less likely both to vote in the future and feel confident their votes are counted as cast. Voters are also less likely to vote when polling places are located far from them. Robust procedures have been developed to measure wait times and organize polling places, so lines are minimized. Free online applications exist to assist local officials in locating polling places close to voters and convenient to transportation lines. Much of the research in this area has been conducted with active involvement of state and local officials. If there are big gaps in this area, it may be in understanding how to implement more widely what is known rather than figuring out what needs to be done.

Auditing is an example of an area where more research is needed both to establish best practices and to understand how best to implement those practices. Considerable academic attention has been paid to post-election tabulation audits in recent years, but little work has been done on other areas where auditing might increase security and accuracy – areas such as voter registration, logic-and-accuracy testing, and district assignments. Risk-limiting post-tabulation audits are a hot area of academic research, but their diffusion among the states has been slow. Finally, almost no research has been conducted into communicating auditing results to voters and whether they actually increase voter confidence.

Communicating with voters to instill confidence is a high-priority activity about which a lot is known of a general nature but where a lot of work is still to be done in the area of implementation. Decades of research in the United States and around the world have established the "winner-loser effect," the importance of personal experiences in establishing trust, and gaps among racial and ethnic lines in election trust. While many experts are eager to offer advice about communicating with voters to build trust, much of this advice still needs to be validated in the elections field using scientifically rigorous methods.

Growing researcher-practitioner partnerships in election administration

The aftermath of the 2000 election saw academic researchers flood into the field of election administration. Some of this research has had a positive influence on how elections are conducted, though not as much as many have hoped. Of course, the political environment in which election policy is developed is one barrier to the adoption of research-based best practices, but a bigger barrier is the misalignment of the interests of academic researchers and election officials. Academic researchers, motivated by curiosity and national news, often lack direct engagement with election officials. Election officials, under pressures to perform perfectly with limited resources, may find little to be gained by collaborating with researchers.

Election administration is not the only important area of public policy where a misalignment of interests, perspectives, and time horizons form a barrier to improving public service using the best scientific evidence. Health care, education, community development, criminal justice, and law enforcement are other areas where similar dynamics occur. These areas have benefitted from a new

way of aligning the interests of researchers and practitioners, called *research-practitioner partnerships* (RPPs).[12] Election administration should benefit, too.

Unlike traditional demand-driven academic research or one-off consulting, RPPs are long-term partnerships designed to solve problems of practice while contributing to generalized scientific knowledge. RPPs are designed to be collaborative from the beginning. When they succeed, it is because of a shared commitment to mutual respect.

As what has been learned over the past two decades in the field of election administration is digested, there is an opportunity to explore a bold new approach that aligns the needs and experiences of academics, voters, and election officials. The goal is to make evidence-based improvements in election administration more commonplace and effective.

[12] Cynthia E. Coburn, William R. Penuel, and Kimberly E. Geil, "Practice partnerships: A strategy for leveraging research for educational improvement in school districts," William T. Grant Foundation (2013), https://eric.ed.gov/?id=ED568396.

Recruiting New Poll Workers in a Challenging Political Environment

Barry C. Burden, *University Wisconsin-Madison*[1]
Asha Jones, *Rice University*[2]
Robert M. Stein, *Rice University*[3]

ABSTRACT
This article investigates factors affecting the use of first-time poll workers. Using data from the 2022 Election Administration and Voting Survey (EAVS), we explore how factors – including the ease of finding poll workers, the number of registered voters, ages of poll workers, and usage of mail balloting – influence poll worker turnover. This study finds significant variability in the prevalence of new poll workers across jurisdictions. The number of registered voters is a major determinant of new poll worker recruitment, highlighting the unique challenges facing larger jurisdictions. Surprisingly, a larger share of older poll workers correlated negatively with the percentage of new poll workers. The researchers find a significant portion of the variation in first-time poll workers is shaped by state-level factors. The study underscores the importance of understanding local and state factors to anticipate and address the recruitment needs of local election officials (LEOs).

In most jurisdictions around the United States, elections cannot be successfully conducted without a sufficient number of well-trained persons to work the polls. Poll workers perform a myriad of tasks essential to the conduct of elections. These tasks range from opening the polling location, setting up and operating a host of equipment, checking in voters, assisting voters with casting their ballots, processing mail ballots, adjudicating who is eligible to vote, and much more. The importance of poll workers was amply demonstrated in 2020 when the presidential election was conducted during a nationwide pandemic. The reluctance of many to work the polls for fear of contracting and spreading the COVID-19 virus presented the country with a significant challenge to find persons to work the polls. Simultaneously, many local election officials (LEOs) found themselves with abundant, albeit less-experienced, poll workers who stepped forward in 2020 out of either a sense of duty to maintain sound elections or skepticism about the integrity of the system. In the aftermath of the contentious 2020 election, many who worked the polls also found themselves the object of partisan criticism resulting in a greater reluctance to return to the polls. Alongside turnover of election officials, turnover among poll workers has become a central concern in contemporary election administration.

LEOs have many reasons to care about how many poll workers in their jurisdictions are new. For administrators who run elections, turnover among poll workers is something of a double-edged

[1] Barry C. Burden is professor of political science and director of the Elections Research Center at the University of Wisconsin-Madison. His email address is bcburden@wisc.edu.
[2] Asha Jones is a Ph.D. student in political science at Rice University.
[3] Robert M. Stein is the Lena Gohlman Fox Professor of Political Science and is a fellow at the James A. Baker III Institute for Public Policy at Rice University.

sword. On the one hand, when more of the poll worker corps is new, LEOs have put more effort into the recruitment, training, and monitoring of those individuals. In many states, training for new poll workers is more intensive than for returning poll workers and, thus, consumes more of a LEO's capacity in the run-up to the election. On the other hand, new poll workers may bring new enthusiasm, openness to instruction, and additional skills to the job, whereas veteran poll workers can be slow to update their practices to reflect changes in election protocols (Atkeson et al. 2014; Burden et al. 2017).

How successful have LEOs been at recruiting new persons to work the polls? What are the correlates of successful recruitment of new poll workers? We offer answers for these questions by drawing on a new question asked of LEOs in the Election Assistance Commission's 2022 Election Administration and Voting Survey (EAVS) about the number of new persons who worked the polls in that election. These data, matched with other information about each jurisdiction's cadre of poll workers, such as the number and ages of poll workers, allows this study to get a first look at efforts to recruit new persons to work the polls.

The EAVS dataset provides longitudinal evidence on the availability of poll workers. The key question in the survey asks LEOs, "[H]ow difficult or easy was it for your jurisdiction to obtain a sufficient number of poll workers for the November [year] general election?" The proportion of local elections officials who have reported having at least some difficulty (i.e., "very difficult" or "somewhat difficult") finding persons to work the polls has increased over time, reaching over 70 percent of jurisdictions in 2018. However, reported difficulty recruiting poll workers declined in surprising fashion in 2020 to 52 percent and remained nearly flat at 54 percent in the 2022 EAVS. This appears to be the result of new methods of recruitment, a fresh group of volunteers concerned about election staff, and the sharp increase in mail-based voting that supplanted in-person voting during the pandemic and reduced the demand for poll workers. Although concerns about COVID abated in 2022, the greater ease in recruiting poll workers continued.

This study finds that the prevalence of first-time poll workers highly varies both across states and within states. Many jurisdictions report that no new poll workers were involved in the 2022 election while others report that a majority, or even the entire poll worker corps, was new. The correlates of new poll workers are a mix of the intuitive and unexpected. The ease of recruiting poll workers lessens the share of poll workers who are new and the proportion of poll workers over 60 similarly depresses the share of new poll workers. The share of votes cast by mail, expected to decrease the demand for poll workers, is unrelated to the share of new poll workers. Unmeasured state-level factors also account for much of the variation in usage of new poll workers and suggest areas for future research.

This article proceeds with a discussion of the contours of new persons working the polls. Previous research is identified that informs both the incidence with which new persons are working the polls and the correlates of this phenomenon. This research presents new data from the EAVS on the reported number of new poll workers and report tests of several hypotheses gleaned from the literature to explain this phenomenon. Based on this research's findings, suggestions for the future conduct of elections and best strategies for assuring an adequate and qualified corps of persons to work the polls are discussed. The paper concludes with suggestions for further research as new data become available on poll worker recruitment in future EAVS.

Existing Research on Poll Workers

There is limited research on the origins of new poll workers or how best to recruit new poll workers. Research on the difficulty LEOs have recruiting and retaining poll workers shows that the policies of state and local governments contribute to the success or failure of local governments in recruiting new persons to work the polls.

At present, most states require that poll workers must be registered voters in the jurisdictions where they will serve. In addition, most states require persons from both major parties be represented at each polling location as poll judges and poll workers. This requirement places a significant constraint on local election officials' ability to recruit new poll workers outside of the two parties and from individuals without a partisan affiliation. As of 2018, Pew reported the modal partisan affiliation of registered voters was at least nominally independent (37 percent), further complicating recruiting of new poll workers.[4]

Jones and Stein (2020) found that compensation is determinative of the difficulty LEOs report having recruiting persons to work the polls. States regulate the compensation LEOs can provide poll workers (Jones and Stein 2020; Greenberger 2023), and many states assist in funding poll workers, though often inadequately (Greenberger 2023; Montjoy 2010; Mohr et al. 2019).

The authors expect the need for poll workers to lessen as poll workers are given more choices of where and when to work. Jones and Stein (2020) find that LEOs report less difficulty recruiting persons to work the polls in states with early voting. Similarly, Hostetter (2019) finds states that allow poll workers to work across jurisdictions lessens the demand for and difficulty of recruiting persons to work the polls. Both these conditions, however, are state-mandated, leaving LEOs in states without early voting and authority to use poll workers from outside their jurisdiction unable to take advantage of these opportunities.

Available research allows the authors to expect that first-time poll workers are more prominent in jurisdictions where the demand for poll workers is greatest. Jurisdictions with larger and growing populations and where local election officials report difficulty recruiting persons to work the polls should be expected to recruit new persons to work the polls (Burden and Milyo 2013; Jones and Stein 2021; Hostetter 2020). Jurisdictions with an older cadre of poll workers might suggest LEOs have not been successful at recruiting new persons to work the polls. This assumes that recruits are younger than those who continue to work the polls.

State and local factors operate together to determine the difficulty LEOs have recruiting and retaining persons to work the polls. The evidence suggests that states provide more constraints and less flexibility in solving the recruiting of new workers. Conversely, local conditions – including size, demographics, and available resources – shape what LEOs can do to resolve the scarcity of persons to work the polls.

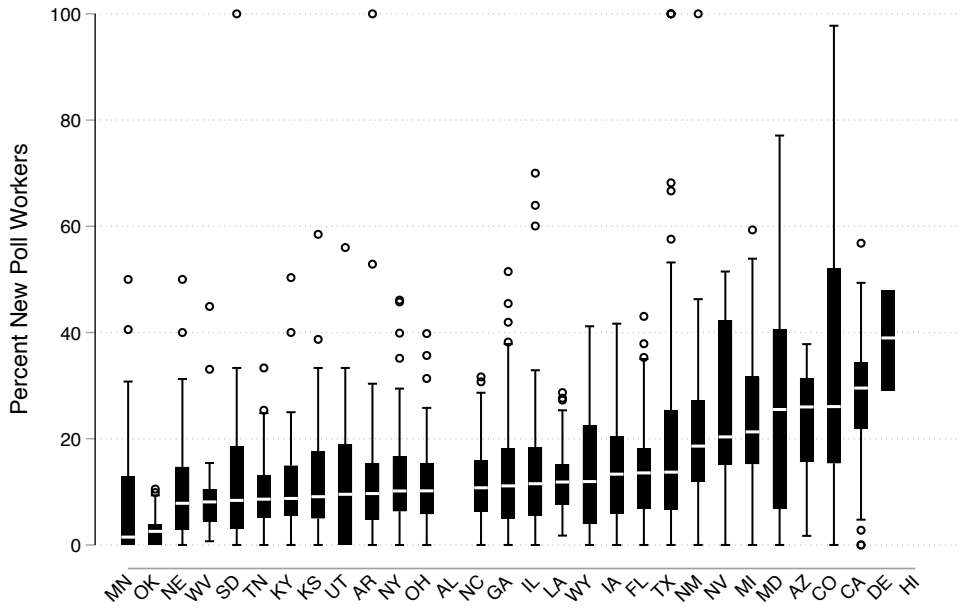
[4] https://www.pewresearch.org/politics/2018/03/20/1-trends-in-party-affiliation-among-demographic-groups/

A Local Perspective on Poll Worker Turnover

The best source of data on poll workers continues to be the EAVS. For numerous election cycles, the EAVS has asked about three things: the total number of poll workers who served on election day and during early voting, the age distribution of those poll workers, and the difficulty jurisdictions experienced in recruiting a sufficient number of poll workers. For the first time, the 2022 edition of the EAVS also asked how many of those poll workers were serving for the first time.

Because the question was asked for the first time in 2022, many jurisdictions were not prepared to collect the information needed to answer it, leaving more missing or unusable values than for other items in the survey. The full EAVS is comprised of 6,456 jurisdictions, but only 3,720 reported the number of poll workers and just 1,757 reported how many of those were new.[5] The main determinant of whether the item was answered appears to be the size of the jurisdiction. Those that did not answer averaged 20,642 registered voters whereas those that did averaged 74,270 registered voters, so analysis of the question could be skewed by the underrepresentation of less populous jurisdictions. Evidence from this study will suggest that smaller jurisdictions are less prone to have new poll workers, so the LEOs who responded skew toward places with higher shares of first-timers.

Figure 1: Percentage of Poll Workers Serving for the First Time in 2022



To compute the percentage of poll workers who served for the first time in 2022, the authors divide the number of new poll workers by the total of number poll workers. Using this measure, the average jurisdiction reported 14 percent of poll workers were new.[6] However, the mean value hides

[5] Four U.S. territories and Washington, D.C., are omitted from this analysis.

[6] This differs slightly from the rate of 17% reported in the 2022 EAVS for reasons that were not determined.

tremendous variation both across and within states. More than one in ten jurisdictions reported having no new poll workers while three percent reported that more than half of their poll workers were new.

Figure 1 displays these percentages as box plots for the reporting jurisdictions in each state. The median share of new poll workers varies from close to zero in states such as Minnesota and Oklahoma to more than one quarter of all poll workers in states such as California and Delaware.[7] However, there is also substantial variation within almost every state, indicating that statewide laws and other factors are not the sole determinants of turnover among poll workers. Nearly every state has at least one jurisdiction with no new poll workers, and most also have at least one jurisdiction where more than half of poll workers are new.

Hypotheses and Variables

Six variables are considered that could plausibly influence the degree to which the poll worker corps is comprised of first-timers.

First, new poll workers should be brought into the fold at a higher rate in jurisdictions where finding poll workers is more difficult. Although the cause-and-effect between the two factors is not entirely clear – recruiting sufficient poll workers might be rated as easier if many new individuals sign up – the authors believe this is an important control variable and does contribute to the prevalence of new people working the polls. This research measures the difficulty of recruiting using EAVS question D8 asking LEOs whether it was "difficult or easy to obtain a sufficient number of poll workers." Responses fall on a five-point scale from "very difficult" (1) to "very easy" (5).[8] This relationship is positive because greater ease in finding poll workers would result in a smaller share who are new. The modal response is "somewhat difficult" (41 percent of jurisdictions).

Second, states with greater use of mail ballots will have less need for poll workers and, thus, may be less likely to recruit new individuals into those roles. Research shows that more election day voting makes recruiting poll workers more difficult (Hostetter 2020). States with heavy mail voting have generally been seeing rates of mail ballot usage increase – especially since the 2020 pandemic election – and that rise would result in less need for poll workers generally and would allow for reliance mostly on veteran poll workers. The authors compute the mail ballot rate as the percentage of all ballots counted (F1a) that were cast by mail (F1d in most states, F1g in vote-by-mail states that did not provide values for F1d).[9]

Third, and related, the authors expect a greater need for new poll workers in jurisdictions where poll workers are used more intensively. State practices and laws, infrastructure, and geography result in some communities deploying more poll workers at each location than do others (Burden and

---

[7] Hawaii technically has the highest median but that state only reported the number of new poll workers for one jurisdiction.

[8] One concern about this measure is that in a few states it appears a single response was provided by a central respondent for all jurisdictions in the state. However, those states are generally not included in the analysis because they failed to report the number of new poll workers.

[9] Although the EAVS instructions stated that the number of ballots should only appear in either F1d or F1g, a small number of jurisdictions reported separate values for both variables. In these cases the two numbers have been summed.

Milyo 2015). This is measured as the number of total poll workers (D7a) per physical polling place (D2a).[10]

Fourth, the authors consider whether poll workers are assigned during election day proper or the lengthier early voting period (if it exists). Research suggests that poll workers are more willing to serve if given opportunities to work on days of their choosing rather than only on the Tuesday of election day (Jones and Stein 2021). On the other hand, the more days polling places are operational, the greater the need will be for poll workers and, thus, could result in more first-time individuals being recruited to serve (Greenberger 2022). This variable is measured as the percentage of total poll workers (D7a) who worked early voting (D6a).

Fifth, it is expected that when more poll workers are older individuals, there will be more turnover and incentive to recruit new people to serve. The relatively old age of poll workers in the U.S. is widely recognized and creates hazards to the degree that declining functioning or poor health cause those individuals to stop serving. However, evidence also suggests that a larger population of older people makes it easier to recruit poll workers generally (Greenberger 2023). To test these conflicting ideas, the researchers compute the percentage of all poll workers in a jurisdiction who are over 60 (D7f and D7g). Among the variables included in the analysis, this variable is the most likely to be endogenous. The share of older poll workers can plausibly lead to more new people being recruited but an influx of younger (on average) workers would lower the share who are over 60. Nonetheless, the authors presume the predominant cause is the underlying age distribution of poll workers and, thus, include it as an important consideration.

Finally, the size of the jurisdiction in terms of the number of voters it serves probably affects the prevalence of new poll workers. Large jurisdictions operate in starkly different ways from smaller jurisdictions as they face greater complexity of operations and more turnover in the potential voter population between elections due to in-migration and out-migration, more residential mobility within their borders, heavier use of provisional and absentee ballots, and longer voter wait times (Burden and Vidal 2016; Kimball and Baybeck 2013; Pettigrew 2017). This might explain why they report more difficulty finding sufficient poll workers (Greenberger 2023). This is measured as the number of registered voters in the jurisdiction (A1a). Because the distribution is highly skewed by a small number of extremely large communities, the natural log is employed.

Table 1 provides descriptive statistics for all of the variables in the regression analysis for those jurisdictions that reported how many poll workers were new in 2022. The table shows that about one in five ballots were cast by mail, the average polling place used about seven poll workers, roughly one in five poll workers were allocated to early voting operations, and two-thirds of poll workers were over age 60. However, as with the share of new poll workers, there is substantial variation in these explanatory factors both within and across states.

[10] This variable is based on the total number of poll workers and does not distinguish between early voting and election day.

Table 1. Descriptive Statistics

Variable	Mean	Minimum	Maximum	N
Percent of Poll Workers Who are New	14.4%	0%	100%	1,729
Ease of Obtaining Poll Workers	2.5	1	5	1,744
Percent of Ballots by Mail	19.4%	0%	100%	1,746
Number of Poll Workers Per Polling Place	7.1	0	121.1	1,743
Percent of Poll Workers at Early Voting	22.0%	0%	100%	1,497
Percent of Poll Workers Over Age 60	66.2%	0%	100%	1,362
Number of Registered Voters (logged)	9.82	5.06	15.82	1,755

Note: Statistics are provided only for jurisdictions that reported the number of new poll workers.

Results

The researchers estimate a linear regression analysis of the six variables to explain the percentage of poll workers who are new in each jurisdiction. The researchers report their estimates of the proportion of poll workers who are new with and without fixed effects for states. Models with fixed effects are preferred for states because they account for unmeasured factors such as state election laws, demographics, and even patterns of reporting to the EAVS that could affect the outcome. In addition, the model with state fixed effects makes it possible to gauge the extent of local poll worker turnover distinct from state-level factors.

Table 2 provides the results of both analyses and shows the factors emerge as reliable determinants of turnover among poll workers. Jurisdictions that have greater ease in finding poll workers have a small share of first-timers. Focusing on the models with fixed effects, a one standard deviation increase in the ease of finding poll workers (1.14 points on a on a five-point scale) reduces the share of first-time poll workers by 1.1 percentage points. The most potent variable in the analysis is the number of registered voters, which drives up turnover. A one standard deviation increase raises the share of first-timers by 2.7 percentage points, a sizable change compared to the overall mean of 14 percent of poll workers being new in 2022. More populous jurisdictions need to hire more poll workers and have a larger population from which to recruit people to work the polls. Larger jurisdictions also tend to experience more turnover in their populations that would bring in a new crop of poll workers but also simply have a large pool of potential workers to draw from.

Surprisingly, a greater share of older poll workers is negatively related to the percentage of new poll workers. This variable is likely a proxy for the age composition of the population more broadly and, thus, the availability of older individuals with time and interest to serve, thus necessitating the need for recruitment of new people. Contrary to expectation, greater use of mail voting is unrelated to the prevalence of first-time poll workers. The increase in mail voting creates demands for poll workers to process mail ballots, which seems to offset whatever reduction there is persons needed to work at in-person polling locations.

One important finding is the significant effect of state-level factors in influencing the number of new first-time poll workers. The fixed effects model, which accounts for state-level variation in the proportion of first-time poll workers, accounts for a significant increase in the explained variation.

This is observed in the doubling of the *R*-squared value between the fixed effects and non-fixed effects models. Clearly, state-level factors, including state election laws and demographic factors such as population replacement, constrain and facilitate first-time poll workers. Overall, the regression models have difficulty explaining much of the variation in the use of new poll workers, and these unmeasured state characteristics are as important as the indicators from the EAVS examined explicitly in this paper.

Table 2. Predictors of First-Time Poll Workers

Variable	Without Fixed Effects	With Fixed Effects
Ease of Obtaining Poll Workers	-.509	-.960**
	(.595)	(.285)
Percent of Ballots by Mail	.109	.012
	(.045)	(.069)
Number of Poll Workers Per Polling Place	-.044	-.044
	(.074)	(.062)
Percent of Poll Workers at Early Voting	.005	-.017
	(.025)	(.019)
Percent of Poll Workers Over Age 60	-.140**	-.111*
	(.044)	(.032)
Number of Registered Voters (logged)	1.508**	1.800**
	(.348)	(.412)
R^2	.128	.249
Number of Jurisdictions	1,190	1,190

Note: Cell entries are ordinary least squares coefficients with clustered standard errors in parentheses. State fixed effects and constants are not reported.
Data are clustered by state. *$p < .05$, **$p < .01$, two-tailed tests

Conclusion

To the degree that the patterns in the 2022 EAVS generalize to subsequent election cycles, it is apparent jurisdictions around the county vary tremendously in how much they depend on a fresh crop of poll workers. Even within the same state, LEOs often report a wide array of experiences that range from the exclusive use of returning poll workers to a majority or even all poll workers serving for the first time. This variability has numerous implications for budgeting, recruitment, training, monitoring, and feedback to LEOs. Understanding what drives the prevalence of new poll workers is essential information for the LEOs who recruit them but also for federal, state, and local policy makers who are charged with writing laws and allocating resources to facilitate high-quality election administration while also being attentive to differing needs across jurisdictions.

This initial study of poll worker turnover shows that the number of registered voters is the strongest determinant of how many poll workers are new. In more populous jurisdictions, the greater size of the electorate creates a larger pool of potential workers, and greater churn due to in-migration and out-migration necessitates more replacement of poll workers between election cycles. In contrast, in jurisdictions where more poll workers are older, more poll workers are also veterans rather than

first-timers. This might represent the infill of younger poll workers by older poll workers who were particularly prone to stop serving in 2020 because of COVID-19 and other concerns, or it could be a proxy for communities with more older residents who are apt to serve repeatedly. Finally, the reported ease of recruiting sufficient poll workers is negatively related to the use of new poll workers. This is the most direct evidence that the prevalence of first-time poll workers is not merely a result of supply factors such as greater volunteerism in some communities but is a response to more intentional recruitment efforts where staffing at the polls is anticipated to fall short.

The tremendous variation in the deployment of new poll workers is somewhat predictable by state and local factors and, thus, signals in advance of election day the differing needs of LEOs across jurisdictions in the attention they must give to recruitment and training. The extreme decentralization of the U.S. election administration system results in rather different experiences across jurisdictions, even within the same state legal environments, is manifest in the most human ways in the varying makeup of poll workers who serve.

At the same time, there is strong evidence that state-level factors – potentially including laws regulating the recruitment, compensation, and performance of poll workers – play a significant role in the number of first-time poll workers. This finding warrants further examination of these state-level policies and practices as well as demographic factors such as population replacement that might drive turnover among poll workers.

References

Atkeson, Lonna Rae, Yann P. Kerevel, R. Michael Alvarez, and Thad E. Hall. 2014. "Who Asks For Voter Identification? Explaining Poll-Worker Discretion." *Journal of Politics* 76 (4): 944–57. https://doi.org/10.1017/S0022381614000528.

Burden, Barry C., and Jeffrey Milyo. 2015. "The Quantities and Qualities of Poll Workers." *Election Law Journal: Rules, Politics, and Policy* 14 (1): 38–46. https://doi.org/10.1089/elj.2014.0277.

Burden, Barry C., and Logan Vidal. 2016. "How Resources, Engagement, and Recruitment Are Shaped by Election Rules." In *New Advances in the Study of Civic Voluntarism: Resources, Engagement, and Recruitment*. Edited by Casey Klofstad. Philadelphia PA: Temple University Press. http://ebookcentral.proquest.com/lib/rice/detail.action?docID=4660753.

Burden, Barry C., David T. Canon, Kenneth R. Mayer, Donald P. Moynihan, and Jacob R. Neiheisel. 2017. "What Happens at the Polling Place: Using Administrative Data to Look Inside Elections." *Public Administration Review* 77 (3): 354–64. https://doi.org/10.1111/puar.12592.

Greenberger, Michael. 2023. "A Method to Detect Whether Countywide Vote Centers Are Located Optimally: The Case of North Carolina." *Election Law Journal: Rules, Politics, and Policy* 22 (2): 105–16. https://doi.org/10.1089/elj.2022.0045.

Greenberger, Michael. 2022. "What Do We Actually Know About Poll Worker Recruitment? Poll Worker Recruitment Policies and Data Problems in the Election Assistance Commission Report."

Hostetter, Joshua D. 2020. "Portable Poll Workers: Eliminating Precinct Requirements in U.S. Elections." *Election Law Journal: Rules, Politics, and Policy* 19 (3): 392–401. https://doi.org/10.1089/elj.2019.0565.

Jones, Colin J., and Robert M. Stein. 2021. "Recruiting Persons to Work the Polls." *Election Law Journal: Rules, Politics, and Policy* 20 (3): 315–26. https://doi.org/10.1089/elj.2020.0701.

Kimball, David C., and Brady Baybeck. 2013. "Are All Jurisdictions Equal? Size Disparity in Election Administration." *Election Law Journal: Rules, Politics, and Policy* 12 (2): 130–45. https://doi.org/10.1089/elj.2012.0174.

Mohr, Zachary, JoEllen V. Pope, Martha E. Kropf, and Mary Jo Shepherd. 2019. "Strategic Spending: Does Politics Influence Election Administration Expenditure?" *American Journal of Political Science* 63 (2): 427–38. https://doi.org/10.1111/ajps.12422.

Montjoy, Robert S. 2010. "The Changing Nature … and Costs … of Election Administration." *Public Administration Review* 70 (6): 867–75. https://doi.org/10.1111/j.1540-6210.2010.02218.x.

Pettigrew, Stephen. 2017. "The Racial Gap in Wait Times: Why Minority Precincts Are Underserved by Local Election Officials." *Political Science Quarterly* 132 (3): 527–47. https://doi.org/10.1002/polq.12657.

Thoughts on "Recruiting New Poll Workers in a Challenging New Environment"

Kurt Bahr, *St. Charles County, Missouri*[1]

The issue of recruiting, training, and staffing election workers for polling places is a struggle election authorities discuss amongst themselves when gathering for conferences or association meetings. This article looks at this issue across the spectrum of large to small election jurisdictions. The authors accurately point out that jurisdictions that use their poll workers primarily on election day have different needs than jurisdictions that also use poll workers to staff absentee and early voting periods. They also point out that, while EAVS data is a great resource concerning poll worker recruitment, it is limited because information about poll workers is new to EAVS, and smaller jurisdictions are less likely than larger jurisdictions to report to EAVS. Regardless of these limitations, they show what I – as an election authority from a larger jurisdiction – presumed, larger election authority jurisdictions have more need for robust poll worker recruitment than smaller jurisdictions.

What this paper could not answer is why this is the case. The six variables laid out seem sound, especially the point that larger suburban and urban jurisdictions have higher rates of mobility than do rural jurisdictions. While recruitment is less necessary when poll workers do not move away, my experience indicates that rural areas have more to their community than lower turnover. In the more rural areas of my county, poll worker retention is higher than in the more densely populated areas. Rural poll workers tell me they enjoy the ability to see friends and neighbors as they work on election day. They also have fewer complaints of negative interactions with voters when people know each other. I would like to see if research can investigate how a sense of community plays into poll worker retention and if precinct size and placement can improve or detract from that sense of community.

When St. Charles County utilized more technology to communicate with poll workers, a significant number of older poll workers retired rather than learn to communicate electronically. Another area to consider with poll worker retention and recruitment is how changes in election technology and process affect poll workers. Larger jurisdictions are the early adopters of technology to save time and money while running elections. While these changes can create retention issues, technology can be positive to recruitment as well. The authors noted that, while many older poll workers did not work during the pandemic, many new workers signed up. The reason for this influx of new poll workers was the massive push on social media encouraging new volunteers to be poll workers. We capitalized on this by creating new online forms to do sign up without the need to print or mail a form. Not only did the social media platforms promote voluntarism, but so did many third-party organizations who wanted to expand democratic involvement. This media blitz made people aware of a need they had been unaware existed.

As an election authority, retaining poll workers and recruiting new ones are two sides of the same coin. Any insight from further research on how to do either will be appreciated.

---

[1] Kurt Bahr is director of elections in St. Charles County, Missouri.

Reflections on "Recruiting New Poll Workers in a Challenging Political Environment"

Constance L. Hargrove, *Pima County, Arizona*[1]

This research is interesting and important; however, the findings do not adequately address the challenges or the motivation behind why poll workers serve.

The findings are not particularly useful to an experienced local election official. The authors mentioned paying new poll workers more as an incentive. However, most poll workers are not working for the pay and are considered paid volunteers. Paying new poll workers more may also create animosity among experienced poll workers. Are the authors suggesting poll workers be treated more like employees than paid volunteers? Poll workers serve out of duty to their community and to support the constitutional right to vote. There will always be a group of poll workers there just for the money, but historically, poll workers who are there just for the money also have the greatest amount of turnover. There is normal attrition with older, experienced poll workers, but it is not a high percentage. We continue to see older individuals above age 60 applying to work as new poll workers. Perhaps research into why poll workers serve would be beneficial in recruiting new poll workers.

A major challenge across states is that poll workers must work the entire day. Poll workers and other advocates want a split shift. While a split shift sounds like a good idea, it is difficult to manage and requires double the workforce. Local election officials are also concerned about the second shift not showing up on election day. Additional research on how local election officials handle split shifts and any challenges would be beneficial.

Furthermore, the research paper mentions state laws regarding the representation of the two major political parties. Recruiting new poll workers and retaining experienced ones became more of a problem after the 2020 election. Many experienced poll workers changed their party affiliation to unaffiliated or independent, creating an imbalance in polling places. Many new poll workers are independents or have not declared a party. Future research into why experienced poll workers are changing their party and why new poll workers are unaffiliated will help local election officials inform state legislators about laws regarding poll workers.

The research paper is a good start to understanding how to recruit new poll workers effectively. However, it does not address why younger voters are unwilling to serve. The average age of new poll workers in Pima County, Arizona, is 60. Future research on new poll workers' motivation to serve and the benefits of split shifts on election day would be beneficial.

---

[1] Constance L. Hargrove is elections office director in Pima County, Arizona.

Can Voters Detect Errors on Their Printed Ballots? Absolutely.

Philip Kortum, *Rice University*[1]
Michael D. Byrne, *Rice University*[2]
Chidera O. Azubike, *Texas Tech University*[3]
Laura E. Roty, *Arizona State University*

ABSTRACT
There is still debate on whether voters can detect malicious changes in their printed ballot after making their selections on a Ballot Marking Device (BMD). In this study, we altered votes on a voter's ballot after they had made their selections on a BMD. We then required them to examine their ballots for any changes from the slate they used to vote. Overall accuracy was exceptionally high, at 99.8 percent. Participants were able to perform with near-perfect accuracy regardless of ballot length, ballot type, number of altered races, and location of altered races. This paper concludes that with proper direction and resources, voters *can* be near-perfect detectors of ballot changes on printed paper ballots after voting with a BMD. This does not mean voters will do so in actual elections, but research should now focus on identifying administrative and behavioral methods that encourage voters to check their BMD-generated ballots before casting.

The last several years have been difficult for American democracy. A large number of Americans continue to question the overall integrity of our voting systems. Confidence that votes will be accurately counted is the lowest seen in the last 15 years (McCarthy 2020). The 2020 presidential election brought accusations that voting systems had been compromised and election results altered by malicious voting machines. To date, these claims have been rejected by the Department of Justice, the Election Assistance Commission, the courts, election officials, and election experts (Brennan Center for Justice 2020), but voting confidence remains shaken, with only 56 percent of Americans currently expressing confidence in the ability of our voting systems to reflect the will of the voters (Agiesta 2022).

[1] Philip Kortum is a professor in the Department of Psychological Sciences at Rice University. His primary interests are in the development of highly usable systems in the voting and medical domains and in the characterization of measures of usability and usable systems.
[2] Michael Byrne is a professor in the departments of Psychological Sciences and Computer Science at Rice University. His primary interests are usability of technological systems and computational models of human cognition and performance. This includes basic research on cognitive architectures and applied usability testing, particularly in the area of voting.
[3] Chidera Azubike and Laura Roty are students at Texas Tech University and Arizona State University, respectively. During this project, they were National Science Foundation Research Experiences for undergraduate students at Rice University.

This is troubling, particularly since the United States has made a concerted effort to improve elections over the last 20 years. The Florida voting debacle in the 2000 presidential election (Mebane 2004; Wand et al. 2001) led the United States to allocate billions of dollars (Congressional Research Service 2021) to help fix problems with voting systems in the United States. One of the significant outcomes of this funding was the replacement of punch card and lever machines as well as many paper ballot systems with electronic voting systems, known as DREs (direct recording electronic voting devices). Not long after the transition to DREs, voting security experts began to question whether electronic voting machines that had no paper trail could be trusted since there was no way to accurately verify the machine had recorded and counted the votes as they had been cast. From these concerns, a new voting technology, known as the ballot marking device (BMD) was introduced. The main difference between a DRE and a BMD is a BMD does not record the vote electronically, and the paper ballot produced is the only official ballot. The BMD retains many of the desirable characteristics of a DRE, such as accommodating voters with physical disabilities and preventing certain kinds of voting errors from occurring (e.g., stray ballot marks, voting for more than one candidate) while having the additional benefit of having an auditable paper trail of election results.

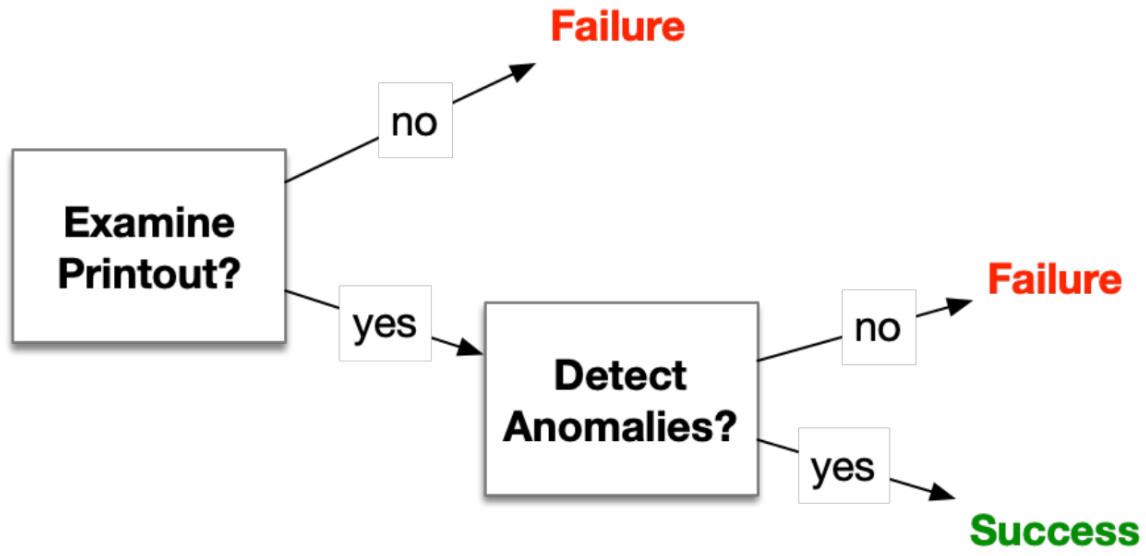
The use of some form of paper ballot in the election process is making a resurgence, and the percentage of jurisdictions having some form of paper record has increased from 71% in 2016 to 88% in 2020 (Verified Voting 2020). Although only 19.6% of registered voters currently live in jurisdictions that vote exclusively with BMDs, there is a strong upward trend in their use, with an 11-fold increase since 2018 (Verified Voting 2020).

As BMD use has increased, some voting experts maintain that these types of voting systems pose an unacceptable security risk to elections (Appel et al. 2020; Stark and Xie 2019). One of the major concerns raised by Appel and his colleagues is that even though a BMD produces a paper record, the BMD itself may be compromised. In the scenario envisioned by these researchers, the ballot marking device would show voters the choices they had made on the screen, but would then alter those choices on the printed ballot. Voters who did not carefully check their printed ballots might be unaware their choices had been altered and the cast paper ballots would not reflect the will of these voters. These concerns have found their way into the U.S. court system. One prominent case in Georgia asked the courts to require a switch to hand-marked ballots but is still unresolved (Huseman 2022).

Much of this concern about the inability of voters to detect changes to their printed paper ballots comes from previous research (Acemyan et al. 2013; Bernhard et al. 2020). Research into review screens on electronic ballots found that those voters also had difficulty detecting changes (Campbell & Byrne 2009; Everett 2007). In each of these studies, the measure of detection was calculated for *all* voters who participated in the study, regardless of whether or not they actually inspected the ballot or review screen for anomalies. The resulting data indicated that voters were generally not successful at detecting these kinds of ballot changes. This lack of success led to a widespread belief that voters are simply incapable of detecting altered selections on their ballots. However, Kortum and Byrne (2022) challenged this by reconceptualizing the problem. They proposed a two-stage model, shown in Figure 1, that treats the choice to examine separately from voters' ability to detect anomalies; the former is instead a prerequisite for the latter. There are, in fact, two different

failure modes. This is different from the way detection rates have been considered in the literature where these two modes were conflated. When these are conflated, the ability of a voter to detect a change is greatly underestimated since detection data is diluted by large numbers of voters who never even examined their ballots and, thus, by definition, could not have detected a change.

Figure 1



A two-stage model of detecting ballot anomalies when voting. If a voter does not examine the ballot, then they, by definition, cannot detect a ballot anomaly. If a voter does check their ballot, they may or may not detect a ballot anomaly.

The results presented by Kortum and Byrne (2022) suggest that voters who did check their ballots were generally quite successful in detecting changes. However, because the experiment was not designed to answer this question directly, there was insufficient statistical power to adequately address the issue.

This current study was designed specifically to answer the question, "Can voters detect changes to their ballots?" and, "To what extent do factors like ballot design and ballot length affect that capability?" In this study, all voters were required to examine their ballot after they voted, so the question of whether voters are cognitively and perceptually capable of detecting changes could be addressed. We are attempting to unpack the "Detect Anomalies?" box in Figure 1.

Of note, this research was *not* designed to answer the question, "*Will* voters check their ballot?" As depicted in Figure 1, this is a fundamentally different question. The importance of this is contingent on the current question. That is, if most voters are essentially unable to detect anomalies even under ideal conditions, it makes little difference whether or not they choose to make the attempt. However, if most voters are able to successfully detect anomalies, this suggests that research efforts should be devoted to determining if there are effective ways of encouraging them to do so.

Method

Participants

This study utilized a total of 64 participants who were eligible to vote in the United States. At the time of the experiment, all participating voters resided in Houston, Texas, and were recruited using advertisements and referrals. In order to qualify for the study, participants were required to be at least 18 years of age, read and speak English, have normal or corrected-to-normal vision, and have normal motor capabilities. Of the 64 total participants, 31 were male and 33 were female. Participants ranged from 18 to 69 years of age, with a median age of 21 years. The study involved a diverse pool of participants, with 28.1 percent identifying as African American, 26.5 percent as Caucasian, 21.9 percent as Hispanic/Latino/Mexican American/Chicano, 18.8 percent as Asian American, 3.1 percent as multicultural, and 1.6 percent as other. Participant education levels reflected similar diversity with 26.7 percent of participants having received either a high school diploma or G.E.D., 48.4 percent reporting some college or an associate degree, 18.7 percent having a bachelor's degree, and 6.2 percent having a graduate degree. All participants were compensated with $25 Amazon gift cards that were emailed to them following the completion of their task. The vast majority of the participants (93.8 percent) had voted at least once on an electronic voting machine, 37.5 percent had utilized paper ballots marked by hand, 3.1 percent had used lever machines, and 6.25 percent had voted with punch cards. Overall, 87.5 percent of participants had voted in at least one national election, and 59.4 percent had participated in local elections.

Experimental Design

This experiment employed a 2 (printed ballot design) x 2 (ballot length) x 2 (number of changes) x 2 (location of changes) between-subjects design.

Printed ballot design: The layout of the electronic ballot was unchanging across conditions; however, the printed paper ballot layout was split between two types. The first ballot was based on the Election Systems & Software (ES&S) design depicted in Figure 2A (Election Systems and Software 2020). The second printed ballot design was modeled after the VSAP system depicted in Figure 2B (L.A. County Registrar-Recorder /County Clerk 2021). These two ballot layouts were chosen with the purpose of determining whether there would be a significant difference in readability between the traditional design (ESS) and one crafted with user-centered design principles (VSAP).

Ballot length: Two ballot lengths were used in the study: a ballot with 40 individual contests and a ballot with five individual contests. These ballots are based on average ballot lengths across all 50 states (Ballotpedia 2018), plus and minus one standard deviation, and then rounded for easier experimental administration.

Number of changes: Two types of ballot selection changes were explored: a single targeted change and multiple changes: two changes for the five-contest ballot and 10 changes for the 40- contest ballot. The one-change condition was set to resemble a targeted attack on a particular contest, for instance, a high-

profile office such as the presidency. The goal of the multiple- change condition was to imitate broader attacks or down-ballot attempts to impact an election.

Location of changes: Two locations of changes were chosen for this study: the beginning part of the ballot (top 25%) or the middle part of the ballot (middle 50%). In the one-change, top-of- ballot condition, the change occurred with the presidential contest. In the middle-of-ballot condition, the change occurred in a random contest in the middle 50% of the ballot. For the multiple-changes, top-of-ballot condition, the changes included the presidential contest along with other random contests in the top 25% of the ballot. In the multiple-changes, middle-of- ballot condition, all changes occurred with random contests in the middle 50 percent of the ballot.

Materials

To better replicate experiences with an electronic voting machine, an 18-inch computer touchscreen tablet was utilized. The screen was installed into a frame box that angled and positioned the touchscreen to better resemble touch-screen voting machines. This setup was surrounded by voting-themed privacy screens to make the system appear as it might in a typical polling center. Qualtrics was employed to craft the electronic ballot and overall ballot interface design. This interface was designed to be similar to the VSAP system depicted in Figure 2.

This study utilized the same names on the ballots that Kortum, Byrne, and Whitmore (2020) used in their study. While previous studies (Acemyan, Kortum and Payne 2013; Campbell and Byrne 2009; Everett 2007) have used computer-generated names on the ballots, this study used widely recognizable names that are apolitical -- such as Indiana Jones, Thomas Edison, and Amelia Earhart -- so that participants might more easily remember these names when looking for ballot anomalies, as they would in an actual voting situation. This may still retain some of the important beneficial characteristics of using fake names, such as allowing participants to keep their political preferences private and not putting them in a situation where they might have to vote in a race where they hold an opinion (Quesenbery and Chisnell, 2009).

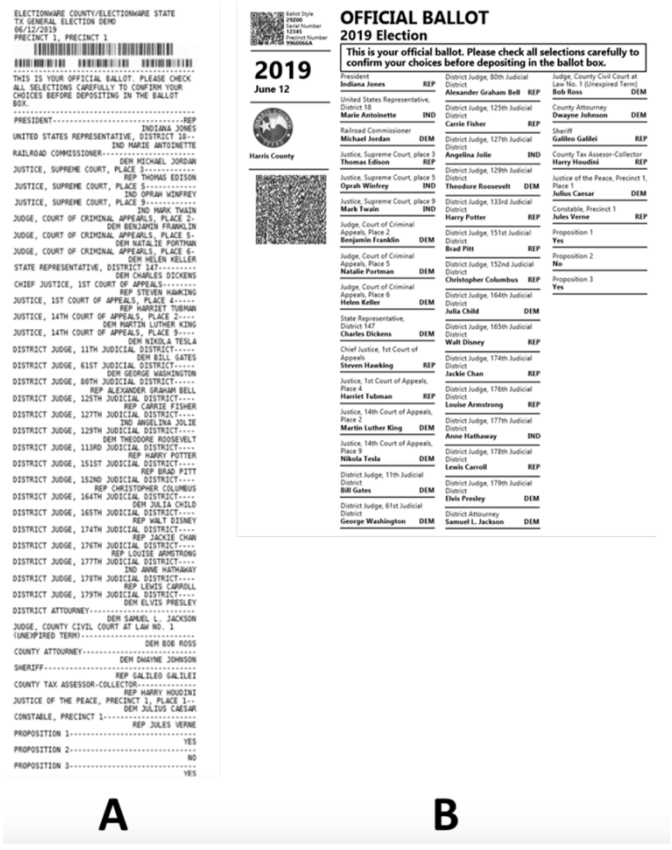
Participants did not have to pick candidates from these highly recognizable names, but rather were given prepared slates of candidates they were to select, in order to have greater control over the experiment, (e.g., Campbell, Tossell, Byrne, and Kortum 2014; Greene, Byrne, and Everett 2006; Redish, Chisnell, Laskowski, and Lowry 2010). Participants were allowed to use their slates throughout the study.

A Wizard-of-Oz protocol was utilized for the ballot printing process. A Wizard-of-Oz protocol (Dahlbäck, 1993) means that participants are led to believe they are using a fully realized device, while, in fact, the experimenters are manipulating certain aspects of the machine unbeknownst to participants. In the experiment, voters believed they were printing their ballots when they clicked the "PRINT" button, when, in truth, the experimenters were controlling the printing process in order to control the number of ballot changes presented to the voters. Because the ballots were pre-generated, how closely participants followed their slates was not measured.

Procedure

Participants were first instructed to fill out the date, their names, and their emails to ensure they received their compensation following the completion of their tasks. Following this, participants reviewed and completed an Institutional Review Board (IRB)-approved consent form. Next, participants were directed toward the voting machine and given a slate that they were instructed to use as a guide with which to vote and given verbal instructions to check their printed ballot when they were done voting. Each participant was randomly assigned a condition that decided the type of ballot they would receive. Before participants voted, they were told, "After you vote, the voting machine will produce a paper ballot. Your job is to identify anywhere where the paper ballot produced by the voting machine differs from how you voted." Once participants had finished making their selections, they then clicked the "PRINT" button, and the experimenter simultaneously printed the manipulated ballot. Participants were then told to determine if there were any discrepancies between their intended candidates and the candidates on their ballots with the instruction, "The next thing we'll have you do is check the printed ballot for errors. On the ballot, circle/highlight any errors you find. There may or may not be any errors on your ballot." Following this, participants then completed a survey that covered information concerning their opinion on the overall usability of the voting system, their voting history, and demographics.

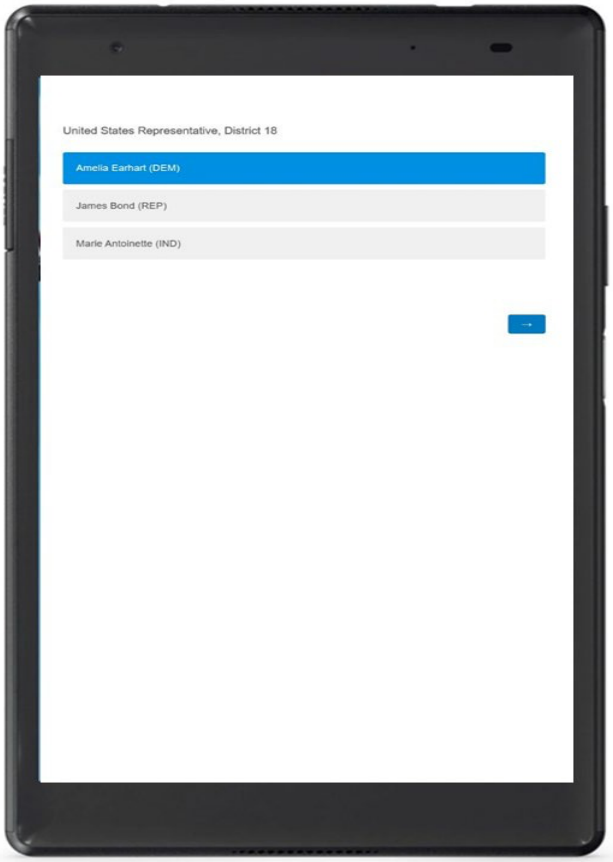
Figure 2



(A) ES&S-style printed ballot form.

(B) VSAP-style printed ballot form. Both ballots show the long ballot with checking instructions.

Figure 3



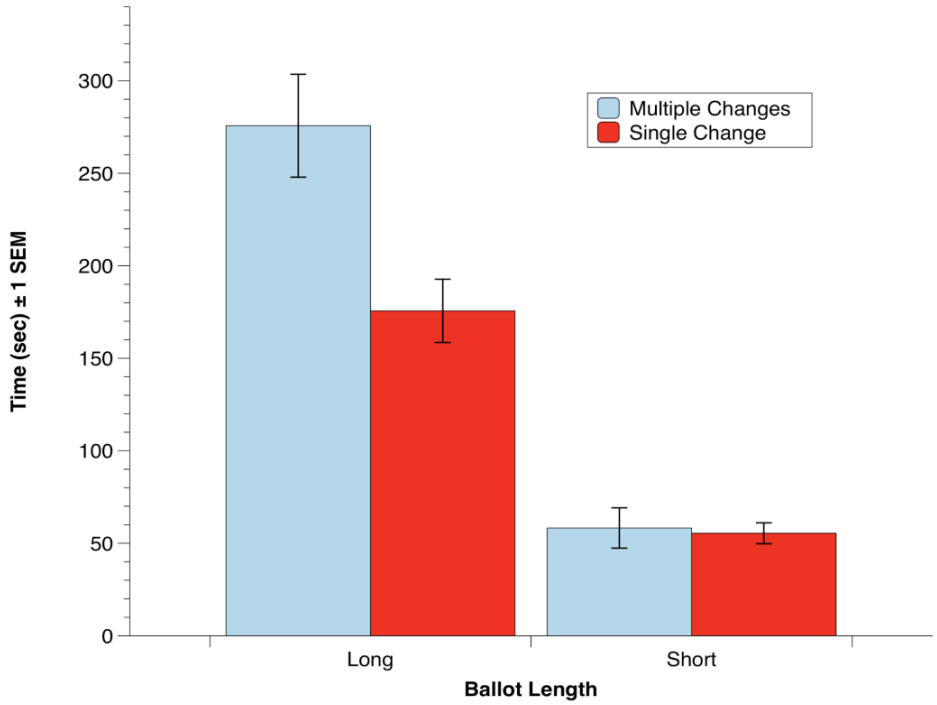
A representative vote selection screen on the ballot marking device.

Results

Overall accuracy was exceptionally high. Subjects saw 1,440 total contests, and of those 1,440, there were a total of four errors, so total accuracy was 99.8 percent. Of those errors, three were misses, where a candidate had been changed, and the subject did not flag it. One error was a false alarm, where a candidate was not changed, and the subject flagged it as having been changed. When averaged across subjects, this is 99.6 percent accuracy.

As a result of the near-zero variability in performance, none of the independent variables had any effect on detection performance. That is, subjects were able to perform with near-perfect accuracy regardless of ballot length, ballot type, number of flipped races, and location of flipped races. Detection performance was extremely robust.

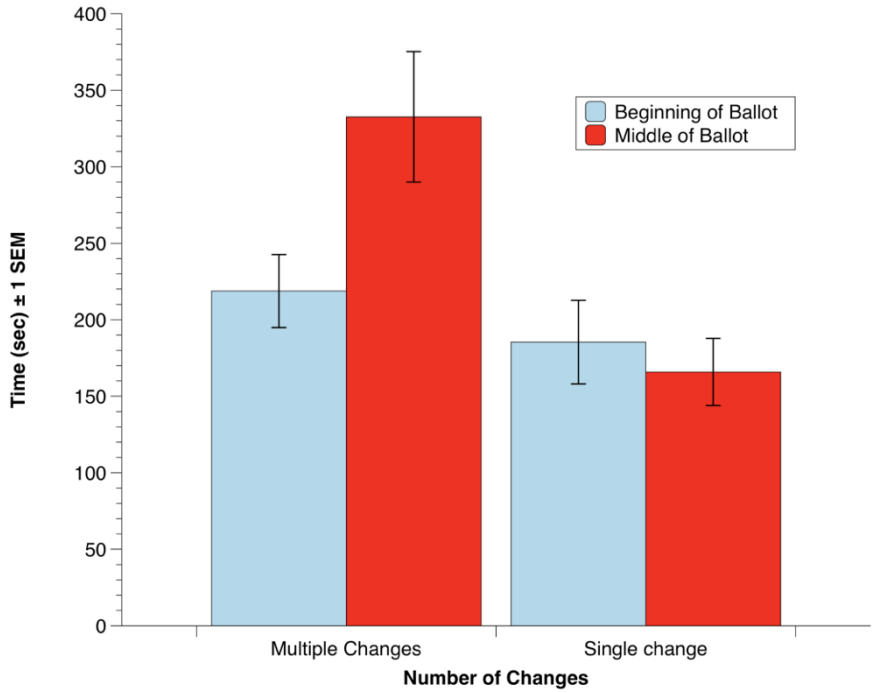
Figure 4



Time to review the ballot as a function of ballot length (short equals five contests, long equals 40 contests) and number of flipped votes

The time taken to perform the task was also recorded, and here there was variability. Figure 4 presents mean time to review the ballot as a function of ballot length and the number of changes made. Not surprisingly, longer ballots took longer to review. The difference between long and short ballots was considerable: main effect of ballot length $F(1, 48) = 96.12$, $MSE = 4745$, $p < .001$, Cohen's $f = 1.42$. Note that the effect of ballot length was quite large, not only in the statistical sense, but in practical terms as well. The overall average time for a five-race ballot was 57 seconds, and for 40-race ballots, it was 226 seconds, almost four minutes. The nearly perfect accuracy and increased time for longer ballots clearly indicates that people are able to invest time in order to maintain high levels of performance. People can do this task highly accurately if they take the time to do so.

Figure 5



Ballot review time for long ballots as a function of the number of changes and location of the changes.

There was also a three-way interaction between ballot length, number of changes, and location of changes, $F(1, 48) = 4.66$, $MSE = 4745$, $p = .036$, Cohen's $f = 0.31$. Three-way interactions can be difficult to interpret, but this one is straightforward. For short ballots, time taken was insensitive to the other independent variables. However, for long ballots, there was a two-way interaction between number of changes and change location, as shown in Figure 5: $F(1, 24) = 4.32$, $MSE = 8237$, $p = .048$, Cohen's $f = 0.42$. This interaction is essentially driven by the fact that the time for multiple changes in the middle of the ballot was longer than the other three conditions.

It is not entirely clear what this result means in practical terms. The fact that changes in the middle of the ballot take longer to detect suggests that when voters review, they start at the top of the ballot, but that would imply that finding a single error mid-ballot should take longer than finding a single error at the top of the ballot, which was not what was found. Further research will be necessary to clarify the basis for this effect.

Discussion

Critics of BMDs have claimed that BMDs are, in principle, insecure in part because voters are incapable of accurately detecting modifications of their choices. However, there is a critical difference between cannot and do not. Prior research did not carefully differentiate between these. As more recent research has shown, the low detection rate shown in early research was actually due to the way

in which the data were being analyzed. It is clear from the current results and other recent research that there are no intrinsic perceptual or cognitive limitations that cause voters to perform poorly at this task. Rather, provided the right direction and support, voters can be almost perfect detectors of changes in ballots. This has important implications for research on ballot marking devices, and suggests that much of the human security necessary to catch errors is already in place, if it can be effectively utilized.

The other factor that makes this result so striking is that there was nothing particularly remarkable about the pool of voters. These were not people who were recruited based on the basis of any kind of relevant work or life experience, such as proofreading or auditing, and they were given no special training. Nor was there any evidence that any demographic variable (e.g., level of education) had any impact on detection performance. Finally, participants were given no incentive based on accuracy; all participants were compensated the same, regardless of how well they did at detection. While it is impossible to guarantee this high of a level of performance from all voters, the fact that this otherwise unremarkable sample yielded such a strong result suggests that this phenomenon is highly robust.

There are some significant limitations with regards to this study that should be noted. First, the data presented here do not eliminate concerns that BMDs are susceptible to malicious vote-flipping attacks. While this research demonstrated that voters *can* detect changes, there is no guarantee they *will* take the time to carefully check their ballot, as was done in this experiment. Besides requiring voters to check their ballots, several other experimental conditions likely facilitated anomaly detection. For example, voters were given a printed list of whom they were supposed to vote for in this experiment. This almost certainly increased detection performance because it circumvents potential memory failures on the part of voters. Further, simply being aware that the experimenters were concerned about checking the ballot likely led voters to apply additional vigilance to their review task. The authors are also aware of the time costs associated with everyone carefully checking their ballot raises important issues, particularly with regard to polling station capacity and voter flow through. The authors in no way intend to suggest that the gap between *can* and *will* is small or that this is a solved problem. Nevertheless, the results show that high detection rates are possible, which is a novel finding, and demonstrate what might be possible in a well-designed system with motivated voters and poll workers.

The focus now moves away from voters' capabilities toward how to best motivate and incentivize voters to check their ballots before depositing them in the ballot box. This is a more straightforward administrative question about providing opportunities for the voter and creating processes that encourage this important behavior. The challenge is now to research and devise these effective administrative processes that support the voters in this critical task. What might these administrative processes look like?

<u>Signage inside the polling place</u>

The most obvious place to start is by simply alerting voters that the paper ballot is the ballot of record, and they need to carefully check it before depositing it into the ballot box. These admonitions could take place as voters enter the polls, on the ballots themselves, and as reminders on the BMD screens.

Results from Bernhard (2020) showed limited effectiveness in the use of these warnings, but a systematic exploration of warning language and placement might find a more effective combination.

Public service/social media campaigns prior to the election

A similar strategy is the use of public service announcements (PSAs) and social media campaigns prior to and on the day of the election to tell voters they are the last line of security defense in the election and checking their ballots is the best way to help ensure a secure election. There is already some evidence that PSAs and social media can alter voter behavior (Burgess et al., 2000; De Rooij et al., 2017).

Ballot checking stations

A more significant change would be the implementation of ballot-checking stations. Here, the physical layout of the polling station would be changed so that after voters receive their printed ballot from the BMD they would then proceed to a specific ballot-checking station. This station would allow voters the opportunity to examine their ballots carefully, without the pressure of having other voters waiting for the voting machine to be freed up, and it would formalize the process of checking the ballot.

Gamification of the process

If these standard administrative steps prove ineffective in shaping voter behavior, more radical approaches might need to be considered. For example, gamification (Deterding et al., 2011) elements could be built into the system that would promote voters spending more time looking at their ballots, and rewarding that checking behavior. Gamification has proven effective in other domains, such as health and consumer business operations (Pereira et al., 2014; Robsin et al., 2016) and public service (Asquer, 2013).

Each of these scenarios should be investigated in future research. Since these changes would largely be administrative, enhanced security could be obtained with minimal additional expense.

Finally, we remain in agreement with critics of BMDs that it should not necessarily be the voters who bear full responsibility for voting system security. Voters should be encouraged to bring a list of candidates who they would like to vote for to the voting booth and thoroughly check their ballots to protect themselves from their own potential mistakes, regardless of security issues.

While having thorough voters is desirable, it should not be the only defense. Use of live audits (Wallach 2020), where professional auditors check the security of voting machines as the election is running by voting and validating (but not casting) test ballots, should be encouraged. While concerns have been raised about the utility of live audits (e.g., Stark and Xie 2022), more rigorous checking by different parties can only help. Multiple layers of defense are critical to ensuring election integrity.

Conclusion

The data presented in this paper show that, with proper direction, voters can be near-perfect detectors of ballot changes on printed paper ballots after voting with a BMD. This finding has significant implications for the voting community as BMD use continues to grow. The key now is to identify

administrative and behavioral methods that will prompt and encourage voters to check their BMD-generated ballots before dropping them in the ballot box.

Acknowledgments

This work was supported in part by NSF grant numbers SMA-1853936 and SMA-1559393 and in part by a grant from the William and Flora Hewlett Foundation through the MIT Election Lab. The views and conclusions contained herein are those of the authors and should not be interpreted as representing the official policies or endorsements, either expressed or implied, of the NSF, the U.S. government, the William and Flora Hewlett Foundation, MIT, or any other organization.

References

Acemyan, C. Z., Kortum, P., & Payne, D. (2013). Do Voters Really Fail to Detect Changes to Their Ballots? An Investigation of Ballot Type on Voter Error Detection. In *Proceedings of the Human Factors and Ergonomics Society Annual Meeting, 57*(1), pp. 1405-1409). Sage CA: Los Angeles, CA: SAGE Publications.

Agiesta, J. (2022). *CNN Poll: A growing number of people lack confidence in American elections.*

Appel, A. W., DeMillo, R. A., & Stark, P. B. (2020). Ballot-marking devices cannot ensure the will of the voters. *Election Law Journal: Rules, Politics, and Policy, 19*(3), 432-450.

Asquer, A. (2013). Not just videogames: Gamification and its potential application to public services. In *Digital public administration and E-government in developing nations: Policy and practice* (pp. 146-165). IGI Global.

Bernhard, M., McDonald, A., Meng, H., Hwa, J., Bajaj, N., Chang, K., & Halderman, J. A. (2020). Can voters detect malicious manipulation of ballot marking devices?. In *2020 IEEE Symposium on Security and Privacy (SP)* (pp. 679-694). IEEE.

Ballotpedia (2018). Official Sample Ballots, 2018. Retrieved from: https://ballotpedia.org/Official_sample_ballots,_2018

Brennan Center for Justice (2020). *It's Official: The Election Was Secure.* https://www.brennancenter.org/our-work/research-reports/its-official-election-was-secure

Burgess, D., Haney, B., Snyder, M., Sullivan, J. L., & Transue, J. E. (2000). Rocking the vote: Using personalized messages to motivate voting among young adults. *Public Opinion Quarterly, 64*(1), 29-52.

Campbell, B. A., & Byrne, M. D. (2009). Now do voters notice review screen anomalies? A look at voting system usability. In *Proceedings of the Electronic Voting Technology Workshop/Workshop on Trustworthy Elections (EVT/WOTE '09)*. Berkeley, CA: USENIX Association.

Congressional Research Service (2021). *The Help America Vote Act of 2002 (HAVA): Overview and Ongoing Role in Election Administration Policy*. https://crsreports.congress.gov/product/pdf/R/R46949

Campbell, B. A., Tossell, C. C., Byrne, M. D., & Kortum, P. (2014). Toward more usable electronic voting: Testing the usability of a smartphone voting system. *Human Factors, 56*(5), 973-985.

Dahlbäck, N., Jönsson, A., & Ahrenberg, L. (1993). Wizard of Oz studies—why and how. Knowledge-based systems, 6(4), 258-266.

De Rooij, E. A., & Green, D. P. (2017). Radio public service announcements and voter participation among Native Americans: Evidence from two field experiments. *Political Behavior, 39*(2), 327-346.

Deterding, S., Sicart, M., Nacke, L., O'Hara, K., & Dixon, D. (2011). Gamification. using game-design elements in non-gaming contexts. In *CHI'11 extended abstracts on human factors in computing systems* (pp. 2425-2428).

Election Systems and Software (2020). *ExpressVote XL Full-Face Universal Voting System.* https://www.essvote.com/storage/2020/12/ExpressVoteXL-Security-Bulletin.pdf

Everett, S. P. (2007). *The Usability of Electronic Voting Machines and How Votes Can Be Changed Without Detection* (Doctoral dissertation). Rice University, Houston, TX.

Greene, K. K., Byrne, M. D., & Everett, S. P. (2006). A Comparison of Usability Between Voting Methods. In *Proceedings of the 2006 USENIX/ACCURATE Electronic Voting Technology Workshop.*

Huseman, J. (2022). *Why the debate over a computer scientist's Dominion report is so heated* https://www.votebeat.org/2022/3/2/22959221/alex-halderman-dominion-report-georgia-bmd- lawsuit

Kortum, P., Byrne, M. D., & Whitmore, J. (2021). Voter Verification of Ballot Marking Device Ballots Is a Two-Part Question: Can They? Mostly, They Can. Do They? Mostly, They Don't. *Election Law Journal: Rules, Politics, and Policy, 20*(3), 243-253.

LA County Registrar-Recorder/County Clerk (2021). *VSAP Voting Solutions for All People Final Report.* https://lavote.gov/docs/rrcc/media/VSAP-Report_FINAL.pdf

McCarthy, J. (2020). *Confidence in Accuracy of U.S. Election Matches Record Low*. Gallup. https://news.gallup.com/poll/321665/confidence-accuracy-election-matches-record-low.aspx

Mebane, W. R. (2004). The wrong man is president! Overvotes in the 2000 presidential election in Florida. *Perspectives on Politics, 2*(3), 525-535.

Pereira, P., Duarte, E., Rebelo, F., & Noriega, P. (2014). A review of gamification for health- related contexts. In *International conference of design, user experience, and usability* (pp. 742-753). Springer, Cham.

Quesenbery, W., & Chisnell, D. (2009). *Testing ballots: Real names or fictional? Direct how to vote or not.* Center for Civic Design. Retrieved from https://civicdesign.org/testing-ballots-real-names-or-fictional-direct-how-to-vote-or-not/

Redish, J. G., Chisnell, D. E., Laskowski, S. J., & Lowry, S. (2010). Plain language makes a difference when people vote. *Journal of Usability Studies, 5*(3), 81-103.

Robson, K., Plangger, K., Kietzmann, J. H., McCarthy, I., & Pitt, L. (2016). Game on: Engaging customers and employees through gamification. *Business Horizons, 59*(1), 29-36.

Stark, P. B., & Xie, R. (2019). *Testing Cannot Tell Whether Ballot-Marking Devices Alter Election Outcomes*. arXiv preprint arXiv:1908.08144.

Stark, P. B., & Xie, R. (2022). They may look and look, yet not see: BMDs cannot be tested adequately. arXiv preprint https://arxiv.org/pdf/1908.08144.pdf

Verified Voting (2020). *Verified Voting Annual Report*. https://verifiedvoting.org/wp-content/uploads/2021/02/Verified-Voting-Annual-Report-2020.pdf

Wallach, D. S. (2020). On the security of ballot marking devices. *Ohio State Technical Law Journal, 16*, 558-586.

Wand, J. N., Shotts, K. W., Sekhon, J. S., Mebane, W. R., Herron, M. C., & Brady, H. E. (2001). The butterfly did it: The aberrant vote for Buchanan in Palm Beach County, Florida. *American Political Science Review, 95*(4), 793-810.

Reflections on "Can Voters Detect Errors on Their Printed Ballots? Absolutely."

Brian Leach, *South Carolina State Election Commission*[1]

The topic of voter error detection on printed ballots is highly relevant for election officials as it directly pertains to the security and reliability of ballot marking devices (BMDs), which are increasingly employed in elections. This study's focus aligns with current concerns regarding election integrity, particularly in light of ongoing scrutiny and public debates surrounding electronic voting systems. Understanding whether voters can accurately identify discrepancies on their printed ballots after using BMDs is crucial for developing effective election practices that bolster voter confidence in election outcomes.

The findings from this research offer considerable value to election officials, as they indicate voters can detect changes on printed ballots with near-perfect accuracy when guided to review them. This capability suggests that officials could improve overall election accuracy by implementing straightforward interventions, such as enhanced signage or verbal reminders, to prompt voters to check their ballots. However, the study's results also reveal a potential gap between a voter's capability to detect errors and the likelihood they will perform such checks independently. This highlights the importance of practical, behavioral interventions to make verification a standard part of the voting process.

One limitation of the study is that it created an idealized scenario requiring participants to check their ballots, which may not fully capture real-world voter behavior. This focus on participants already primed to detect errors could be seen as a form of selective reporting, or cherry-picking, as it may lead to overestimating detection rates outside the controlled environment. Factors such as time constraints, distractions, or voter fatigue – all common issues in actual polling stations – could reduce the likelihood that voters would review their ballots equally attentively. Therefore, while the study provides valuable insights, its application may be limited without further exploration of how these variables impact error detection in a general election setting.

From a practical perspective, the study could expand by examining additional variables that influence ballot verification in real-world settings, including the impact of polling station crowding, time pressures, and overall voter fatigue on error detection. By addressing these real-world conditions, the study could inform a broader range of interventions to encourage ballot verification among the general voting population. This expanded scope would give election officials more comprehensive data on improving voter verification processes in various voting contexts.

Future research could be directed towards examining strategies to promote ballot verification behavior among voters – strategies such as educational campaigns, strategic signage in polling stations, or technology-assisted prompts that remind voters to review their ballots. Additionally, studies on the role of poll workers in encouraging ballot verification or using automatic error alerts on BMD screens

[1] Brian Leach is information technology manager for the South Carolina State Election Commission.

could further enhance election security by promoting error detection as a routine part of the voting process. Research focused on such supportive interventions could contribute significantly to developing more secure, accurate, and user-friendly election systems that facilitate voter participation in safeguarding election integrity. Future research could also include studies on how much trust voters put into what is printed on BMD ballots. Such topics could include whether voters trust that the barcode on a ballot accurately represents their vote. Another possible topic is whether or not social media posts related to supposed or perceived ballot errors will elicit more significant verification efforts or cause voters to claim ballot errors that did not exist.

Building Confidence Through Ballot Review: An Election Administrator's Perspective

Remi Garza, *Cameron County, Texas*[1]

As with all things in elections, it is the results that count. The same is true for "Can Voters Detect Errors on Their Printed Ballots? Absolutely." The pervasiveness of suspicion in our voting system continues despite assurances from election administrators and professionals across the country. What gets overlooked in the process is the role of the voter in election integrity. The questions raised and answered in this study refocus attention to the part that the voter plays in the process. Whether using hand-marked ballots or a ballot marking device (BMD), the ultimate responsibility of making sure the ballot is cast as intended falls on the voter before placing it in a ballot box or precinct tabulator. It follows that strongly encouraging a review of the ballot, which is shown to be highly effective in this study, would give the voter confidence that his or her ballot will be counted as intended.

One of the advantages of BMD over hand-marked ballots is correctly identified by this study: "preventing certain kinds of voting errors … – e.g., stray ballot marks or voting for more than one candidate." If a ballot is returned by the tabulator to a voter due to errors of these types, the voter can either correct the ballot or cast it with the questioned markings, which may or may not reflect the voter's true intent. Subsequent hand counts, either by a candidate-requested recount or a post-election audit, can provide differences in the final counts. These slight differences occur because the voting errors may be misinterpreted and resolved by a different standard applied by someone other than the voter. Ballot marking devices reduce the frequency of these differences in interpreting voters' intent, and the counts are less likely to differ upon hand counting.

The question of the ballot marking device changing voters' choices, or flipping votes, before or after they print their official ballot does not appear to be fading away. The study approaches the errors from the perspective of malicious intent. The changes occur after the voter's choices were made on the screen and when the official ballot was printed. Election administrators more frequently experience screen calibration errors or screen sensitivity that result in accusations of intentional vote flipping. This device failure does not appear to allow the voter to make his or her choice on screen during the initial selection as expected. Even though voters are able to correct the selection before printing the ballot for tabulation, their suspicion is confirmed. In either case, a ballot review before or after printing and confirmation of voters' selections fails to overcome this experience.

The ability to cite academic data will go a long way to address issues raised by the public on the integrity of the voting systems used throughout the nation. The suggested administrative steps of encouraging ballot review at all stages in the process by the voter are well taken. The single most reliable reviewer of a ballot is the voter, as demonstrated by the study. It maintains privacy and opportunity for correction before the ballot is cast. The suggested administrative processes of signage, public information campaigns, and the real-time logic and accuracy testing – classified here as audits

[1] Remi Garza is elections administrator for Cameron County, Texas.

– will help encourage confidence. The manner of messaging would be important, as we always have to reflect our confidence in the integrity of the voting system while giving the voters the tools to build their own.

Purchasing Elections: How Election Services Influence the Voting Experience

Nadine Suzanne Gibson, *University of North Carolina Wilmington*[1]

Elections are one of the most complex tasks governments are asked to per- form (Hall 20l8). Modern election administration can be described as a com- plex network composed of public officials, nonprofit organizations, and private actors (Hale and Slaton 2008). The United States utilizes a hyper-federalized election administration system due to the "blend of national, state, and local responsibility" (Ewald 2009, p.3). Theoretically, this lack of uniformity should lead to policy improvement because jurisdictions can act as laboratories of democracy.

In reality, there is little sharing of empirical data and scientific research among jurisdictions. This makes sense when we consider that localities (often with little resources) are responsible for the vast majority of election conduct. Consequentially, this leaves localities footing the bill of major election expenditures. Local election officials, those primarily in charge of elections, are faced with many institutional and budgetary restrictions with little concrete evidence for what will actually work the best.

This study sheds light on one of the least-studied aspect of election administration—election service vendors (Gibson 2020). Specifically, whether election services vendors and the services they provide help states and localities con- duct high-quality elections in the eyes of voters? Unique to this study is the investigation of the impact of four broad categories of vendor service packages -- election support, project management, training, and voter outreach programs—on individual-level election performance indicators of the voting experience and confidence in elections.

The results of regression analyses on categorical indicators of election performance and voter confidence on cross-sectional survey data from the 20l6 Survey of the Performance of American Elections merged with county-level contract data for the acquisition of voting systems present little evidence supporting the notion that services from the election services vendors generate more positive election experiences for in-person voters. However, these results do not present evidence in favor of an alternative conclusion that vendors' services are detrimental. Depending on the availability of resources, the choice to purchase services from the private sector may be a convenient alternative to relying completely on the public sector.

More Than Just Voting Machines

The purchasing of voting equipment is more nuanced than a simple payment for the acquisition of voting machines. Rather, not only is voting equipment purchased but so are services provided by the vendors to maintain the equipment. Unlike other industries, local election officials are not usually able to mix and match products from different manufacturers as the unit for certification is the voting

[1] Nadine Suzanne Gibson is an assistant professor at the University of North Carolina Wilmington.

system as a whole.[2]

Spending on these services is no small matter. Roughly one-third of county- level election expenditures are spent on election services (Gibson 2020). De- pending on the resources available, localities may opt to purchase a variety of services provided by election equipment vendors. It should be noted that private sector election services are not exclusively provided by major election equipment. In actuality, election equipment manufacturers as well as value- added resellers offer election services to localities. The majority of localities in the United States purchase equipment and services from the former, while some value-added resellers have regional popularity. In addition to private sector vendors, election services are not exclusive to the private sector. Alternatively, localities can provide these services in-house or by non-profit organizations such as the Election Center. Regardless of the vendor, services for training, Election Day support, ballot production, and project management are typically available for purchase.

The following are the election services investigated in this study:

Election Day Support. As a preventative measure, localities may opt to purchase election support on the date of the election in the form of a technician on site or through devoted communication channels, i.e., telephone.

Voter Outreach. Localities may purchase vendor-created materials—such as posters with instructions, social media campaigns, online demonstrations, and pocket guides—aimed at increasing the public's understanding of how to use voting equipment.

Project Management. When localities desire staff with expertise at the highest level, vendors offer services to help plan and conduct elections on behalf of jurisdictions. Specifically, project managers are appointed to help with ballot programming, logic and accuracy testing, training, and equipment administration.

Training. Election services vendors also provide courses and training sessions for local election officials and poll workers. These sessions are designed to teach election personnel about the voting equipment and its proper operation as well as how to troubleshoot potential problems. These training programs tend to focus on preparing election personnel in providing their own continuous support distinct from the vendor.

[2] In the rare instances of localities using products from different vendors, they are for vote-by-phone systems for ADA-accessible voters and systems using independent tabulation systems for absentee and in-person voting.

Theoretical Framework

The relationship motivating this analysis is that of election services vendors and state and local election administration agencies. This relationship has many parallels to a supplier-customer relationship. By framing the election services vendor-election administrative agency relationship as a supplier-customer relationship, we can better understand how election services vendors create value for state and local election administration agencies. As previously mentioned, election services vendors provide a variety of services -- such as voter outreach, training, election support, and project management -- aimed at improving state and local election officials' ability to provide high-quality elections.

An important wrinkle in understanding the dynamics of this relationship is conceptualizing the election services vendors/suppliers as having adopted a service business logic. According to Grönroos and Ravald (20ll, p.24l) "a service logic means that a supplier does not provide resources for the customers' use only, but instead, it provides support to its customers' business processes through value-supporting ways of assisting the customers' practices relevant to their business." In terms of value creation, firms that adopt a service business logic facilitate the value-generating process of their customers (Grönroos 2008).

A classic example of a firm that adopts a service business logic in the manufacturing industry is a call center. Call centers facilitate customers' efficient provision of information to users. Given the service business logic framework de- scribed by Grönroos and Ravald (20ll) and Grönroos (2008), the value created by call centers is a function of its ability to increase the operational efficiency of its customers' business practices. In this case, the call center is also a co-creator of value because it serves the customer's business by extending the service offerings to include informational resources for users.

What makes the service business logic lens useful for understanding the relationship between election services vendors and election administration agencies is its holistic approach to understanding value creation. Grönroos (2008 p.303) articulates value created by service businesses as whether their customers "are or feel better off than before" following the use of the supplied services. This definition is intentionally vague because the concept of value is difficult to quantify. Even in financial terms, the concept of value can mean a multitude of metrics, i.e., profits, cost-saving, market share. Value can also be measured using attitudinal metrics such as satisfaction, trust, or ease of use. Given the loosely defined nature of value, this study extends its meaning to include public value.

High-Quality Elections as a Public Value

Since election administration is a function of the public sector, the value created by election administration agencies is in line with the public value theory scholarship in public administration. Benington (20ll p.2) notes the conceptualization of the value generated from public services as distinct from private value offers a "clearer conceptual framework" for judging outcomes in the public sector. Moore (20l4, p.468) defines public value as "individually held values that focus on the welfare and just treatment of others" and "particular values that are articulated and embraced by a

polity working through the (more or less satisfactory) processes of democratic deliberation to guide the use of the collectively owned assets of the democratic state". Bozeman (2007 p.l3) provides an alternative definition of public values as:

> "A society's "public values" are those providing normative consensus about (a) the rights, benefits, and prerogatives to which citizens should (and should not) be entitled; (b) the obligations of citizens to society, the state, and one another; and (c) the principles on which governments and policies should be based" (Bozeman 2007, p.l3).

In a meta-analysis of competing definitions of public value, Rutgers (20l5) finds the term public value to be a pantheon concept for which there is "no identifiable singular set of characteristics for all public values." Despite the lack of a consensus in the public value theory literature in defining what constitutes a public value, the delivery of high-quality elections is arguably a public value in a well-functioning democracy.

This study posits that election services vendors facilitate state and local election administration agencies in the creation of public value in the form of high- quality elections. The delivery of high-quality voting experiences and fostering feelings of trust in the electoral system are ways in which election administrators create public value. In other words, a pleasant and enjoyable voting experience translates to value in the mind of the voter.

Data and Method

When it comes to measuring public value, attention is generally focused on performance, service, quality, real outcomes, and trust (Rhodes R. A. W. 2007). Given that the study of election administration is still quite underdeveloped, the scholarship has not yet yielded a single metric or set of metrics for judging election administration scholarship for evaluating success in election administration. Instead, this study examines four commonly used metrics -- wait time in line, polling place performance, poll-worker performance, and voter confidence -- for assessing the performance of election administration in the United States.

The distributions and coding schemes of these variables are presented in Table l. Due to the quasi-complete separation of the data in sparsely populated categories, the levels of the dependent variable expressing the most negative ratings were collapsed.

Polling Place and Poll Worker Performance

Integral to the Election Day experience are poll workers. Interactions between poll workers and voters at the polling place have an independent effect, from overall trust in government, on confidence in elections. Hall, Monson and Patterson (2009) argue that poll workers should be thought of as street-level bureaucrats due to the amount of discretion they have in the polling place. In their examination of voter and poll worker interaction, higher evaluations of poll workers is a statistically significant predictor of higher overall confidence in the electoral process. In fact, Gronke (20l4) finds poll-worker performance to be the most influential predictor in modeling voter confidence.

Table 1: Frequency Distributions of Dependent Variables: Polling Place Performance, Poll Worker Performance, Line Wait Time, and Confidence in Vote Counted as Cast.

Variable	Item Text	Levels	%	N
Polling Place Performance	How well were things run at the polling place where you voted?	1. Very well- I did not see any problems at the polling place.	84.33%	1345
		2. Okay- I saw some minor problems, but nothing that interfered with people voting.	13.92%	222
		3. Not well- I saw some minor problems that affected the ability of a few people to vote.	1.32%	21
		4. Terrible- I saw some major problems that affected the ability of many people to vote.	0.44%	7
Poll-Worker Performance	Please rate the job performance of the poll workers at the polling place where you voted.	1. Excellent	73.56%	1177
		2. Good	24.06%	385
		3. Fair	2.19%	35
		4. Poor	0.20%	3
Wait Time in Line	Approximately, how long did you have to wait in line to vote?	1. Not at all	44.60%	741
		2. Less than 10 minutes	36.04%	577
		3. 10-30 minutes	13.37%	214
		4. 31minutes- 1 hour	4.62%	74
		5. More than an hour	1.37%	22
Confidence in Vote Counted as Cast	How confident are you that your vote in the General Election was counted as you intended?	1. Very confident	74.22%	1163
		2. Somewhat confident	21.76%	341
		3. Not too confident	2.74%	43
		4. Not at all confident	1.28%	20

Note: *Italicized* levels were collapsed into the adjacent level.
Source: Survey of the Performance of American Elections, 2016

In a survey of quantitative election performance metrics, Alvarez, Atkeson, and Hall (2013) note the importance of gauging voter perceptions of poll workers because these items tend to capture an overall summary of voter experiences. This article will examine a direct assessment of poll-worker performance as well as another metric for judging the voting experience: polling place performance. Polling place performance is more accurately described as a more global indicator of polling place operations (Stein and Vonnahme 2014).[3] Distinct from poll worker performance ratings, polling place performance can be a function of other aspects of the voting experience such as lines, polling place location, and time of day.

Lines

As lines are a given for a substantial number of voters year after year (Stewart 2013), wait time in line is included as part of evaluations of the voting experience. It is generally thought "long lines at polling stations are a visible indication that something is wrong" (Spencer and Markovits 2010, p.3). Levitt (2013, p.470) equates long lines at polling places as a "national embarrassment ... We should expect that a baseline attribute of responsible government is the capacity to accommodate its own public's desire to participate in its foundational constituent moment." Unfortunately, understanding of what causes long lines is mostly anecdotal (Stewart 2013).

To rectify this gap in our understanding, election surveys such as the Survey of the Performance of American Elections (SPAE) have included survey items gauging polling place line length. As it cannot be expected for voters to know their exact wait time or remember the exact number of minutes they waited in line when they are polled, the most common measurement strategy is to ask voters to report the interval of within which they estimate their wait time. The levels of the variable used in this study, wait time in line, is described in Table l.

Confidence Vote Counted as Cast

A number of scholars have stressed the importance of making the conceptual distinction between confidence in the electoral process and overall trust in government (Atkeson and Saunders 2007). Confidence in the electoral process focuses on procedures of democracy (Atkeson and Saunders 2007). Holbert, LaMarre, and Landreville (2009 p.l56) define electoral procedural fairness as "the degree to which you feel your own vote was counted accurately in an election." Therefore, the final dependent variable examined in this study is voter confidence, more specifically, "confidence in your vote counted as cast." Atkeson and Saunders (2007) advocate for the use of a measure along the lines of "whether a voter believes her vote will actually be counted as intended" for measuring confidence in the electoral process, generally referred to as "voter confidence" (Alvarez, Atkeson, and Hall 2013).

[3] Stein and Vonnahme (2014) note that polling place performance is not just a function of line length.

2016 Survey of the Performance and American Elections

Given the unconventional nature of the 2020 presidential election in light of the COVID-l9 pandemic and salient legal battles, this study uses data from the 20l6 presidential election. Individual-level survey data on perceptions of the voting experience comes from the 20l6 Survey of the Performance of American Elections (SPAE) (Stewart 20l7). This survey collects data from a national sample composed of 200 respondents in each state. The survey was subset to include only respondents who reported having cast a ballot in-person. In-person voting includes both voters who cast ballots on Election Day and during early voting periods.

Variables from the SPAE included in the regression models are several individual- level demographic and political variables that have been shown to correlate with perceptions of the voting experience such as income (Herrnson et al. 2008; Atkeson and Saunders 2007), partisan identification (Sinclair, Smith, and Tucker 20l8; Atkeson and Saunders, 2007), age (Herrnson et al. 2008), and gender (Herrnson et al. 2008).

In addition to individual-level covariates, variables at the county level were included. With some exceptions, the unit of analysis for election administration in the United States is the county.[4] As a result, much of the variation which interests political scientists takes place at the county level. More specifically, variation in election practices, voting equipment, and vendor services takes place at the county level. It is therefore prudent to include a battery of election administrative variables at the county level alongside individual-level covariates.

County Contracts for the Acquisition of a Voting System

Both county contracts and data from the AVSR were obtained from open records requests made to state and local public information officers. An open records request, also known colloquially as a Freedom of Information Act re- quest, or a FOIA request, is the process by which a citizen may ask to obtain a copy or inspect documents that are considered to be public information but are not made publicly available.[5] Municipal contracts are considered public information. The bidding process, however, is not. County and municipal-level contracts for the acquisition of voting equipment will provide data on services subcontracted to vendors.

County-level election expenses data collected from the contracts were then merged with survey data from the 20l6 SPAE. This is possible through the inclusion of geographic place codes like the federal information processing standards (FIPS) code. The following analysis consists of l,607 respondents in 202 counties across l4 states. Table 2 presents the distribution of SPAE respondents by state.

Vendor services are coded as a "l" for a purchase of a particular vendor service in any

[4] States that do not have county as the level of government responsible for conducting elections include Vermont, Connecticut, Massachusetts, and Wisconsin. These states conduct elections at the sub-county level.
[5] Although both terms are identical in terms of the type of request, the Freedom of Information Act is a federal law. Governmental transparency laws are referred to by different names depending on the state. For example, in Texas the Texas Public Information Act governs open records requests made to the state and local governments.

interaction of the current contract. It is important to note the coding for vendor services is reliant on the information provided to the researcher via open records requests for "the opportunity to obtain copies of public records of all county contracts for the acquisition of a voting system since November 2000" as well as a specific request for information regarding "any vendor services (if applicable)." Despite the instructions to county and state public information officers for contract information on vendor services, the data was not always provided due to the destruction of old documents, non- itemized receipts, flat fees, and the administrative burden of including every possible document relating to the request. All county public information officers provided as much information as could reasonably be expected to give a global picture of their voting system to the researcher. Given this limitation, vendors' services were coded as "purchased" if they were purchased at least once during the most current contract period.

Table 2: Distribution of Respondents by State

State	# Counties	n
California	13	33
Connecticut	8	178
Delaware	3	182
Illinois	16	**111**
Kentucky	19	50
Nebraska	31	130
Nevada	9	163
New Mexico	22	167
Ohio	8	23
Rhode Island	5	172
Texas	42	136
Utah	9	68
Vermont	14	157
Virginia	3	37
Total	202	1607

Model Estimation

It is generally assumed the true performance rating observed by voters, y^*, is unobserved. What is observed, however, is a crude categorical rating of performance on a scale. In the case of this analysis, the dependent variables follow a three-point scale, y_i in Table 1. Observations are related to the latent variable as follows:

$$\begin{aligned} y_i &= 1 \quad if \quad 0 \leq y_i^* < \alpha_1 \\ y_i &= 2 \quad if \quad \alpha_1 \leq y_i^* < \alpha_2 \\ y_i &= 3 \quad if \quad \alpha_2 \leq y_i^* < \infty \end{aligned} \tag{1}$$

The most natural starting point for modeling a discrete ordered variable is the proportional odds regression model (Agresti 20l2, 20l3, and 20l8; Long l997; O'Connell and Liu 20ll; Powers and Xie 2000). The proportional odds model is used to estimate the cumulative probability of being at or below a particular level of a response variable ($P\,[Y \leq y_m]/P\,[Y > y_m]$). The proportional odds model is nonlinear in probability but linear in log odds (Fullerton 2009). The proportional odds model assumes the log odds of a given outcome as:

$$logit[P(y_i \leq m)] = log\Big[\frac{P(y_i \leq y_m|x)}{1 - P(y_i \leq y_m|x)}\Big] \qquad m = 1, .., M-1 \qquad (2)$$
$$= \alpha_m - \boldsymbol{X_i}'\boldsymbol{\beta}$$

Where M is the number of levels in the dependent variable, X is a matrix of independent variables, *a* is a cut point, β is a vector of logit coefficients, and *i* being the observation. In this model, β, the parameter representing the vector of logit coefficients does not vary across equations. The cut point, *a*, is the only parameter varies changes across logit equations. The log odds can be transformed into probability:

$$P(y_i \leq m) = \Big[\frac{exp(\alpha_m - \boldsymbol{X}_i'\boldsymbol{\beta})}{1 + exp(\alpha_m - \boldsymbol{X}_i'\boldsymbol{\beta})}\Big] \qquad (3)$$

Table 3: Proportional Odds Regression Models of Wait Time in Line

	Wait Time in Line
Value Added Reseller	−0.809 (0.286)**
Vendor Services:	
Training	−0.298 (0.265)
Project Management	0.389 (0.171)*
Election Day Support	0.238 (0.172)
Election Administration:	
Voter Outreach	0.012 (0.137)
Paper-Based System	−0.462 (0.163)**
Peak Voting Period	0.178 (0.105)
Reg.Voters Per Precinct	0.000 (0.000)
Demographics:	
Early Voting	0.137 (0.120)
Democrat	0.172 (0.109)
Race: White	0.173 (0.137)
Age	−0.011 (0.003)***
Female	−0.363 (0.106)***
Family Income	−0.011 (0.014)
1|2. (Intercept)	−0.931 (0.305)**
2|3. (Intercept)	0.834 (0.305)**
AIC	2831.423
BIC	2915.193
Log Likelihood	−1399.711
Num. obs.	1388

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$

Results

Table 3 reports the results of a proportional odds regression model of the wait time in line variable. Higher values of the dependent variable are representative of longer wait times. As such, positive regression coefficients indicate an increase in odds of a longer wait time.[6]

The proportional odds model presented in the second column of Table 3 presents evidence voters in localities that made contracts with value added resellers of election equipment had, on average, lower odds of waiting in line.[7]

The odds of waiting in a longer line for voters in a locality purchasing equipment and services from value-added resellers is less than that of voting equipment manufacturers. In contrast, the odds of waiting in a longer line are 45 percent higher when localities purchase project management services from the private sector. Paper-based voting systems also appear to be associated with lower odds of waiting in line. Respondents in counties with paper-based systems reported a statistically significant

[6] See Equation 2.

[7] It is important to note when interpreting models that use the logistic link function, the coefficient estimates are in the form of log odds. A simple transformation of the coefficient estimates in log odds via the exponential function produces predicted odds.

lower likelihood of waiting in a longer line.[8]

Table 4 presents the results of proportional odds regression models for in- person voter evaluations of polling-place and poll-worker performance.[9] Both polling-place and poll-worker evaluations are used as proxies for evaluations of the voting experience. A positive coefficient estimate in both models signifies an increase in the odds of a positive evaluation.

Table 4: Proportional Odds Regression Model of Polling Place and Poll-Worker Performance

	Polling Place Performance	Poll-Worker Performance
Wait Time in Line	−0.894 (0.105)***	−0.388 (0.083)***
Value Added Reseller	0.180 (0.450)	0.143 (0.343)
Vendor Services:		
Training	−0.046 (0.437)	−0.358 (0.340)
Project Management	−0.211 (0.248)	−0.203 (0.203)
Election Day Support	−0.216 (0.268)	0.050 (0.211)
Voter Outreach	−0.170 (0.200)	−0.019 (0.163)
Election Administration:		
Paper-Based System	0.062 (0.243)	0.226 (0.195)
Peak Voting Period	−0.104 (0.157)	−0.166 (0.127)
Reg.Voters Per Precinct	0.000 (0.000)	−0.000 (0.000)
Early Voting	0.674 (0.198)***	0.116 (0.147)
Demographics:		
Democrat	0.027 (0.166)	0.139 (0.134)
Race: White	0.142 (0.197)	0.388 (0.158)*
Age	0.022 (0.005)***	0.019 (0.004)***
Female	0.029 (0.160)	0.103 (0.128)
Family Income	0.020 (0.022)	0.016 (0.017)
1|2. (Intercept)	−4.590 (0.561)***	−3.349 (0.445)***
2|3. (Intercept)	−2.137 (0.527)***	−0.638 (0.416)
AIC	1275.597	1793.246
BIC	1364.529	1882.203
Log Likelihood	−620.799	−879.623
Num. obs.	1382	1384

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$

The results of both models in Table 4 do not present statistically significant evidence supporting the notion localities that purchase election services from the private sector perform relatively better on average than localities that did not. As conventional wisdom suggests, the odds of more positive polling-place and poll-worker performance ratings were lower when voters waited for longer periods of time in line. Voters who cast their ballot during early voting periods had about twice the odds in recognizing high quality polling place performances. Older voters were also more likely to give positive ratings to their polling places and poll workers.

Table 5 presents the results of a proportional odds regression model of vote counted as cast.

[8] The results of likelihood ratio tests indicate a violation of the proportional odds assumption for the explanatory variables paper-based system and early voting. As a result, it is appropriate to use the partial proportional odds model which relaxes the proportional odds assumption for the variables paper-based system and early voting. Although these variables are not central to the research question, an additional regression analysis using a partial proportional odds model is presented in the appendix. The differences in coefficient estimates between tables 3 and Al are trivial.

[9] Neither model exhibited likelihood ratio statistics indicating violation of the proportional odds assumption for any of the explanatory variables.

Higher levels of vote counted as cast indicate higher levels of confidence.[10] As expected, positive evaluations of polling places and poll workers increase the odds of higher feelings of confidence in vote counted as cast by 73 percent and 207 percent respectively. Individual-level variables that appear to increase the odds of a higher sense of confidence are Democratic Party identification, age, and income.

Table 5: Proportional Odds Regression Model of Confidence in Vote Counted as Cast

	Voter Confidence
Polling Place Performance	0.550 (0.159)***
Poll-Worker Performance	1.124 (0.134)***
Wait Time in Line	0.189 (0.093)*
Value Added Reseller	−0.062 (0.357)
Vendor Services:	
Training	0.396 (0.347)
Project Management	0.193 (0.221)
Election Day Support	−0.300 (0.238)
Voter Outreach	0.079 (0.175)
Election Administration:	
Paper-Based System	−0.071 (0.213)
Peak Voting Period	−0.027 (0.137)
Reg.Voters Per Precinct	0.000 (0.000)
Early Voting	−0.108 (0.156)
Demographics:	
Democrat	0.411 (0.146)**
Race: White	0.317 (0.168)
Age	0.017 (0.004)***
Female	0.044 (0.137)
Family Income	0.068 (0.020)***
1|2. (Intercept)	3.293 (0.619)***
2|3. (Intercept)	5.695 (0.632)***
AIC	1657.457
BIC	1756.449
Log Likelihood	−809.729
Num. obs.	1353

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$

The direction of the coefficient estimate for the wait time in line variable is unexpected. According to the proportional odds model, a longer waiting period increases the log odds of less confidence in vote counted as cast by voters. Given the literature on determinants of turnout, when voters are faced with obstacles to voting, such as a line, the likelihood of abstaining from

[10] The result of a likelihood ratio test of the explanatory variable female suggests a violation of the proportional odds assumption. The results of the partial proportional odds model are presented in Table A2. The differences in coefficient estimates between tables 5 and A2 are trivial. In the partial proportional odds model presented in Table A2, the coefficient estimate for the white variable reaches statistical significance but is of a similar magnitude to the corresponding coefficient in Table 5.

casting a ballot will disproportionately impact those with low levels of political efficacy.[11] In the case of this analysis, it is likely that the voters with lower levels of voter confidence are disproportionately self-selecting out of the sample of in-person voters when faced with lines.

Conclusion and Discussion

Taking all the evidence presented in this analysis into account, the choice of localities to purchase services from election services vendors is not a panacea to solving election performance issues in the United States. In fact, the statistical evidence presented suggests voters in counties relying on vendors for project management have higher odds of waiting in a longer line. At first glance, this finding suggests project managers from election services vendors are less apt at keeping lines at bay compared to in-house project managers. Although this study does not examine the plights of local election offices directly, it is likely counties that are attracted to project management services are also counties less able to employ staff with the expertise necessary for running elections.

These findings also highlight the role of election services vendors in American elections. Consistent with the findings of Gibson (2020), localities that purchase services may do so to deliver a similar quality election experience to voters as localities who have the resources to provide these services in-house. Given increasingly tighter budgets and an increasingly higher demand for alternative voting methods, the option to purchase election services may ease administrative burdens on already burdened election offices. In an otherwise hyper-federalized arena, the availability of private sector election services may help to establish some uniformity in the voting experience.

References

Agresti, Alan. 2012. *Analysis of Ordinal Categorical Data.* Wiley Series in Probability and Statistics John Wiley & Sons.

Agresti, Alan. 2013. *Categorical Data Analysis*. Wiley Series in Probability and Statistics Hoboken, NJ: John Wiley Sons.

Agresti, Alan. 2018. *An Introduction to Categorical Data Analysis*. Wiley Series in Probability and Statistics John Wiley & Sons.

Alvarez, R. Michael, Lonna Rae Atkeson and Thad E. Hall. 2013. *Evaluating Elections: A Handbook of Methods and Standards*. New York, NY: Cambridge University Press.

Atkeson, Lonna Rae and Kyle L. Saunders. 2007. "The Effect of Election Ad- ministration on Voter Confidence: A Local Matter?" *PS: Political Science S Politics* 40:655–660.

Benington, John. 2011. *Public Value: Theory and Practice*. Basingstoke, NH: Palgrave Macmillan chapter From Private Choice to Public Value.

Bozeman, Barry. 2007. *Public values and public interest: Counterbalancing economic individualism*. Washington, DC: Georgetown University Press.

[11] Riker and Ordeshook (1968, p.28) include an additional term to the Calculus of Voting to encompass the "satisfaction of affirming one's efficacy in the political system."

Ewald, Alec C. 2009. *The Way We Vote: The Local Dimension of American Suffrage*. Nashville, TN: Vanderbilt University Press.

Gibson, Nadine Suzanne. 2020. "Privatized Democracy: The Role of Election Services Vendors in the United States." *American Politics Research* 48(6):705– 708.

Gronke, Paul. 2014. *The Measure of American Elections*. New York, NY: Cambridge University Press chapter Voter Confidence as a Metric of Election Performance.

Grönroos, Christian. 2008. "Service logic revisited: who creates value? And who co-creates?" *European Business Review* 20(4):298–314.

Grönroos, Christian and Annika Ravald. 2011. "Service as business logic: implications for value creation and marketing." *Journal of Service Management* 22(1):5–22.

Hale, Kathleen and Christa Daryl Slaton. 2008. "Building Capacity in Election Administration: Local Responses to Complexity and Interdependence." *Public Administration Review* 68(5):839–849.

Hall, Thad E. 2018. *The Oxford Handbook of Electoral Systems*. New York, NY: Oxford University Press chapter Election Administration.

Hall, Thad E., J. Quin Monson and Kelly D. Patterson. 2009. "The Human Dimension of Elections: How Poll Workers Shape Public Confidence in Elections." *Political Research Quarterly* 62(3): 507–22.

Herrnson, Paul S., Richard G. Niemi, Michael J. Hanmer, Peter L. Francia, Benjamin B. Bederson, Frederick G. Conrad and Michael W. Traugott. 2008. "Voters' Evaluations of Electronic Voting Systems: Results From a Usability Field Study." *American Politics Research* 36(4):580–611.

Holbert, R. Lance, Heather L. LaMarre and Kristen D. Landreville. 2009. "Fanning the Flames of a Partisan Divide: Debate Viewing, Vote Choice, and Perceptions of Vote Count Accuracy." *Communication Research* 36(2):155–177.

Levitt, Justin. 2013. "'Fixing That': Lines at the Polling Place." *The Journal of Law S Politics* 28(4):465.

Long, J. Scott. 1997. *Regression Models for Categorical and Limited Dependent Variables*. Thousand Oaks,CA: SAGE Publications.

Moore, Mark H. 2014. "Public Value Accounting: Establishing the Philosophical Basis." *Public Administration Review* 74(4):465–477.

O'Connell, Ann and Xing Liu. 2011. "Model Diagnostics for Proportional and Partial Proportional Odds Models." *Journal of Modern Applied Statistical Methods* 10(1):139–175.

Peterson, Bercedis and Frank E. Harrell. 1990. "Partial Proportional Odds Models for Ordinal Response Variables." *Journal of the Royal Statistical Society. Series C (Applied Statistics)* 39(2):205–217.

Powers, Daniel and Yu Xie. 2000. *Statistical Methods for Categorical Data Analysis*. San Diego, CA: Academic Press.

Rhodes R. A. W., Wanna J. 2007. "The Limits to Public Value, or Rescuing Re- sponsible Government from the Platonic Guardians." *The Australian Journal of Public Administration* 66(4):406–421.

Riker, William H. and Peter C. Ordeshook. 1968. "A Theory of the Calculus of Voting." *The American Political Science Review* 62(1):25–42.

Rutgers, Mark R. 2015. "As Good as It Gets? On the Meaning of Public Value in the Study of Policy and Management." *The American Review of Public Administration* 45(1):29–45.

Sinclair, Betsy, Steven S. Smith and Patrick D. Tucker. 2018. ""It's Largely a Rigged System": Voter Confidence and the Winner Effect in 2016." *Political Research Quarterly* 71(4):854–868.

Spencer, D.M. and Z.S. Markovits. 2010. "Long Lines at Polling Stations? Observations from an Election Day Field Study." *Election Law Journal* 9(1):3–17.

Stein, Robert M. and Gregg Vonnahme. 2014. *The Measure of American Elections*. New York, NY: Cambridge University Press chapter Polling Place Practices and the Voting Experience.

Stewart, III, Charles. 2013. "Waiting to Vote in 2012." *The Journal of Law and Politics* 28:439–463.

Stewart, III, Charles. 2017. "2016 Survey of the Performance of American Elections.

Appendix

Partial Proportional Odds Regression Model

The proportional odds model, is not appropriate when the proportional odds assumption (sometimes referred to as the parallel slopes or parallel lines assumption) is taken into account. Under this assumption, the effect of an independent variable will be the same regardless of where the cut point is made. Although the proportional odds model is an elegant and straightforward way to model associations between ordinal variables, the proportional odds assumption is rarely met. This study will evaluate the probability of model violation of the proportional odds assumption using likelihood ratio tests comparing the log-likelihood from the proportional odds model the log-likelihood from a model in which the covariate in question has nonproportional odds (Peterson and Harrell, 1990).

An option for dealing with violations of the proportional odds assumption is the use of a more flexible model, the partial proportional odds model. This model is more flexible in that it allows for nonproportional odds for a subset of variables (Peterson and Harrell, 1990).[12] The partial proportional odds model is defined as:

$$logit[P(y \leq m)] = \alpha_m - \boldsymbol{X}_i'\boldsymbol{\beta} - \boldsymbol{T}_j'\boldsymbol{\gamma}_m, \qquad m = 1, .., M-1; j = 1, .., N \quad (4)$$

In contrast, the proportional odds model defined in Equation 2, the partial proportional odds model in Equation 4 has an additional T 'j γm. This term represents the vector of coefficients for the variables without the requirement of proportional odds at the cut point m, γm, and the corresponding observations, Tj.

[12] The nonproportional odds model described in this study is the unconstrainted version described by Peterson and Harrell (1990, p.209).

Table A 1
Proportional Odds and Partial Proportional Odds Regression Models of Wait Time in Line

	Proportional Odds	Partial Proportional Odds
Value Added Reseller	−0.809 (0.286)**	−0.840 (0.286)**
Vendor Services:		
Training	−0.298 (0.265)	−0.302 (0.264)
Project Management	0.389 (0.171)*	0.377 (0.169)*
Election Day Support	0.238 (0.172)	0.254 (0.173)
Election Administration:		
Voter Outreach	0.012 (0.137)	0.008 (0.137)
Paper-Based System	−0.462 (0.163)**	
Peak Voting Period	0.178 (0.105)	0.178 (0.105)
Reg.Voters Per Precinct	0.000 (0.000)	0.000 (0.000)
Demographics:		
Early Voting	0.137 (0.120)	
Democrat	0.172 (0.109)	0.174 (0.109)
Race: White	0.173 (0.137)	0.177 (0.136)
Age	−0.011 (0.003)***	−0.011 (0.003)***
Female	−0.363 (0.106)***	−0.363 (0.106)***
Family Income	−0.011 (0.014)	−0.011 (0.014)
1|2. (Intercept)	−0.931 (0.305)**	−0.901 (0.306)**
2|3. (Intercept)	0.834 (0.305)**	0.791 (0.310)*
1|2. Paper-Based System		0.350 (0.170)*
2|3. Paper-Based System		0.646 (0.186)***
1|2. Early Voting		−0.047 (0.129)
2|3. Early Voting		−0.285 (0.154)
AIC	2831.423	2826.943
BIC	2915.193	2921.184
Log Likelihood	−1399.711	−1395.472
Num. obs.	1388	1388

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$

Table A 2
Proportional Odds Regression Model of Confidence in Vote Counted as Cast

	Proportional Odds	Partial Proportional Odds
Polling Place Performance	0.550 (0.159)***	0.549 (0.159)***
Poll-Worker Performance	1.124 (0.134)***	1.128 (0.134)***
Wait Time in Line	0.189 (0.093)*	0.190 (0.093)*
Value Added Reseller	−0.062 (0.357)	−0.061 (0.358)
Vendor Services:		
Training	0.396 (0.347)	0.401 (0.347)
Project Management	0.193 (0.221)	0.190 (0.221)
Election Day Support	−0.300 (0.238)	−0.300 (0.238)
Voter Outreach	0.079 (0.175)	0.071 (0.175)
Election Administration:		
Paper-Based System	−0.071 (0.213)	−0.075 (0.213)
Peak Voting Period	−0.027 (0.137)	−0.030 (0.137)
Reg.Voters Per Precinct	0.000 (0.000)	0.000 (0.000)
Early Voting	−0.108 (0.156)	−0.109 (0.156)
Demographics:		
Democrat	0.411 (0.146)**	0.419 (0.146)**
Race: White	0.317 (0.168)	0.330 (0.168)*
Age	0.017 (0.004)***	0.017 (0.004)***
Female	0.044 (0.137)	
Family Income	0.068 (0.020)***	0.067 (0.020)***
1|2. (Intercept)	3.293 (0.619)***	2.914 (0.647)***
2|3. (Intercept)	5.695 (0.632)***	5.739 (0.635)***
1|2. Female		0.609 (0.312)
2|3. Female		−0.101 (0.139)
AIC	1657.457	1653.609
BIC	1756.449	1757.811
Log Likelihood	−809.729	−806.805
Num. obs.	1353	1353

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$

Practitioner Review for "Purchasing Elections: How Election Services Influence the Voting Experience"

R. Todd Davidson, *Denver, Colorado*[1]

In Denver we are fortunate to have a strong framework in place to run elections. I have a decade of election administration experience in Colorado. The Colorado County Clerks Association is very strong, and knowledge is shared broadly at our statewide conferences and regional meetings. We also benefit from a strong relationship with our secretary of state's office and staff.

However, in states without similar support, the researcher nails her introduction: there is very little research about how election services vendors impact the voting experience. Local election officials have no "Consumer Reports" to rely on for recommendations. What is also true is that election officials rarely have the power over their own budget and may not have decision-making ability concerning voting system vendors.

While I have a strong dislike of the title of this article, the researcher had me deeply interested within the first three paragraphs. I followed and agreed with the theoretical framework — even the use of call center study assumptions as related to line length and experience.

I was disappointed in a few of the sources cited, such as Stewart's *Survey of the Performance of the American Elections*/SPAE (2016) when a newer version of the SPAE from 2020 was available. The election world changed dramatically between those two elections. For example, California completely changed how its citizens vote. Therefore, I wonder how the data would compare. Additionally, eliminating mail ballots from the research studied leaves those of us in the West with little to glean. Despite my objections to the data used, the results were encouraging, especially to a Colorado administrator. These included:

- Paper-based voting models led to short wait times in polling locations.
- Voters who participate in early voting are more likely to recognize high performance in polling places.
- Private project management consulting seems to be very effective in helping governments succeed.
- Private project management firms can be a tool in the box of cash-strapped counties.

If state legislatures – that seem constantly determined to change election laws – would look to these results, we might see a bit of progress.

Lastly, election offices in the West are a wealth of data for elections conducted in the last decade. I invite more researchers to exploit our data; you might find some fascinating work out here.

---

[1] R. Todd Davidson is the director of elections for the Denver City and County Clerk and Recorder's Office.

Response to "Purchasing Elections: How Election Services Influence the Voting Experience"

Peter Lichtenheld, *Hart InterCivic*[1]

While I appreciate the subject of professional election services being addressed in this journal, I believe that the specific attributes attempted to be correlated within this study are not the most effective way to measure the value and influence of these services. The effectiveness of professional services such as election day support, voter education and outreach (VEO), project management, and training cannot be reduced to only a measure of polling place optimization due to the number of other dependent variables that carry more influence. In addition, I am not supportive of the title of the article in that no election is ever "purchased" within the United States of America, as the title implies. I do support the hypothesis posited in this article which stated "… election services vendors facilitate state and local election administration agencies in the creation of public value in the form of high-quality elections." However, to evaluate the effectiveness of professional services by measuring polling place wait time and the vague quality of "polling place and poll-worker performance" is neither a complete nor accurate assessment. Wait time, for example, is not a good attribute with which to measure the impact of professional services as long lines are the result of other factors that have a much greater impact. Election officials understand that wait time at a polling place is the result of the number of poll workers present in the polling place, the quality of training those poll workers received and retained, the technology used to check in voters, the number of voting devices available, the ratio of polling places to registered voters, and the selected locations for polling places, to name a few. Third-party professional services, unless hired specifically to address polling place efficiencies, are far less influential on voter perceptions than these other variables.

While project management is indeed a critical professional service provided to local jurisdictions, my experience indicates its primary objective is different than that outlined in the study. For example, the author seemed to be assuming that most project management services are used to address polling place processes. Whereas our experience indicates that in most jurisdictions project management occurs during the initial implementation of a newly purchased voting system and is focused on the milestones involved in delivering the hardware, software, and training on the features and functionality of the new election system. Once a system is fully implemented, ongoing training, VEO, and election support – not necessarily always on election day – keep a jurisdiction in tune, just like an automobile tune-up does. To continue with the automobile analogy, an analysis of jurisdictions that perform ongoing tune-ups versus those that just continue using the system with no tune-ups would be an interesting juxtaposition that may lead to measurable positive change.

From my experience leading professional services teams for decades in delivering election day support, VEO, project management, and training to customers, I have concluded that the effectiveness of these programs is better assessed by measuring the results of the specific intent of the

[1] Peter Lichtenheld is senior vice president of customer success for Hart InterCivic.

services provided. Project management and implementation should be assessed according to the successful utilization of the features and functionality of the voting system. For example:

- Was the ballot created without errors?
- Was the logic and accuracy test well run and successful?
- Were election results posted in a timely manner, and were they accurate?
- Did audits show that the election results were correct?

Likewise, poll worker training could be better measured by simply noting if polls opened on time, closed on time (unless there were lines), and whether results, files, and paperwork were delivered to the jurisdiction's central counting station in a timely manner. Election day support success could be measured by customer feedback on the expertise provided on election day for timely and accurate assistance. VEO could be measured by simple surveys of the public and identifying whether they'd seen information about how to vote, where to vote, how to make certain their vote was recorded, and whether that information was effective. I also appreciate the fact that the author was attempting to use available data, and data on some of my suggestions may be difficult to gather. I will add that it does make sense that confidence in poll workers and polling place performance would increase voter confidence both in the election overall and that votes were counted as cast.

One correlation on which we have fact-based data in the form of annual customer surveys going back more than 10 years, is the correlation between customers who utilize our third-party professional services and those customers' overall satisfaction with their vendor or reseller. I believe that, used properly, various types of professional services do create value in the form of delivering best practices and election process expertise to enhance the overall voter experience. Unfortunately, the allocated dollars for the purchase of such services are frequently one of the first items to be discarded by local jurisdictions with limited budgets. It is well documented that local election officials' positions have experienced a high percentage of turnover since 2020[2, 3, 4, 5]. Unfortunately, this high turnover rate has exacerbated the need for more frequent training and other professional services. Yet, I see the budgetary investment allocated at the federal, state, and local levels does not always keep up with the need. I hear first-hand the frustrations that new local election officials face when having to learn new-to-them systems and procedures in a short amount of time with no budget for training as they "drink from the fire hose." I believe that quality services for election managers and administrators, especially when provided by the original equipment manufacturers who are the true subject matter experts, are impactful and lead to successful elections and, ultimately, may increase voter confidence.

This study took on a great and worthy topic that should receive more attention. But, in my opinion, the study looked at the wrong attributes to measure the success of professional services and the author may have misunderstood the composition of at least some of those professional services.

---

[2] https://www.texastribune.org/2024/04/09/election-administrator-turnover-rates-increases/
[3] https://www.brennancenter.org/our-work/analysis-opinion/great-resignation-election-officials
[4] https://www.route-fifty.com/workforce/2024/03/why-so-many-election-officials-are-leaving/395315/
[5] https://www.wnct.com/news/north-carolina/election-officials-concerned-about-job-turnover-leading-up-to-november/

Call for Submissions

The Journal of Election Administration Research and Practice invites potential authors to submit original research manuscripts, practitioner reflection pieces, policy briefs, and book and service reviews. Submissions will go through multiple reviews from the editorial team and potentially double-blind peer review as appropriate.

To submit a piece or contact an editor with a question about a piece, please email us at journal@electioncenter.org.