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Increasing Organ Donor Registrations Among BC Public Servants Using E-Newsletters

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Knowledge Summary: This project aimed to increase organ donation registrations. Three new behaviourally-informed messages were tested against a control message in newsletters reaching BC government employees. The behaviourally-informed message that challenged the audience's assumptions about their registration status, "Many B.C. residents believe they're organ donors, but they're not.", yielded the most web page visits and the most donor registrations. Based on these results, the project team recommends scaling this message; they also provide other recommendations to simplify registration and improve data collection.

UBC Decision Insights for Business & Society (UBC-DIBS) is a cluster of researchers and partners building a cross-sectoral centre of excellence to shape how Behavioural Insights (BI) are used in British Columbia and beyond. CBI Working Papers are capstone projects completed by BI Practitioners graduating from UBC's Advanced Professional Certificate in Behavioural Insights.

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Executive Summary

BC Transplant, an agency under the Provincial Health Services Authority, plays a vital role in managing organ donation consent. British Columbia's organ donor registration rate has experienced a decline year-over-year — likely influenced by the pandemic's impact on typical in-person registration processes (BC Transplant, 2023). While about 300 British Columbians receive organ donations annually, this number falls short of the demand for lifesaving procedures (BC Transplant, 2023).

Enhancing organ donor registration offers a lifeline to those in need of lifesaving transplants, reduces costs and wait times by streamlining the healthcare system, and facilitates clear end-of-life care by conveying individuals' wishes and providing comfort to patients and their families. BC Transplant sought behavioural interventions to increase donor registration rates in British Columbia.

Previous research contributed to the understanding of factors shaping attitudes and intentions toward organ donation, yet a knowledge gap existed in ways to enhance actual registrations. This is particularly important within British Columbia where registration growth has declined post COVID. Existing evidence indicated that educational initiatives and media campaigns hold promise in this context (Robitaille et al.,2021). However, those approaches face challenges with both scalability and economic feasibility.

To address these challenges, we conducted a behavioural insights intervention consisting of a low-cost, scalable, government e-newsletter tested amongst 9,940 BC public servants. The primary objective of this intervention was to evaluate the effectiveness of encouraging donor registration through four e-newsletters (three treatment levels and one control group). Each e-newsletter contained a brief article headlined by one of four previously tested message conditions and streamlined the registration process by directly linking to the registration page. Web page visits and donor registrations were monitored to determine which message condition was the most effective in inspiring action.

Data collected from March 7-28, 2024 revealed that the message challenging assumptions, "Many B.C. residents believe they're organ donors, but they're not.", appealed to the intervention audience's uncertainty about their registration status — yielding both the highest web page visits and donor registrations. However, the control message "Register your decision today." garnered the highest conversion rate between web visits and donor registrations. The difference between these top results revealed that there is potential to increase registration rates through e-newsletters, especially through a previously unexplored audience — those that think they're registered but might not be.

Based on our exploratory research, trial results, and collaboration with BC Transplant, we recommend:
- Scaling to all BC public servants via government organizations and directing people to the online registry
- Simplifying the user experience for verifying organ donation status
- Further testing challenging assumptions messaging to encourage registration verification in a more focused campaign
- Tracking organ donation registrations and BC Transplant website activity going forward

Ultimately, nudging audiences to increase online donor registrations can be achieved at low-cost, with minimal resources, and through trusted partners, while streamlining the healthcare system and continuing to save lives.

Part A. Problem Background

British Columbia's organ donor registration rate has experienced a decline year-over-year, likely influenced by the Covid-19 pandemic's impact on typical in-person registration processes (BC Transplant, 2023). According to Canadian Blood Services, 4,100 Canadians await a lifesaving transplant every year, with hundreds passing away without ever receiving one (BC Transplant, 2023). Currently, about 300 British Columbians receive organ donations annually, yet 551 patients await a transplant (BC Transplant, 2023).

The reduction in registration rates is not a reflection of British Columbians' feelings towards organ donation. Sixty-eight per cent of British Columbians express their willingness to donate and an overwhelming 90% of the population supports organ donation (Leger, 2023), however the current registration rate is 31%—a number that may be even lower when considering factors like unaccounted deaths or relocations.

Becoming a registered organ donor provides a lifeline to those in dire need of transplants and leads to a more efficient healthcare system with reduced costs and shorter wait times. Furthermore, organ donor registration ensures clarity in end-of-life care by respecting individuals' wishes and offering comfort to patients and their families. It also encourages open discussions about end-of-life preferences, ultimately benefiting the healthcare system and the overall well-being of the people it serves.

With overwhelming public support for organ donation but a disproportionately low registration rate, this problem is well-suited to be explored using behavioural insights.

Part B. Behaviour & Context

The target behaviour focused on enhancing registration rates among BC government employees, with an emphasis on streamlining access to and 'nudging' them towards digital registration.

BC government employees were selected as the target audience as they are a large (35,000), identifiable group of people living in BC that could receive isolated intervention methods. Additionally, our exploratory research confirmed that this audience would be important and impactful to the overall problem:
- 90% supported organ donor registration
- 75% of respondents expressed they were currently registered donors—a stark contrast to previous BC Transplant data stating that 31% of residents are registered
- 20% of those who were certain they were registered did so over six years ago under a now outdated program
- 15% of those surveyed believed they were registered but were uncertain
- 63% of non-registered participants expressed a likelihood of registering
- No one stated they would not register as a donor

The target behaviour can be measured by tracking visits to the organ donor registry (ODR) via Google Analytics and registrations via the ODR application. Tracking users through their website journey to registration was not possible due to multiple partner agency involvement and privacy concerns. To counter this, we implemented campaign tracking for each message condition in Google Analytics and used the same tracking technique on the ODR. This two-part system ensured both web page visits and registrations were trackable for each message condition.

The targeted behaviour, which aimed to boost online organ donation registration of BC government employees, aligned seamlessly with the MISFIT framework.

- **Measurable:** BC Transplant has established effective means to measure behaviour (number of registrations) for both digital and traditional (paper) registrants.
- **Identifiable:** The target population, BC public servants, was easily identifiable and lived in BC.

- **Sizeable:** BC's Public Service Agency, with about 35,000 members across diverse regions, provided a significant and diverse sample.
- **Feasible:** BC Transplant was open to new ideas, and the BC Public Service Agency was willing to try digital tactics, minimizing resource requirements.
- **Impactful:** Increasing registered donors can substantially enhance the likelihood of saving lives.
- **Touchpoints:** The population could be reached through the BC Public Service Agency's monthly e-newsletter, which allowed the project team to administer and track effectiveness of various messages.

There are several barriers to organ donor registration which could be addressed with BI-informed solutions:

Barriers	Description	Possible Solutions
Status quo bias	People don't register due to inconvenience and inertia. Taking action requires effort; inaction is easier.	Emphasize the social responsibility and benefits to others of organ donation, highlighting the need and the number of patients waiting for donation.
Decision fatigue	People stick with defaults if decision-making is overwhelming. A Leger 2023 study found 42% of willing registrants think there's no rush, and 24% find it inconvenient.	Reduce friction costs by streamlining online registration processes on the BC Transplant website and communicate the ease of registering.
Emotional discomfort	Contemplating mortality and health issues makes registration emotionally challenging.	Emphasize reciprocity ("If you needed a transplant, would you get one?") or appeal to altruism ("How would you feel if you couldn't get an organ when you needed one?").
Assumed registration	Many mistakenly believe they are already registered, leading to inaction. 40% of willing registrants are unaware they need to register (Leger, 2023).	Highlight the gap between support for organ donation and actual registration, emphasizing the need to verify and update registration status.
Forgetfulness	Despite intentions, daily responsibilities overshadow registration.	Implement timely reminders and prompts, integrating them into related healthcare activities like checking medical records.
Cultural nuances	Some cultures have strong taboos about discussing death, creating psychological barriers. The Leger study found 24% of those hesitant to register cited religious or belief-based opposition (Leger, 2023).	While promoting the societal benefits of organ donation is important, deeply held cultural beliefs may be difficult to change.

Touchpoints

Our target population was reached through a monthly e-newsletter delivered to 9,940 People Leaders (people who supervise others) in the BC Public Service and randomized into four groups—each receiving one of the message conditions. This was an effective group to receive the intervention to change behaviour as the newsletter was consistent across all four groups—the only variable was the BC Transplant article. The e-newsletter was a trusted piece of communication from the target's employer that would provide them with direct online access to the registration page/form.

Feasibility

It was feasible to use the e-newsletter as a touch point because it was the only touchpoint of BC public servants that could be tested in a four-way split test randomized controlled trial (RCT). Although People Leaders are management roles in BC Public Service and may be slightly more biased, we ensured all other demographics were randomized. The Ministry allocation was randomized, as was location, and population demographics. This ensured the cleanest possible RCT.

Ethics

We considered several ethical considerations as outlined in <u>Part G:</u>
- Freedom of choice
- E-newsletter to 'People Leaders' and coming across as their employer's directive
- Ability to change a decision
- Ability to register a negative decision

Part C. BI Solution

Our exploratory research indicated that messages emphasizing the social impact and simplicity of registering a decision might have the highest likelihood of increasing registration amongst BC public servants. It was also believed that we could leverage challenging assumptions to craft a message for those that were confused or uncertain about their organ donation status. In the end, four potential Behavioural Insights (BI) solutions were identified and tested in March 2024.

In our exploratory research, the two statements that resulted in the most positive responses were those highlighting social responsibility and anticipated benefits to others, and the simplicity benefits of the organ donation process.

Test Message	"A single donor can save up to 8 lives."	Highlighted social responsibility and benefits to others (Top 2 Box: 84% likely to register)
Test Message	"It takes less than 2 minutes to register to become an organ donor."	Focused on the simplicity of the process (Top 2 Box: 75% likely to register)

In 2017 the Insurance Corporation of British Columbia partnered with BC Transplant to add an organ donor sticker to an individual driver's licence. This sticker did not register the individual on the organ donor registry and therefore, the commitment needed to be renewed with the driver's licence renewal (every 5 years). Exploratory research revealed that 15% of BC public servants were unaware of this and were uncertain about their registration status as organ donors. This uncertainty suggested a willingness and openness to registering, yet it represented a missed opportunity to have them officially registered.

BC Transplant mentioned they hadn't previously reached those unsure about registration, indicating eagerness to test a message to gauge impact. With that in mind, we tested a message to challenge people's assumptions.

Test Message	"Many BC residents believe they're registered donors, but they're not."	Challenging assumptions

Overall, our messaging addressed barriers originating from status quo bias, decision fatigue, and forgetfulness by leveraging simplicity, reciprocity, social impact, and reminders as BI tools.

Our BI solution involved incorporating a message with four levels into a government issued e-newsletter to BC public servants. This method was measurable and met the requirements of a randomized controlled trial. With support from the BC Public Service Agency, we randomly assigned 2,485 users to one of four different message conditions—eliminating bias, promoting generalization, and minimizing confounding variables in our research.

To maintain consistency between our government-focused exploratory research and the intervention, our intervention was specific to BC public servants. BC public servants represented a large and diverse group spanning various sectors, disciplines, and ages, thus being more reflective of the broader population—contributing to generalization.

Figure 1 shows one of the March emails issued to BC public servants. The organ donor article connected BC public servants directly to the organ donor web page, alleviating friction points associated with registration. This helped to address one of the identified barriers: people's inclination to express intent to register but subsequently forgetting to do so.

Research by Cameron et al. (2013) emphasized that knowledge about organ donation and the donation process strongly predicts willingness to be a donor. Therefore, by making the registration process simple, easy, and readily available through a message condition, organ registration rates were expected to increase.

While the newsletter did provide an opportunity to deliver four different levels to four discrete groups, it had its limitations. Firstly, we could not confirm the open rate for each message but assumed it would be consistent with other e-newsletters (under 15%). Because our topic was not work-related, our article couldn't be prioritized and was positioned further down the email. Lastly, we were not able to add photos or formatting that would visually help our article garner attention. This was a restriction of the newsletter that we needed to accommodate and were aware that it might lead to fewer interactions than anticipated.

We considered whether BC public servants might feel obliged to register as a donor because this email was coming from their employer, however the message condition was a small addition, treated no differently than any other featured article, and was neutral so as not to appear as the employer asking its employees to register.

Figure 1. March e-newsletter with BC Transplant article circled
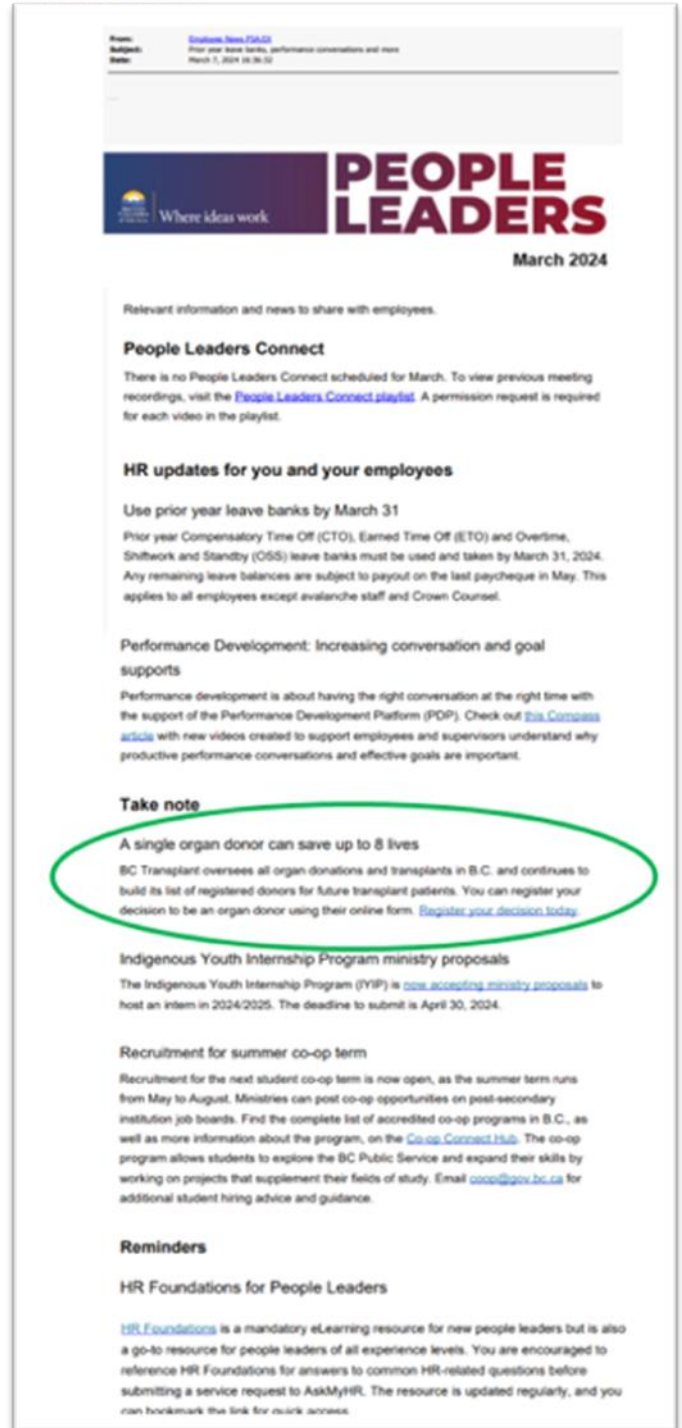
Part D. Research Design

Design

The research design was a four-level message condition (three treatment and one control condition) randomized controlled trial as illustrated in Figure 2. Two of the treatment arms used the most successful messages from our exploratory research while the third level reflected a new barrier revealed in the exploratory research—that is, people who thought they were registered via a driver's licence sticker were not actually registered.

In the control condition, participants received a generic registration message that did not leverage behavioural insights; it simply instructed them to register.

There were challenges finding a suitable audience to test our initiative within the timeframe for the intervention. Some potential partners had a sizeable potential audience for an intervention, but no way of split-testing messaging. People Leaders in the BC Public Service were the only audience with whom we could split test a randomized controlled trial within the required time frame.

The independent variable was the message condition to which 9,940 BC public servants were randomly assigned to one of four messages. The evaluation sought to uncover any causal effects of the nudges on the likelihood of the target audience registering as organ donors or visiting the organ donor page.

Intervention
The independent variable was the message condition for the four levels outlined below (Table 1). The dependent variables measured were the web page visits to the organ donor registry (ODR) (DV1) and registrations submitted on the ODR (DV2). (Figure 2)

Table 1. Message conditions

Challenging assumptions, "Many BC residents believe they're organ donors, but they're not."
Social impact of organ donation, "A single donor can save up to 8 lives."
Ease and convenience, "It takes less than 2 minutes to register to become an organ donor."
Control condition with a neutral message, "Register your decision today."

This four-level design allowed us to assess the impact of different messaging strategies on the likelihood of respondents registering as organ donors.

Figure 2. Illustration of four-level research design
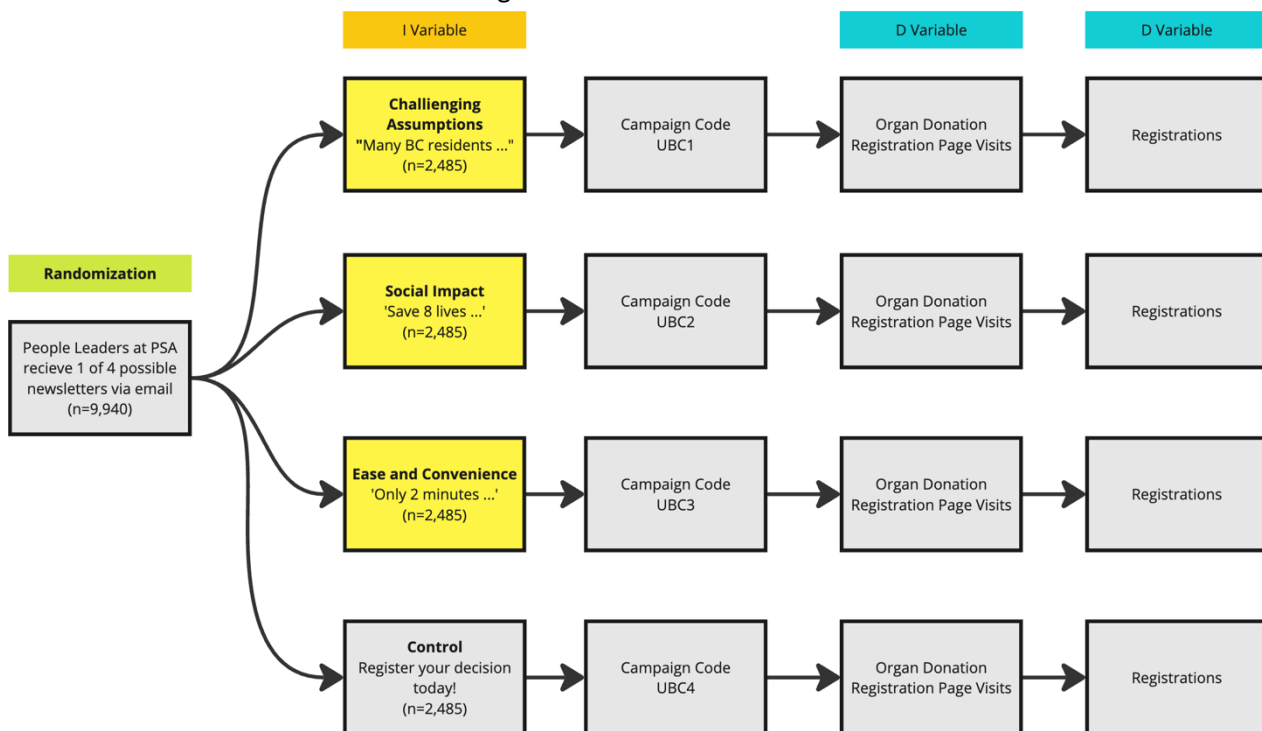
9,940 participants were randomly assigned by participant ID to one of the message conditions (Curtis et al., 2015) to reduce the effect of confounding variables. The random assignment of BC public servants to message conditions was crucial to ensure an even distribution of potential confounding variables, enhancing internal validity, and allowing us to be more confident that any differences in registrations were due to message condition. Strengthening internal validity allowed for a more accurate evaluation of the impact of message condition on organ donor visits and registrations.

Hypothesis

We hypothesized that BC public servants in the social impact test group would perform best in delivering web page visits and registrations. This expectation was based on exploratory research which indicated that this message performed the strongest. Additionally, we hypothesized that the condition focusing on challenging assumptions, highlighting that many believed they were registered but were not, would also perform well in generating visits and registrations. This message was expected to pique individuals' interest in checking their registration status, as they may have previously assumed they were already registered.

Implementation & Data Collection

The organ donation study was conducted between March 7 to March 28, 2024. The message condition received an unexpected boost as an error in another article caused it to be re-sent to all participants at 15:05 on March 8, 2024.

The sample size included 9,940 BC public servants with 2,485 in each of the four message conditions. One of the challenges we faced was accessing data on visits to the organ donor registry (ODR) page and tracking subsequent organ donation registrations from those visits. This was confounded by concerns around patient privacy, which made it difficult for BC Transplant to collect data confirming a patient's online decision to become an organ donor. As a result, we tracked data via two different channels:

- Dependent variable 1 – visits to the ODR page were tracked in Google Analytics (GA)
- Dependent variable 2 – registrations on the ODR were tracked via the Provincial Health Services Authority (PHSA)

Implementing campaign codes and card codes to these variables helped identify which variable was clicked. An example of a URL with a campaign code and card code is outlined in Figure 3.

Figure 3. Example of URL with campaign codes and card codes

A report was built in Google Analytics as outlined in Appendix IV. Google Analytics data was exported as a CSV file, saved as an XLS file, and cleaned by removing header rows 1 to 6. Post intervention, the cleaned data was structured to examine the relationships between the message condition and dependent (visits and registrations) variables, enabling robust and insightful inferential statistical testing. Appendix VI outlines the steps taken to both clean and implement the data.

Part E. Research Results

Descriptive Statistics

The trial included 9,940 participants divided equally into the message conditions, indicating a balanced experimental design. The dependent variables were visits (DV1) to or registrations (DV2) on the organ donor registry (ODR) page.

Figure 4 displays descriptive statistics that measure the effectiveness of different messages in promoting visits and registrations among BC public servants per message condition.

Figure 4. Percentage of web page visits and registrations per test message

Note: Error bars indicate +/- one standard error
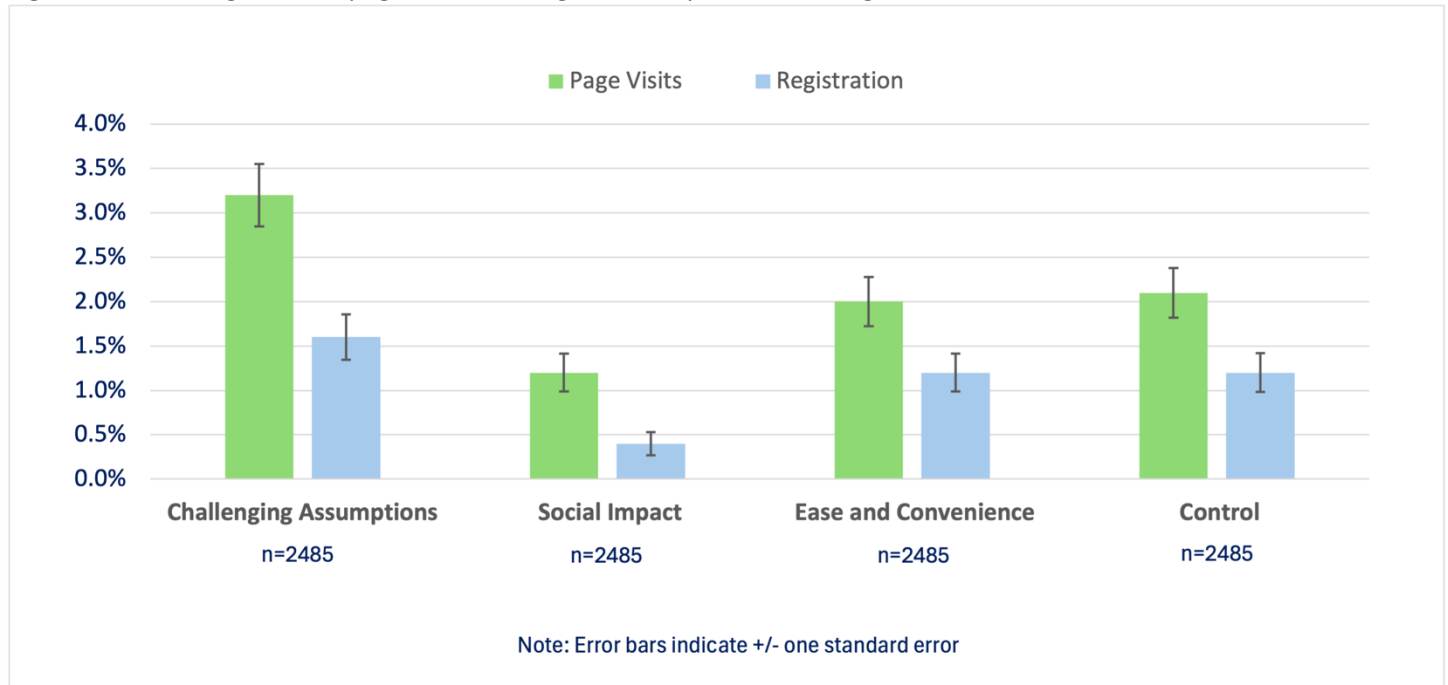
The findings from the descriptive statistics revealed:

Challenging assumptions message condition (n=2,485): "Many B.C. residents believe they're organ donors, but they're not." This message achieved the strongest visitation rate (3.2% of respondents visited) and the greatest number of registrations (1.6% of respondents registered).

Social impact message condition (n=2,485): "A single organ donor can save up to 8 lives." Despite its appeal to altruism, this message resulted in both a lower visitation (1.2%) and registration rate (0.4%) This suggests that while the message underscores the impact of donating, it might not sufficiently address personal relevance.

Ease and convenience message condition (n=2,485): "It takes 2 minutes to register as an organ donor." This message effectively conveyed the ease of registration, leading to the second-highest visitation rate (2%) and a moderate registration rate (1.2%). By reducing perceived barriers to action, it used the behavioral science principle of making desired actions easy and quick.

The control message condition (n=2,485): "Register your decision today." Serving as the control, this straightforward call-to-action had a visitation rate of 2.1% and registration rate equal to the ease and convenience message condition (1.2%). This suggests that even a simple, direct message can be moderately effective.

Inferential Statistics

Chi-square tests were conducted to evaluate the impact of messaging strategies on the dependent variables (Table 2). Significant p-values for both visits and registrations showed that not all messaging strategies were equally effective. For registrations specifically, the Chi-square statistic was 16.9 (df = 3, N = 9,940), p = <.001, indicating significant differences in registrations based on the type of message delivered. For page visitations, the Chi-square statistic was 24.9 (df = 3, N = 9,940), p = <.001, demonstrating that registration page visits also varied significantly amongst different messages.

Table 2. Chi-square test evaluating relationship on independent and dependent variables.

	Chi-Square (χ^2)	df	Sample Size (N)	p-value
Visits	24.9	3	9,940	<.001*
Registration	16.9	3	9,940	<.001*

*indicates statistical significance

Additional analysis was conducted using Chi-square tests to compare each message against the control and determine which had the most significant impact on the dependent variables. Since registration was our main objective, the analysis specifically considered registrations (with page visitations in Appendix VI). This focused approach helped us identify which message condition most effectively influenced registration rates. Further, as illustrated in Table 3, the percentage increase or decrease in registrations is also included to compare to the control group.

The Chi-square results for each message condition's impact relative to the control are detailed in Appendix VI. Additionally, as illustrated in Table 3, we included the percentage increase or decrease in registrations to facilitate a direct comparison with the control group.

In the Chi-square test, none of the message conditions significantly enhanced registrations compared to the control. A possible explanation for why the challenging assumptions message, with 41 registrations, did not outperform the control, which had 31 registrations, might be that visitors realized they were already registered upon reaching the registration page. This realization would eliminate their need to register again, which could explain the significant difference in visitations between the challenging assumptions message condition and the control observed in our Chi-square analysis on visitation rates (Table 4). These findings partially support our second hypothesis that challenging assumptions would be a strong performer, indicating that further research is necessary to fully understand its impact.

Additionally, the control had significantly larger registrations than the social impact message condition, indicating that the message had little effect on motivating registrations overall and disproving our hypothesis that it would be the strongest performing message.

Table 3. Contingency table of registration status by message condition

	Did not Register	Registered	% +/- relative to Control Condition
Challenging assumptions	2,444	41	+32%
Social impact	2,474	11	-64%
Ease and convenience	2,456	29	-6%
Control	2,454	31	
Total	9,828	112	

Table 4. Contingency table of page visitations by condition

	Did not Visit	Visited	% +/- relative to Control Condition
Challenging assumptions	2406	79	+55%
Social impact	2456	29	-43%
Ease and convenience	2436	49	-4%
Control	2434	51	
Total	9732	208	

Hypothesis Analysis

Our hypothesis predicted that BC public servants exposed to the message condition about the social impact of saving up to eight lives would lead to the highest number of registrations. However, this was disproven as it resulted in the lowest registration rate, indicating that despite its altruistic appeal, it may not have been perceived as motivating enough.

Another hypothesis predicted that the challenging assumptions message condition would generate significant registrations and visits due to uncertainty about registration status. This was partially confirmed, with the challenging assumptions message condition recording the highest rates for both visits and registrations. However, registrations weren't significantly higher than the control group, possibly because many public servants are already registered.

Overall, these outcomes provide key insights into the effectiveness of different messaging strategies. While the social impact message condition was not supported, the challenging assumptions approach demonstrated effectiveness by achieving the highest registration rates. Further details and recommendations will be covered in subsequent sections of the report.

Post-Intervention Mini Trial

In addition to the intervention with BC public servants, the Ministry of Emergency Management and Climate Readiness (EMCR)—who sponsored our teammate Karen Smallwood to take the course through their leadership program—conducted a follow-up article for organ donation awareness month. The article was a follow-up mini trial based on the work done by our team but also aimed to encourage more staff to register for scholarships. Karen conducted an A/B trial of the two top-performing message conditions (challenging assumptions and ease and convenience). Figure 5 shows how the article appeared for staff; full details of the mini trial are outlined in Appendix III.

Figure 5. In collaboration with Lindsay Miles-Pickup and BC BIG, Karen Smallwood (UBC Team 1) ran a second trial using the same tracking methodology developed for the UBC BC Transplant trial with employees at the Ministry of Emergency Management and Climate Readiness.

Bridging the gap: Using behavioural insights to streamline organ donor registration

April is Organ Donation Awareness Month, and Karen Smallwood, a product manager here at EMCR, is working on a project with a personal connection: making it easier for people to register to become an organ donor.

Karen is enrolled in the UBC Behavioural Insights program as a Pacific Leaders scholar. As part of her final project, Karen is helping BC Transplant boost registration rates.

"It's exciting to see a Pacific Leaders scholar from EMCR making such a huge difference! Karen's project is increasing awareness of organ donation, and it's fascinating to hear about how she's applying her behavioural insights expertise," says ADM Alex Chandler. "For anyone at EMCR thinking about taking part in Pacific Leaders — enrollment in the program is open until May 31."

Part F. Recommendations

Based on our exploratory research, the results of our trial, and our collaboration with BC Transplant and other partners, we have four overall recommendations.

Scale the challenging assumptions message condition to all BC public service employees, and partner with similar government organizations to direct people to the online organ donor registry (ODR).

In our trial, the most web page traffic and number of registrations were driven by the challenging assumptions message condition—3.2% of participants that received this message went on to visit the ODR form, and 1.6% went on to register a decision. While the effect is low, that is a reasonable return on investment for an intervention that requires little effort and resources. If the same intervention and newsletter were sent to all 35,000 Public Service Agency employees, it would result in ~1,120 web page visits and ~550 new registrations. This amount could be improved even further by iterating and improving the registration process.

The challenging assumptions message condition could be incorporated into future communications as a low-cost, low-risk intervention, resulting in increased registrations when scaled to a wider audience. Furthermore, an external link reminding a recipient to double-check their registration status could be added to existing emails or other online communications to make the registration process even easier (Figure 6).

BC Transplant could also consider identifying similar audiences, such as other government or public employees. Our survey of Metro Vancouver employees, for example, indicated a higher registration rate than the average BC residents at 71%; however, 12% thought having a sticker on their driver's licence was sufficient. It may be worth reminding this audience and similar groups to double-check their registration status. Table 5 demonstrates potential registration numbers for scaling the trial to larger groups.

**Table 5.** Potential Audiences and Results

Target/Intervention	Population Size	Potential Result
E-newsletter to all BC public service employees	35,000 BC Public Servants	~500 to 600 registrations
Notification banner on Health Gateway website	1.28 million Health Gateway users (Ministry of Health, 2022)	Up to 20,000 registrations (dependent on monthly active users)
Facebook post	8,700 Facebook followers	Up to 120 registrations

While the results would depend greatly on the size of their active population and level of engagement, there are many pools of users BC Transplant can target with the challenging assumptions message condition.

Finally, BC Transplant could look to partner with other organizations with members that may be interested in donation registration or engaged in health-related services, such as Canadian Blood Services. It would take minimal effort to add messaging to their website and/or existing digital communications.

Figure 6. Example of a notification banner on Health Gateway's website and the process to double-check organ donation status. A reminder to double-check a registered decision would link to the Services page, reducing friction in the process. Currently an external link on the Services page directs users to a BC Transplant page with multiple, redundant options. If this link directed users to the ODR form directly, it would reduce friction and confusion.

RECOMMENDATION
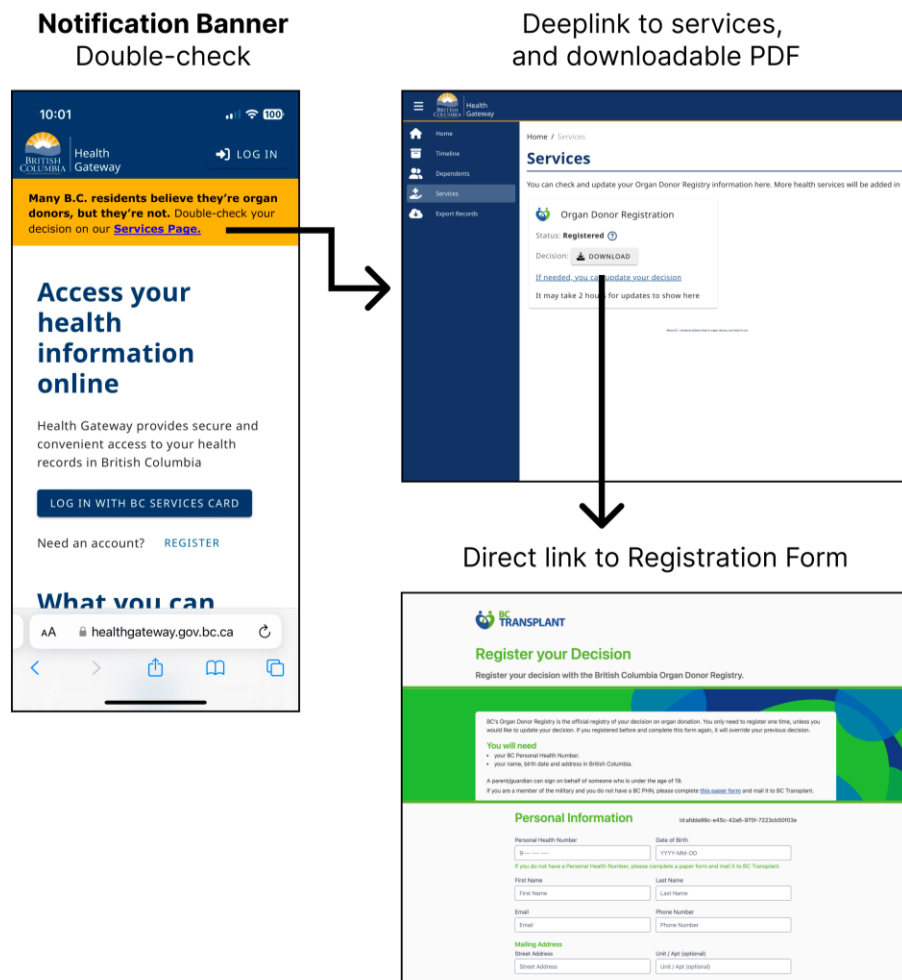
Simplify
Streamline the user experience for verifying organ donation status.

The comparable success of the "control" and "ease and convenience" messaging indicates that simplification and clarity are crucial. Ensuring the registration process is as effortless as possible might further enhance conversions.

A considerable number of individuals who believed they were registered or were unsure about their registration status used the wrong channels. A promising strategy could involve nudging those uncertain about their registration to verify their status via BC Transplant's online platform, which hosts a verification page and a link to Health Gateway, where users can see their medical records and donation status (https://register.transplant.bc.ca/verification).

Our intervention used the organ donation registry form as its landing page for all conditions. This wasn't ideal for our best-performing message condition challenging assumptions ("Many B.C. residents believe they're organ donors, but they're not"). While the message drove the most traffic to the ODR form, the percentage of users that went on to complete the form was lower than the control as the web page didn't offer a way to verify status. Ideally, BC Residents who are reminded to check their donation status would be directed to the verification page. There, users can check if they have registered their decision in less than a minute using their Personal Health Number (PHN).

During our exploratory research phase, a heuristic evaluation of the user experience revealed unnecessary confusion in the verification process. On BC Transplant's website, a prominent button directs users to Health Gateway to verify their registration status. This external portal is only accessible through a BC Services Card and account. Creating a new account to check registration status is a multi-step process that takes days to resolve, derailing the user from their goal.

To encourage and simplify registration verification on BC Transplant's website, we recommend:
- Prioritizing verification via PHN and positioning "View on Health Gateway" as a secondary option
- Prefacing the Health Gateway option with language "If you already have an account..."
- Prompting those that confirmed they are not registered with a prominent call-to-action button to register
- Offering those that have registered the opportunity to modify their registration
- Adding the ability to share the registration link and the verification link on social media platforms

Figure 7 demonstrates how the donor registry verification page could be modified to improve user both user experience and engagement.

Figure 7. Left-hand side, current verification form. Right-hand side, recommended form where verification via Personal Health Number is the primary call-to-action, the option to View on Health Gateway is deemphasised, and only users that already have a BC Service Card are recommended that option.
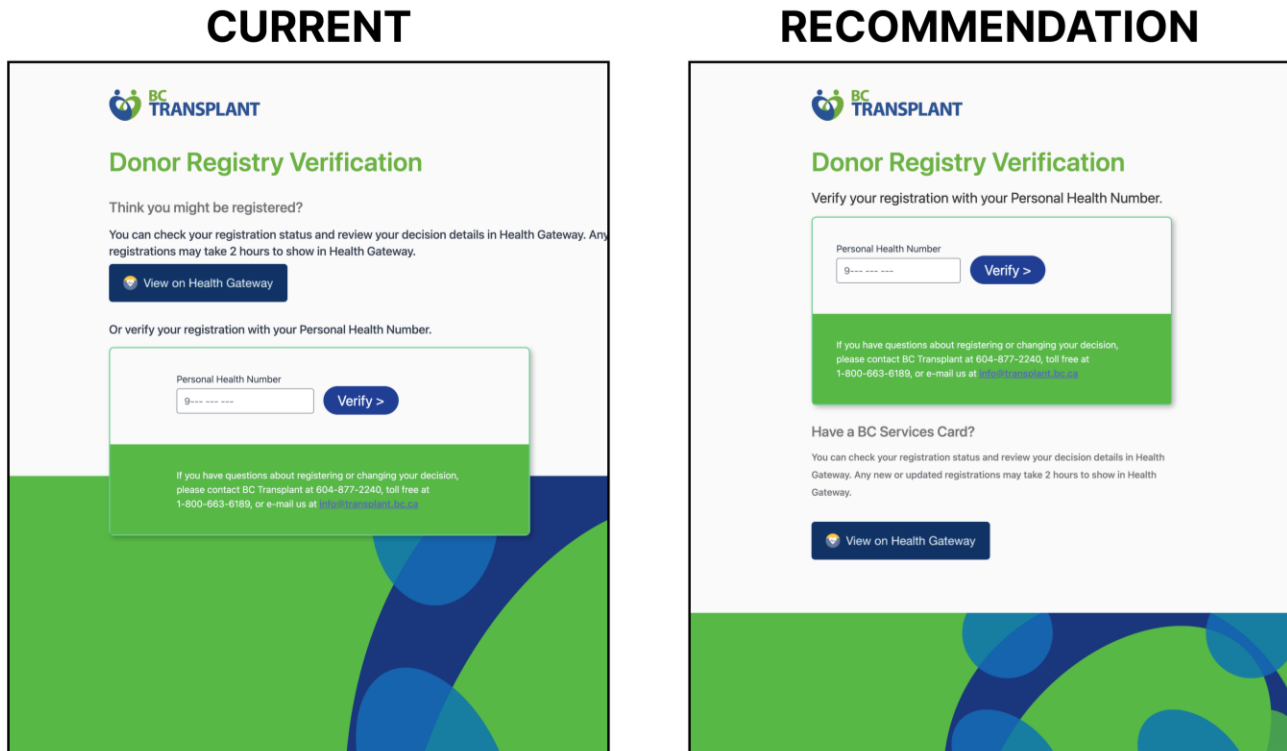
Test
Further test the challenging assumptions messaging to encourage registration verification in a more focused campaign.

Our challenging assumptions message condition outperformed the other, more typical calls-to-action. We recommend testing similar messages outside the limitations of text-heavy emails. Social media channels (Facebook, Instagram, YouTube Shorts, TikTok) lend themselves to simple, highly visual messaging, and can link directly to the relevant web page for each social post's message.

Further iteration of the combined social norm message and subsequent call-to-action may further improve response rates. This can include clarifying registration misconceptions and provide immediate confirmation of registration status. A more direct call to "Double check your registration!" or "Verify your registration in less than a minute!" may be more compelling than asking users to "Register your decision today!".

Another area worth exploring is the timing, frequency, and scheduling of this style of message. The challenging assumptions message condition is essentially a reminder, and we expect its effectiveness would diminish if exposed repeatedly to the same audience.

Soon after our trial, BC Transplant used messaging on Instagram highlighting a common misconception about organ donation in BC (Figure 8).

Figure 8. BC Transplant message on Instagram that says *"That little sticker on your licence doesn't mean you're a registered organ donor. Gasp! We know. It's confusing. You have to register to be an organ donor—whether you had the sticker or not."* From www.instagram.com/bc_transplant on April 23, 2023.
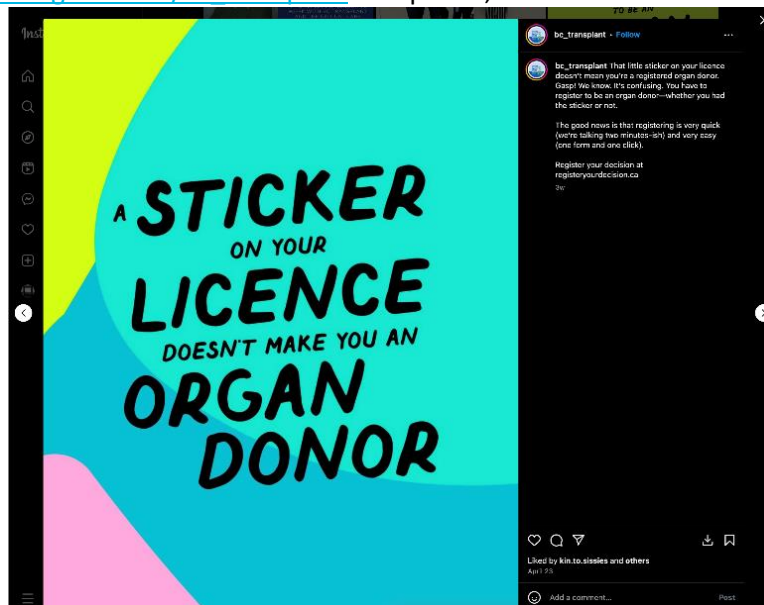
Implement
Tracking organ donation registrations and BC Transplant website activity

One of the successes of the project was working with the Provincial Health Services Authority who manages the organ donor registry. Working together, we developed a way to track form completion, determine which message a user originated from, and monitor activity via Google Analytics. This measurement and tracking method could be deployed in the future by BC Transplant to track the performance of future digital campaigns.

Furthermore, we met with the Ministry of Citizen Services and their data analysis team. Their recommendation is to implement Snowplow Analytics (snowplow.io) on the BC Transplant website. Snowplow is the approved platform for tracking and collecting anonymized data by the Government of BC as outlined in Appendix V. Once integrated, BC Transplant can collaborate directly with the Ministry of Citizen Services to provide analysis and support on future projects.

Part G. Discussion of BI & Research Ethics

Nudging British Columbians to register their decision to donate garners a greater pool of registered donors, improves the chances of transplant patients receiving life-saving care, eases end-of-life decisions for families dealing with a potential donor's death, and streamlines the healthcare system.

Our study adhered to current ethical guidelines throughout the project and would maintain those guidelines if scaled beyond the trial itself.

Exploratory Research

Our exploratory research was conducted via an optional survey to both Metro Vancouver employees and BC Public Service employees. This research maintained freedom of choice, transparency, anonymity, and equity.

The survey was distributed to staff by email and intranet article—both methods could be seen by all staff. The survey was prefaced with a brief introduction of the topic and sponsor (UBC)—transparency that helped alleviate potential confusion that the survey was coming from their respective employer.

All questions were optional except for asking participants where they lived as it was critical we received information from BC residents specifically as no one out of province was eligible to register as a donor. Responses were anonymous. To encourage survey response rates, we offered participants the chance to enter a contest to win one of seven $50 Amazon gift cards. Data was collected through a separate form and not traceable back to the original survey data.

Experimental Research

Our planned BI solution maintained freedom of choice, as BC public servants were free to disregard the message. The monthly e-newsletter was familiar to BC public servants and the message conditions were a small addition, treated like another piece of news/information. The language for the intervention articles was neutral so as not to appear as the employer asking or pressuring its employees to register.

Participants could choose whether to engage with the message condition and choose whether to register their decision. Furthermore, no registration decision is permanent—decisions can be updated at any time.

While the articles for the intervention were clearly in support of organ donation, the messages did not encourage participants to register a 'yes' decision, but rather they encouraged participants to register a decision — a 'yes' or 'no'.

The process to register a decision required little effort (two minutes and an MSP number) from the participant at no financial cost. Their decision (positive or negative) is considered part of their medical record and is kept confidential. Neither UBC nor BC Transplant can access that information—guaranteeing privacy.

And lastly, while the audience for this intervention is specific to BC public servants, BC Transplant does not exclude anyone from registering their decision to donate and everyone is welcome to register. This gives BC Transplant the option to scale up the intervention upon completion of the trial.

Scaling

It was critical to the research design that the BI solution be easily and reasonably replicated. The recommendations to scale up are digitally based, use BC Transplant's existing website, and rely mainly on staff time to implement—all solutions are both feasible and affordable.

The recommendations to scale also maintain freedom of choice in that the audience can choose whether to click/register—nothing is mandatory. However, it is critical that should BC Transplant partner with government or other like-minded organizations to deliver their message, that the message be marked as "external" or "sponsored" content so as not to appear as the employer pressuring/expecting their employees to take action.

While our recommendations to scale up are rooted in evidence from our intervention, we've noted that a focused campaign on registration verification would initially need more research as the trial project landing page was not conducive to further verification action.

Evidence Limitations

- Non-random sample: our intervention was conducted amongst BC public servants as the group matched the conditions for a randomized controlled trial—however, our research showed this group was more supportive of organ donation than the average public with many believing they were already registered donors.
- External validity: the intervention's most clicked message related to people thinking they're registered but aren't. If we ran our intervention with the public, we might not observe the same click-through-rate as the public's support for organ donation, while still positive, doesn't match those of government employees.
- Contamination: the intervention was administered to BC public servants in March after they were exposed to exploratory research in December, which means that a proportion of those receiving the intervention could have seen organ donation messages twice from their employer.
- Internal validity: with our audience exposed to organ donation messaging twice in a short window, we could have observed a higher response rate because people were prompted for that topic, or a lower response rate because people might have thought it was the same topic as before and weren't inclined to click further.

Potential Misuse for BI Solution

- Overgeneralization: our study was conducted exclusively with government employees (BC public servants) through their internal monthly email. Applying the BI solution to other audiences with the same message and different delivery methods could yield inconsistent results.

Potential to Further Optimize the BI Solution

- Visual and placement limitations: due to the formatting and content of the Public Service Agency message condition was limited in how it was presented. Had we been able to stylize the article in a more visually appealing way and positioned it closer to the beginning of the article, we could have observed better results.

Part H. Project Reflections

Project Challenges

- Data and tracking: accessing data on visits to the organ donor registry and tracking those visits into registrations of an organ donation decision was not simple. This was compounded by concerns around patient privacy, which made it difficult for BC Transplant to collect data confirming a patient's registration decision.
- Audience: finding a suitable audience to test our solution within the intervention timeframe was difficult. While other agencies such as Health Gateway were eager to help, finding and involving these secondary partners and developing a substantive intervention that would meet the requirements of an RCT was not possible.
- Communications: changes to the website required approvals/scheduling with the Provincial Health Services Authority that the intervention timeframe couldn't accommodate. This limited our options as we identified many barriers and inconsistencies in the registration process that could have improved registration rates.
- Partners: in-person campaigns rely on partnerships with other governmental agencies such as ServiceBC and ICBC and depending on their priorities, may not have the ability to assist.

Limitations

Research limitations include several factors that impact the interpretability and generalizability of the findings:

- Sample bias and representativeness: the intervention was conducted among BC public servants who might not be representative of the general population. This group could have higher awareness and potentially more favorable attitudes towards organ donation compared to other segments of the population.
- Low open rates of e-newsletters: the effectiveness of the intervention is dependent on the recipients opening the e-newsletters. Without knowing the e-newsletter open rate, exposure to the articles is unknown.

- While we successfully launched a true randomized controlled trial with a large sample population, the scope and presentation of the intervention were limited. Our messaging was confined to text only and was bundled with other unrelated messaging, which prevented it from being as prominent as we would have preferred.
- Generalization of findings: the results are specific to the settings and conditions of the message condition format and the messaging used. These findings might not generalize to other formats or messaging strategies that could be employed in different contexts or with different populations.

These limitations suggest caution in interpreting the results and recommend considering these factors in future research and implementations to enhance the effectiveness and applicability of the findings.

Lessons Learned

1. Data is key and tracking an audience needs to be in place prior to any study.
2. Interventions requiring the input of government departments can take a long time—ensure expectations are managed accordingly.
3. Secure a suitable audience early and keep looking for opportunities to grow it.
4. If our sample size wasn't as large, it's possible no change would have been detected.
5. An ideal intervention would have included both testing message conditions as well as interrelated improvements to website user flows to support the user experience and improve overall performance.

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Appendices

Appendix I. Qualitative Research Survey

Intro
Welcome! This is a survey about BC Transplant and organ donor registration. We are conducting this survey as part of a Behavioral Insights class project at UBC Sauder School of Business.

The survey should take about 8 minutes. You will review messaging related to organ donation registration and answer questions about the process and yourself. Your answers will be anonymous. You may withdraw from the survey at any time by closing your browser window.

No identifying information will be collected. At the end of the survey, you may submit your email for a **chance to win one of 7 x $50 Amazon gift cards.**

Data will be stored on the advising professor's encrypted, password-protected computer for a period of at least six months.

If you have any questions or complaints, you may contact any of the following:
Student Project Leader: Talent Pun, info@talentpun.ca
Advising Professor: Katherine White, Katherine.White@sauder.ubc.ca
Principal Investigator (PI): David J. Hardisty, david.hardisty@sauder.ubc.ca

If you have any concerns or complaints about your rights as a research participant and/or your experiences while participating in this study, contact the Research Participant Complaint Line in the UBC Office of Research Ethics at 604-822-8598 or if long distance e-mail RSIL@ors.ubc.ca or call toll free 1-877-822-8598.

Clicking the button below indicates that you consent to participate in this study.

This survey is only open to people 18 years of age and older that live in the province of British Columbia.

1.2 Age What is your current age?
o   Younger than 18 years (1)
o   18 - 24 years (2)
o   25 - 34 years (3)
o   35 - 44 years (4)
o   45 - 54 years (5)
o   55 - 64 years (6)
o   65+ years (7)

1.3 Region Please indicate your primary place of residence:
o   British Columbia (1)
o   Another province or territory in Canada (2)
o   Outside of Canada (3)
o   Prefer not to say (4)

Intro - Reg Status
This survey concerns organ donation in BC and the decision to donate organs after your death to help patients in need of a transplant.

During the survey, you are free to withdraw at any time, without having to give a reason. To withdraw, please exit the browser or avoid pressing the submit button on the last page.

2.1 Reg Status
Have you registered your decision regarding organ donation in BC?
o   Yes, I know I have registered my decision (1)
o   I think I have registered my decision, but not sure (2)
o   No, I have not registered my decision (3)
o   I don't know (4)

2.2 Reg Decision
You mentioned you have registered your decision regarding organ donation in BC. Did you consent to being a donor?
o   I consented to be an organ donor (1)
o   I did not consent to be an organ donor (2)
o   I don't know (3)
o   Prefer not to say (4)

2.3 Reg Channel
You mentioned that you've registered your decision to be an organ donor or think you have. How did your register? If you've registered in different ways, choose the most recent way.
o   Recorded intent with a notary or while estate planning (11)
o   Told a close family member(s) (12)
o   Registered by **mail** via BC Transplant (13)
o   Registered **in-person** via an ICBC licence sticker (14)
o   Registered **in-person** via government offices (ICBC, Service BC, BC Transplant) (15)
o   Register **online** via BC Transplant (16)
o   Register **online** via Health Gateway (17)
o   You don't have to register; it's assumed unless you register no to organ donation after your death (18)
o   Other (specify) (19) _____
o   I do not know (20)

2.4 Reg Tenure
How long ago did you register your decision?
o   Within the past year (1)
o   1 - 2 years (2)
o   3 - 5 years (3)
o   6 - 10 years (4)
o   10+ years (5)
o   I don't know (6)

3.1 Likely to reg
How willing would you be to register your decision to be an organ donor after death?
o   Definitely would register (1)
o   Probably would register (2)
o   Might or might not register (3)
o   Probably would not register (4)
o   Definitely would not register (5)

3.2 Reg awareness
To the best of your knowledge, how does a person in BC officially express their decision to donate their organs? Choose all that apply.
- ☐ Record intent with notary or while estate planning (1)
- ☐ Tell close family member(s)   (2)
- ☐ Register by **mail** via BC Transplant (3)
- ☐ Register **in-person** via an ICBC licence sticker (4)
- ☐ Register **in-person** via government offices (ICBC, Service BC, BC Transplant) (5)
- ☐ Register **online** via BC Transplant (6)
- ☐ Register **online** via Health Gateway (7)
- ☐ You don't have to register; it's assumed unless you register no to organ donation after your death (8)
- ☐ Other (specify) (9) _____
- ☐ I do not know (10)

3.3 Reg Confidence
How confident are you that you know how to register your intention to become an organ donor after death?
- o Not at all confident about how to register   (1)
- o Slightly confident with a limited understanding of how to register   (2)
- o Moderately confident with a fair understanding of how to register (3)
- o Confident with a good understanding of how to register (4)

4.1 HG Engagement
We're now going to talk about Health Gateway, an online platform used by the BC government and residents that digitally stores personal health records. When did you last log in and use Health Gateway?
- o Less than 1 month ago (1)
- o 1 to 3 months ago (2)
- o 4 to 6 months ago (3)
- o 7 to 12 months ago (4)
- o Over 12 months ago (5)
- o I am aware of Health Gateway but haven't used it (6)
- o I am not aware of Health Gateway (7)

4.2 Reg Channel
Were you aware that you can confirm your organ donation registration status online through Health Gateway?
- o Yes, I am aware, and I **have** previously checked my organ donation status online (1)
- o Yes, I am aware, but I have **never** checked my organ donation status online (2)
- o No, I was unaware of the option to check through Health Gateway, but I **plan to check now** (3)
- o No, I was unaware of the option to check through Health Gateway, and I **do not plan to check** (4)

4.3 While we know you are a registered donor, we are now going to ask you some questions to understand what kind of messages might have been influential for you in making your decision to be a donor.

6.01 Influence Qual
What do you think are the most compelling reasons why people do decide to register their decision to be an organ donor?

6.02 Barriers Qual
What do you think are the most common barriers that stop people from registering their decision to be an organ donor?

6.1 Group 1

Consider the following statements that people have mentioned positively influenced their decision to register their organs for donation. Please indicate the degree to which each statement would positively impact your likelihood to register your decision to become an organ donor.

	Not at all likely (1)	Less likely (2)	Neutral (3)	Somewhat likely (4)	Very likely (5)
If I was in need of a transplant and would accept a donated organ, I should be willing to register and donate (1)	○	○	○	○	○
One day, someone I love may need a transplant, so I should be willing to register and donate (2)	○	○	○	○	○
Registering my decision would take the burden off my family after my death (3)	○	○	○	○	○
One individual donor could save up to 8 lives (4)	○	○	○	○	○
People from minority ethnic groups are more likely to need an organ transplant (5)	○	○	○	○	○
There are currently more than 500 people in BC who are in need of a transplant (6)	○	○	○	○	○
Around 20 people die each year waiting for an organ (7)	○	○	○	○	○
Successful transplants have happened using organs from donors who were more than 60 years old (8)	○	○	○	○	○
It takes less than two minutes to register your decision online (9)	○	○	○	○	○
When registering, you can specify which organs you'd be willing to donate (10)	○	○	○	○	○
If you ever decide you want to change your organ donation status, updating your choice online is quick and easy (11)	○	○	○	○	○
Although over 90% support organ donation, only 32% are registered on the BC Organ Donor Registry (12)	○	○	○	○	○
Fewer than 160 British Columbians donate their organs each year (13)	○	○	○	○	○
Although over 45,000 people die in BC every year, fewer than 2% die under circumstances that would allow them to donate their organs (14)	○	○	○	○	○

Attention Check Here's a simple question that has nothing to do with organ donation. When asked for your favourite drink, you need to select tea.

Based on the text above, what is your favourite drink?
○ Coffee (1)
○ Milk (2)
○ Water (3)
○ Tea (4)
○ Hot Chocolate (5)
○ Juice (6)

5.0 Messaging
On the next few screens you will see various statements for organ donation. Please review thoroughly before advancing to the next screen.

5.1 Stmt 1
Based on the message below, how likely would you be to register to be an organ donor in BC after death?
"If you needed an organ transplant, would you get one in time?"

- o   Definitely would register   (1)
- o   Probably would register (2)
- o   Might or might not register (3)
- o   Probably would not register (4)
- o   Definitely would not register (5)

5.2 Stmt 1
What thoughts and reactions went through your mind while you read the message? Please type your thoughts here:

_____

5.1 Stmt 2
Based on the message below, how likely would you be to register to be an organ donor in BC after death?
"Register your decision to be an organ donor once and save someone's life"

- o   Definitely would register   (1)
- o   Probably would register (2)
- o   Might or might not register (3)
- o   Probably would not register (4)
- o   Definitely would not register (5)

5.2 Stmt 2
What thoughts and reactions went through your mind while you read the message? Please type your thoughts here:

_____

5.1 Stmt 3
Based on the message below, how likely would you be to register to be an organ donor in BC after death?
"90% of BC residents support organ donation, but only 32% have registered"

- o   Definitely would register   (1)
- o   Probably would register (2)
- o   Might or might not register (3)
- o   Probably would not register (4)
- o   Definitely would not register (5)

5.2 Stmt 3
What thoughts and reactions went through your mind while you read the message? Please type your thoughts here:

_____

5.1 Stmt 4

Based on the message below, how likely would you be to register to be an organ donor in BC after death?

"You can save or transform up to 8 lives as an organ donor"

o Definitely would register   (1)
o Probably would register (2)
o Might or might not register (3)
o Probably would not register (4)
o Definitely would not register (5)

5.2 Stmt 4

What thoughts and reactions went through your mind while you read the message? Please type your thoughts here:

_____

5.1 Stmt 5

Based on the message below, how likely would you be to register to be an organ donor in BC after death?

"It takes less than 2 minutes to register to become an organ donor"

o Definitely would register   (1)
o Probably would register (2)
o Might or might not register (3)
o Probably would not register (4)
o Definitely would not register (5)

5.2 Stmt 5

What thoughts and reactions went through your mind while you read the message? Please type your thoughts here:

_____

5.1 Stmt 6

Based on the message below, how likely would you be to register to be an organ donor in BC after death?

"Join thousands who have chosen to make life-changing impact through organ donation"

o Definitely would register   (1)
o Probably would register (2)
o Might or might not register (3)
o Probably would not register (4)
o Definitely would not register (5)

5.2 Stmt 6

What thoughts and reactions went through your mind while you read the message? Please type your thoughts here:

_____

5.3 Rank Order

Now, please drag and drop the messages below so they appear in order of preference. The **first message (1) is most likely** to increase your likelihood to register as an organ donor and the **last message (6) is least likely** to increase your likelihood to register.

_____ If you needed an organ transplant, would you get one in time? (1)
_____ Register your decision to be an organ donor once and save someone's life (2)
_____ 90% of BC residents support organ donation, but only 32% have registered   (3)
_____ You can save or transform up to 8 lives as an organ donor (4)
_____ It takes less than 2 minutes to register to become an organ donor (5)
_____ Join thousands who have chosen to make life-changing impact through organ donation (6)

Appendix II. Qualitative Research Results

Registration Channel by status

	Yes (n=339)	Unsure (n=75)	No (n=50)
	%	*%*	*%*
Although over 90% support organ donation, only 32% are registered on the BC Organ Donor Registry	*69*	*69*	*55*
Around 20 people die each year waiting for an organ	*69*	*89*	*78*
One individual donor could save up to 8 lives	*68*	*95*	*83*
One day, someone I love may need a transplant, so I should be willing to register and donate	*68*	*86*	*80*
There are currently more than 500 people in BC who are in need of a transplant	*67*	*88*	*81*
It takes less than two minutes to register your decision online	*66*	*86*	*66*
If I was in need of a transplant and would accept a donated organ, I should be willing to register and donate	*66*	*75*	*79*
Registering my decision would take the burden off my family after my death	*65*	*83*	*57*
Successful transplants have happened using organs from donors who were more than 60 years old	*64*	*69*	*57*
If you ever decide you want to change your organ donation status, updating your choice online is quick and easy	*64*	*74*	*62*
When registering, you can specify which organs you'd be willing to donate	*62*	*59*	*62*
Although over 45,000 people die in BC every year, fewer than 2% die under circumstances that would allow them to donate their organs	*61*	*47*	*51*
Fewer than 160 British Columbians donate their organs each year	*58*	*66*	*52*
People from minority ethnic groups are more likely to need an organ transplant	*56*	*47*	*49*

Driving Forces

When analyzing open-ended responses on motivations for organ donor registration, a predominant theme emerged, with 25% expressing the desire to save lives ("save lives when yours has been lost"). The specificity of these responses suggests a clear motivation regarding the potential lifesaving impact of organ donation.

Following closely, altruistic motives constituted approximately 20% of responses, wherein individuals expressed a commitment to helping others — characterized by the desire "to give and make a possible difference in someone's life." Altruistic motivations encompass empathy, compassion, and a willingness to help others without expecting personal gain.

Restraining Forces

The most prominent barrier to registering was discomfort with death and religious beliefs (26%). Fear, judgment, and discomfort associated with the idea of body dismemberment were highlighted as significant factors.

A second barrier was a lack of knowledge or understanding of the registration process (20%). Issues such as not knowing how to register, confusion, and a complicated process contributed to this barrier. Furthermore, assumptions that individuals are already registered (18%) were identified as a noteworthy barrier, emphasizing a need for clearer communication and confirmation mechanisms.

Background

The Ministry of Emergency Management & Climate Readiness (EMCR) supported the Pacific Leader sponsorship of one of our teammates (Karen Smallwood) and wanted to conduct a follow-up article for organ donation awareness month to encourage more staff to register for Pacific Leaders scholarships. Karen asked if she could also test two of the messages from the trial to confirm which one performed best.

Research Design

The research design was a split test message trial testing the top two message conditions (challenging assumptions and ease and convenience) from the intervention. This was to test if the message to get users to verify their decision continued to perform better than other messages.

EMCR has 476 staff that were randomized into two lists of 238, one list for each message. The remainder of the e-newsletter for both groups was consistent and the only difference was the message outlined below and the link to the organ donor registry (ODR) web page.

Messaging was delivered on April 19, 2024 and all visits and registrations were received by April 25, 2024.

Challenging assumptions: "Many BC residents believe they're organ donors, but they're not."	**n=238**
Ease and convenience: "It takes less than 2 minutes to register to become an organ donor."	**n=238**

Email
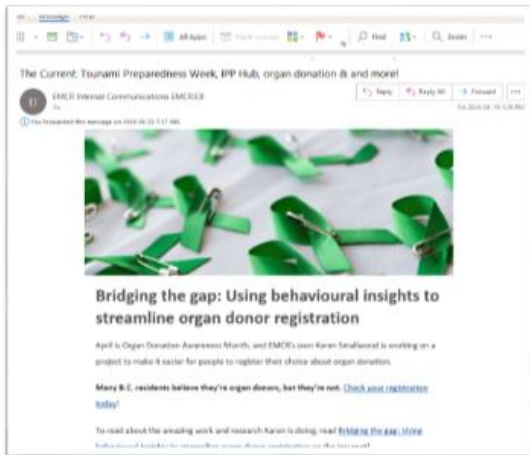
Intranet Article

Data was coded in the same way as the original trial:
- Independent variable – 4-level message condition
- Dependent variables:
  - DV1 – Visits – Coded '1' for visit, '0' for no visit
  - DV2 – Registrations – Coded '1' for registration, '0' for no registration
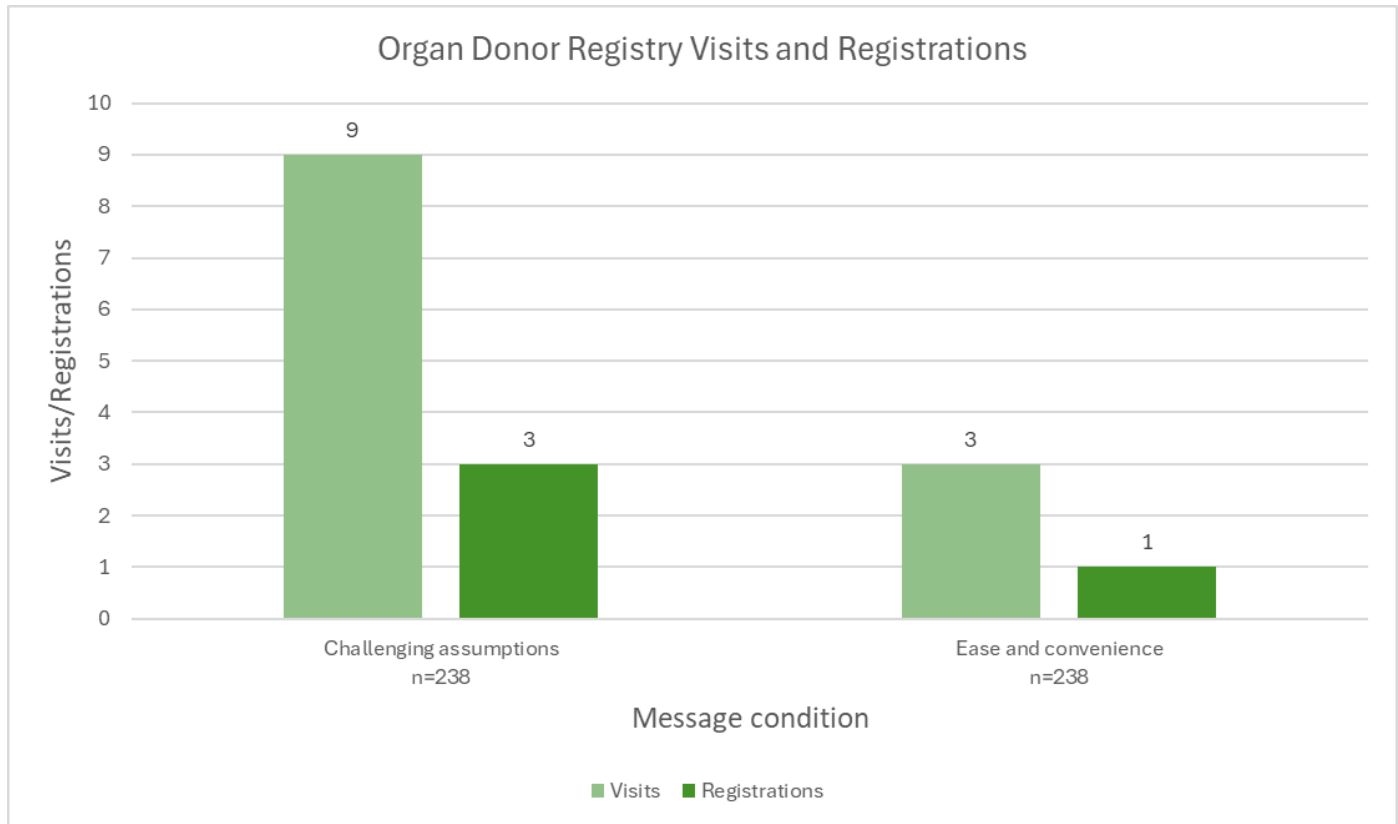
Metrics were tracked the same way as our intervention using:
- Google Analytics campaign codes
- Organ donor registry (ODR) card codes

Research Results

The research results are as follows:

Message condition	Visits	Registrations
Challenging assumptions n=238	9	3
Ease and convenience n=238	3	1

A t-test analysis was completed on the results and found that the Ministry of Emergency Management & Climate Readiness staff choose the challenging assumptions message condition (M = 0.013, SD = 0.112) more than the ease and convenience message condition (M = 0.004, SD = 0.065), t(474) = 1.003, p = 0.316.

This difference was not statistically significant, indicating that the preference for the messages could be due to random chance.

Reflections

- The challenging assumptions message condition continued to outperform the ease and convenience message condition, however with a limited number of visits and registrations this could be due to random chance.
- Email message conditions to BC public servants has a limited shelf life and this should be considered for future interventions.
- "Bundling" the message within an "action" email seems to assist the nudge. However, ethical implications should be considered (such as users feeling that they are required to act).

Appendix IV. Analytical Tracking Guide

This guide provides instruction on how to create a URL that can be used with any campaign and have it track visits in Google Analytics as well as registrations in the Organ Donor Registry.

Most of the URL can be formatted through an auto URL generator – https://ga-dev-tools.google/ga4/campaign-url-builder/

Information for the URL generator
1. Website URL = domain/page that you want to send people to e.g. https://register.transplant.bc.ca (required)
2. Campaign ID = id code that you want to show in Google Analytics e.g. 1 (not required)
3. Campaign source = where people are coming from e.g. newsletter (not required)
4. Campaign medium = what medium are they getting this information via e.g. email (not required)
5. Campaign name = same as card code e.g. UBC1 (required)
6. Campaign term = (not required)
7. Campaign content = (not required)

The final URL looks something like this:
https://register.transplant.bc.ca?utm_source=newsletter&utm_medium=email&utm_campaign=UBC1&utm_id=1

Now you need to add the card code to the URL too. This is done by adding "&location=" then the card code (e.g. UBC1) between "email" and "&utm_campaign" as highlighted below
https://register.transplant.bc.ca/?index&utm_source=newsletter&utm_medium=email&location=UBC1&utm_campaign=UBC1&utm_id=1

The final URL should look something like this:
https://register.transplant.bc.ca/?index&utm_source=newsletter&utm_medium=email&location=UBC1&utm_campaign=UBC1&utm_id=1

Tracking data in Google Analytics
1. Select the property & App you want to track (transplant.bc.ca or register.transplant.bc.ca). Ensure you select the property that has G4A after the name.
2. Go to Reports on the left-hand side.
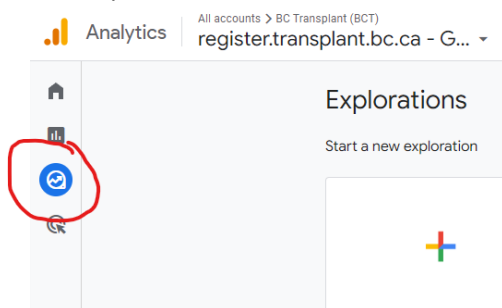
3. Select "Blank" to create a new exploration.
4. Name the exploration something relevant.
5. Select the date range you would like to track.
6. Under dimensions select:
   a. Traffic source:
      i. Session campaign (this is the campaign listed in the URL above)
      ii. Session source/medium (if you are tracking)
7. Under metrics select:
   a. Total users, new users and returning users (depending on which you would like to track).
8. Click the top right blue button that says "import".
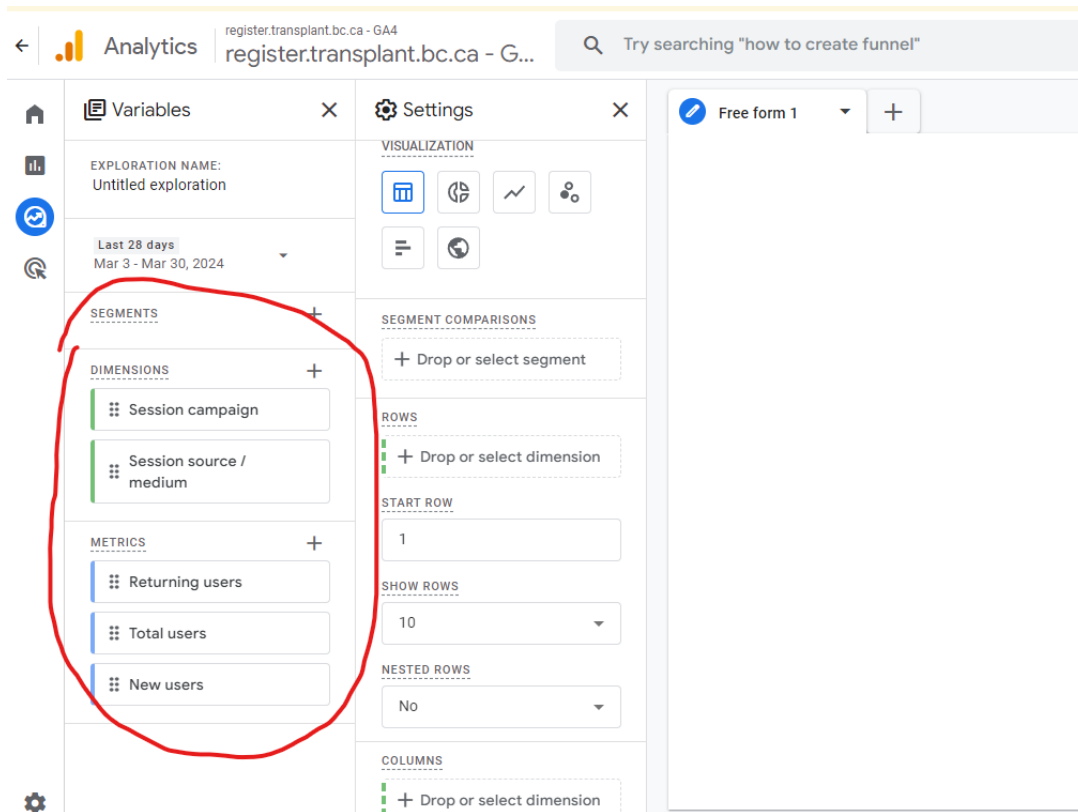
9. The dimensions and metrics selected now appear on the left for you to select.
   a. You can also select a date dimension if you would like to see a breakdown by day.
10. Under row – drag a dimension selected (session campaign).
11. Under values – drag one of the metrics selected (users).
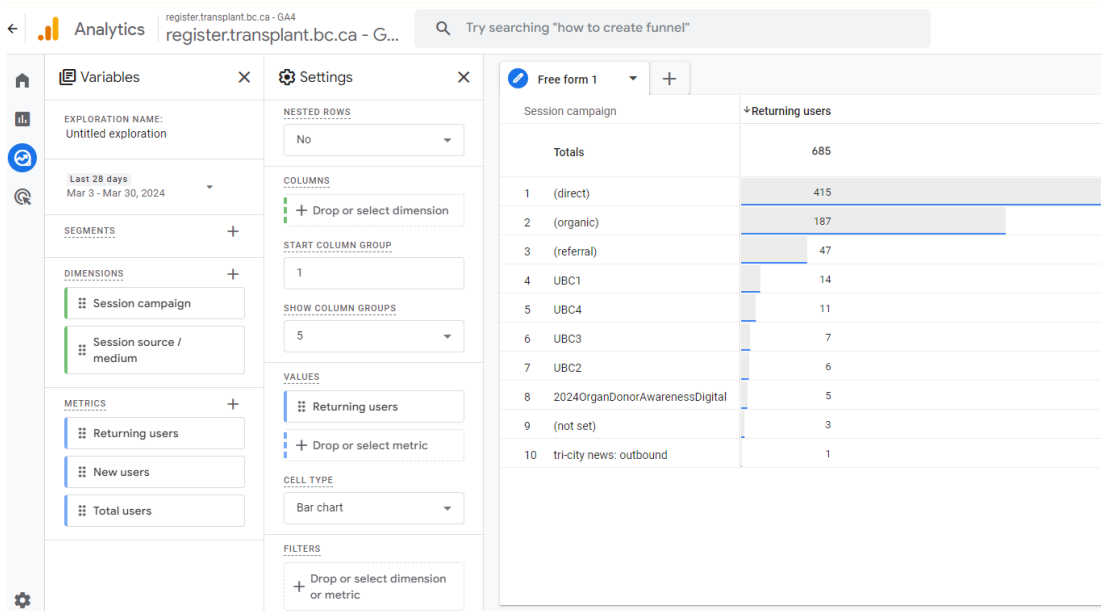
12. To filter the results to only show campaign codes, select filters.
    a. Session source/medium > contains > newsletter / email (if you added this to the URL
    b. Apply
13. It will now only show results from URLs you created with the source = newsletter and medium = email in the URL you created.
14. If you did not add source and medium to the URL, you could alternatively add a filter for session campaign and add the campaign name that you would like to track (in our example this is UBC).

Appendix V. Snowplow Analytical Tracking

The Ministry of Citizen Services on behalf of the Provincial Government of BC offers a service called Snowplow Analytical tracking.
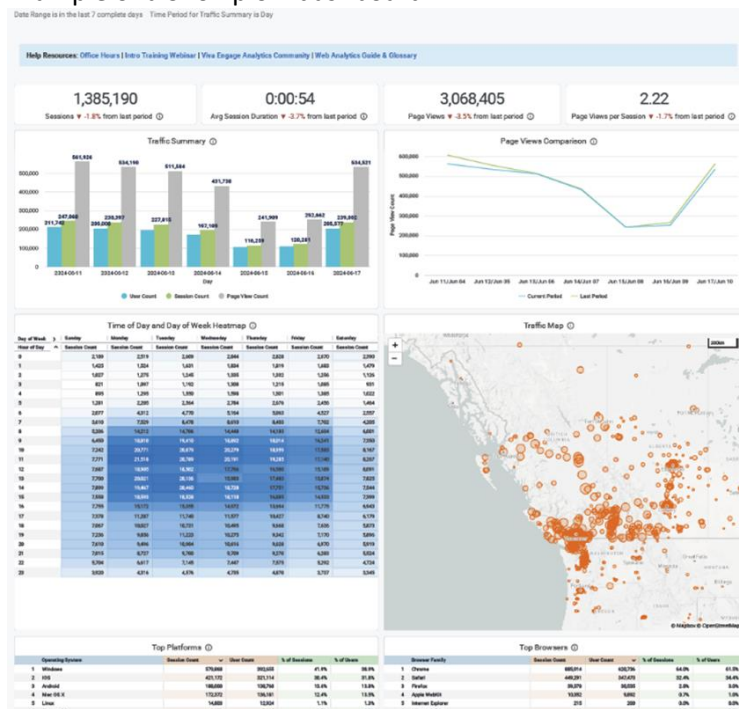
Snowplow:
- is managed and controlled by the Ministry of Citizen Services
- anonymizes data and is located within Canada
- has the associated Privacy Impact Assessment and Security Threat Assessment

Snowplow offers improved clarity with the "event specification". This gives all users a clear understanding of the events and entities being tracked as well as the validation in place. You can also detail how tracking should be implemented, including instructions on where and how events should be triggered, as well as screenshots. Combined with Snowplow's underlying schema technology, teams using Snowplow not only have access to rich, high-quality behavioral data, but can also collaborate more effectively and scale the use of the data to more applications in the organization (Edwards, 2024).

The Ministry of Citizen Services offers the Snowplow service on many high-profile Government websites and applications in the Justice and Health sector. They have offered to assist in the integration of Snowplow analytical tracking and think that they may be able to do it at no cost (as it could be provided under an existing memorandum of understanding (MOU) with the Ministry of Health). We recommend pursuing the integration of Snowplow as this will allow BC Transplant to validate and tweak the effectiveness of their campaigns.

Example of a Snowplow dashboard:

Appendix VI. Statistical Analysis

Implementation & Data Collection

Data organization	A spreadsheet compiled and organized the data. This spreadsheet included 9,940 rows, with each row corresponding to an individual participant and their responses divided by message conditions. The message condition was the independent variable.
Initial coding	All rows were coded with a '0'.
Integration of Google Analytics data	GA data was used to update the dataset. Every visit recorded in GA for each message condition was coded as a '1' in the corresponding row—indicating a web page visit.
Incorporation of registration data	Like the page visit data, each ODR form submission (registration) from the ODR page per message condition was also coded with a '1'—indicating a registration.
Registration and visits tab	After coding, a separate file was created containing only the message conditions and those who visited or registered. This helped to compare each message condition to the control condition instead of overall results from the entire dataset including those who did not visit or register on the ODR.
Data saving and conversion	After coding and updating the dataset with necessary data points from GA and the ODR, the file was saved in CSV format.
Statistical analysis preparation	The saved CSV was then opened in JASP, to prepare for detailed statistical analysis. Within JASP, the Frequencies tab was accessed to set up the initial data view. Contingency tables were created with 'condition' as rows and 'visits' and 'registrations' as columns.

Descriptive Statistics

Figure 9. Conversion Rate per Message condition from Visits to Registration
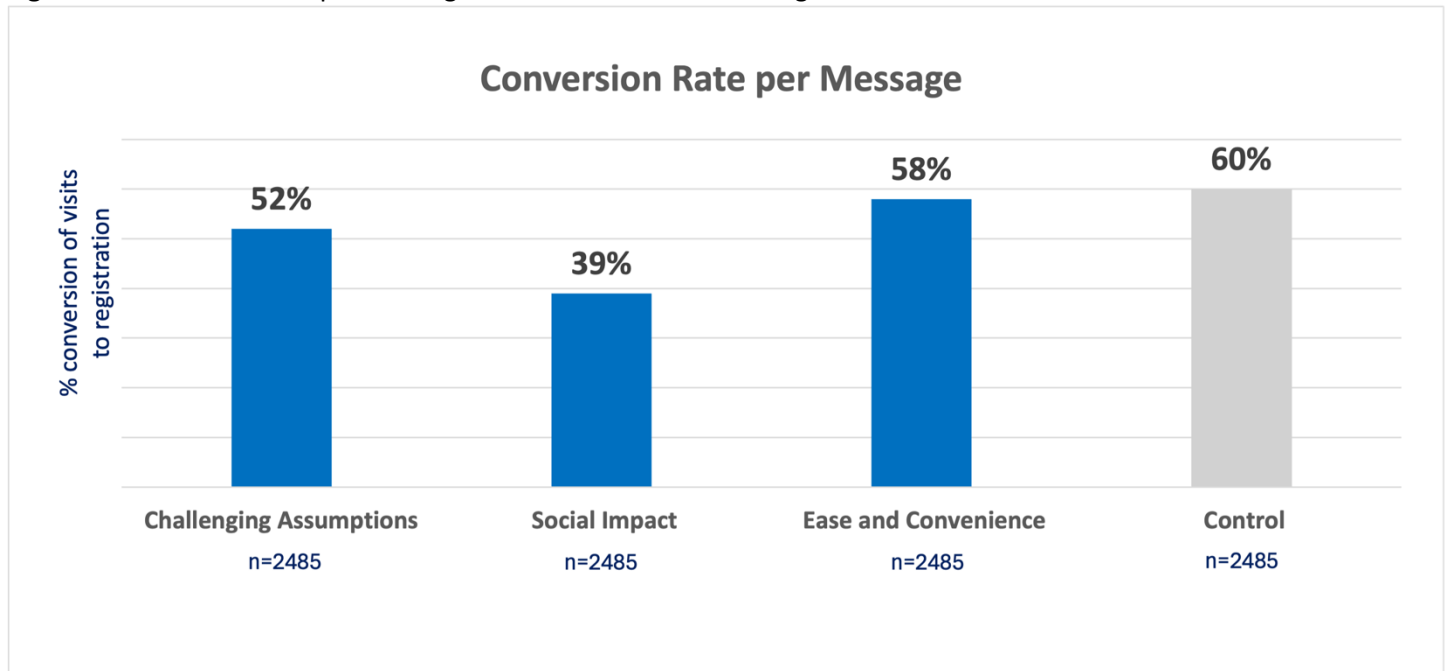
Figure 10. Percentage Difference in Page Visits per Test Message

Difference in Form Visits per Test Message, Compared to Control

Number of Form Visits

Challenge Assumptions
Many B.C. residents believe they're organ donors, but they're not.
79 ⬆ +58%

Social Impact
A single organ donor can save up to 8 lives.
28 ⬇ -44%

Ease and Convenience
It takes 2 minutes to register as an organ donor.
48 ⬇ -4%

Control
Register your decision today.
50

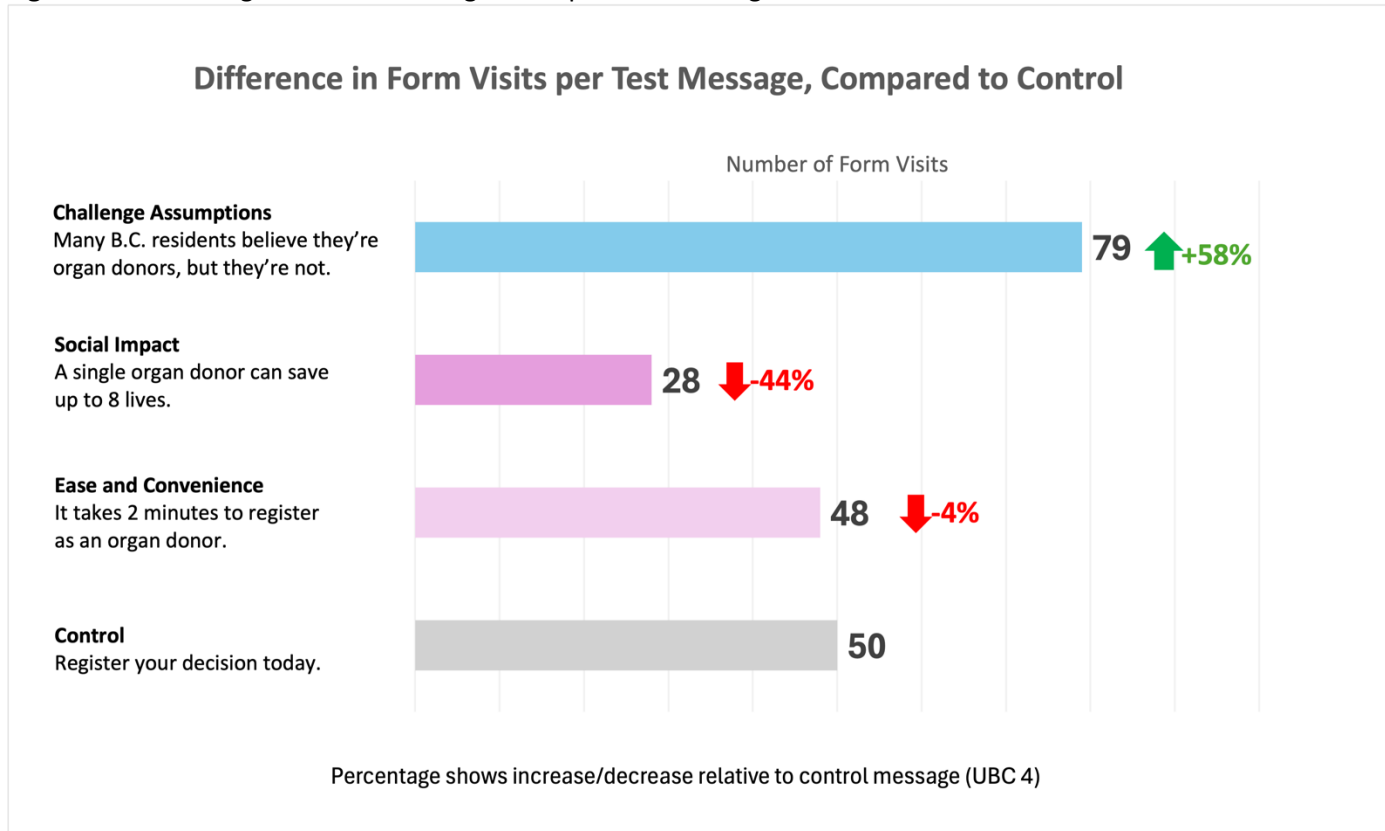Percentage shows increase/decrease relative to control message (UBC 4)

Figure 10 showcases that the challenging assumptions message condition was most effective at improving visitation rate—a 58% improvement over the control message condition. The social impact message—"A single organ donor can save up to 8 lives"—performed worse than our control message and ease and convenience message condition.

Inferential Statistics
Chi-Square evaluating impact of message conditions compared to control.

Table 6. Chi-Squared comparing Visit and Registration Rates on the challenging assumptions message condition compared to control.

	Chi-Square (χ²)	df	Sample Size (N)	p-value
Visits	6.19	1	4970	<.01*
Registration	1.41	1	4970	0.24

Note. *Indicates statistical significance

For visits, the Chi-square statistic was 6.19 (df = 1, N = 4970), p = .01, indicating a significant variation in the likelihood of visiting the registration page across different message conditions. Specifically, the treatment group, which focused on challenging assumptions, showed a higher likelihood of leading to visits (79 visits) compared to the control group (51 visits).

For registrations, the Chi-square statistic was 1.41 (df = 1, N = 4970), p = .24, indicating no significant difference in registration rates between the treatment group (41 registrations) and the control group (31 registrations). This suggests that the type of message did not significantly influence the likelihood of actual registration as an organ donor.

Table 7. Chi-Squared comparing Visit and Registration Rates on the social impact message condition compared to control.

	Chi-Square (χ²)	df	Sample Size (N)	p-value
Visits	6.15	1	4970	<.01*
Registration	9.60	1	4970	0.002

Note. *Indicates statistical significance

For visits, the Chi-square statistic was 6.15 (df = 1, N = 4970), p = .01, indicating a significant variation in the likelihood of visiting the registration page across different message conditions. The treatment group showed a lower likelihood of leading to visits (29 visits) compared to the control group (51 visits).

For registrations, the Chi-square statistic was 9.60 (df = 1, N = 4970), p = .002, demonstrating significant variations in registration rates depending on message condition. The treatment group showed a much lower likelihood of leading to registration (11 registrations) compared to the control group (31 registrations).

Table 8. Chi-Squared comparing Visit and Registration Rates on ease and convenience message condition compared to control.

	Chi-Square (χ²)	df	Sample Size (N)	p-value
Visits	0.04	1	4970	0.84
Registration	0.07	1	4970	0.80

For visits, the Chi-square statistic was 0.04 (df = 1, N = 4970), p = .84, indicating that there is not a significant difference in the likelihood of visiting the registration page between the treatment condition (49 visits) and the control condition (51 visits).

For registrations, the Chi-square statistic was 0.07 (df = 1, N = 4970), p = .80. Similarly, this suggests there are no significant differences in registration rates (29 registrations) compared to the control (31 registrations).

Table 9. JASP Descriptive Statistics

		Visits				**Registrations**			
	Challenging assumptions	Social impact	Ease and convenience	Control	Challenging assumptions	Social impact	Ease and convenience	Control
Valid	2485	2485	2485	2485	2485	2485	2485	2485
Missing	0	0	0	0	0	0	0	0
Mean	0.032	0.012	0.020	0.021	0.016	0.004	0.012	0.012
Std. Deviation	0.175	0.107	0.139	0.142	0.127	0.066	0.107	0.111
Minimum	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Maximum	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Table 10. JASP Bayesian Contingency Tables

Contingency Tables

Message condition

Visits	Challenging assumptions	Social impact	Ease and convenience	Control	Total
0	2406	2456	2436	2434	9732
1	79	29	49	51	208
Total	2485	2485	2485	2485	9940

Contingency Tables

Message condition

Registrations	Challenging assumptions	Social impact	Ease and convenience	Control	Total
0	2444	2474	2456	2454	9828
1	41	11	29	31	112
Total	2485	2485	2485	2485	9940

Table 11. JASP Chi-Square Test Registrations

Contingency Tables

Message condition

Registrations	Challenging assumptions	Social impact	Ease and convenience	Control	Total
0	2444	2474	2456	2454	9828
1	41	11	29	31	112
Total	2485	2485	2485	2485	9940

Chi-Squared Tests

	Value	df	p
X^2	16.904762	3	0.000739
N	9940		

Table 12. JASP Chi-Square Test Visitations

Contingency Tables

Message condition

Visits	Challenging assumptions	Social impact	Ease and convenience	Control	Total
0	2406	2456	2436	2434	9732
1	79	29	49	51	208
Total	2485	2485	2485	2485	9940

Chi-Squared Tests

	Value	df	p
X²	24.905783	3	0.000016
N	9940		