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Using Twitter to investigate discourse on immigration: the role of values in expressing polarized attitudes toward asylum seekers during the closure of Roxham Road

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Introduction: The world is witnessing an escalating migration crisis, and Canada, with its historically high immigration rates, is experiencing a rise in the number of asylum seekers entering the country as well. Despite generally positive Canadian attitudes toward newcomers, there is a notable division in opinions about welcoming them. Past studies suggest personal values significantly shape these attitudes, particularly conservation (resistance to change) and self-transcendence (concern for others). However, little research has examined if these values manifest in social media discussions about immigration, especially at times when policies change. This study examines how the discourse on immigration changes following the announcement of the closure of Roxham Road, a debated irregular border crossing between the US and Canada used by asylum seekers.

Method: In total, 33,459 Tweets referencing Roxham Road were collected over the course of 1 week (before, during, and after the closure). We used the Personal Values Dictionary to automatically assess references to personal values (i.e., conservation and self-transcendence) in the Tweets.

Results: The results indicate that expression of the values of conservation and self-transcendence were prevalent in discourse surrounding the closure of Roxham Road. Tweets expressing conservation had a negative tone, whereas Tweets expressing self-transcendence had a positive tone. Analyzing sentiment over time, Tweets reflecting conservation became less negative immediately after the closure, whereas Tweets reflecting self-transcendence values became more positive.

Discussion: The research highlights the interplay between personal values and policy change on immigration discourse and emphasizes the need for more analyses on how personal values are expressed in the public domain.

KEYWORDS

immigration, Twitter, personal values, sentiment analysis, Roxham Road, asylum seeker

Introduction

As the number of global conflicts and crises are on the rise, so too are the number of people seeking refuge in other countries. This mass displacement has brought about an international “migration crisis” in which pressure is put on potential receiving countries to open their doors to those seeking refuge. This is the case for Canada, which has

one of the highest annual immigration rates per population of any country in the world (Statista, 2024). Indeed, Canada has been receiving record numbers of immigrants (Statistics Canada, 2022) and asylum seekers (Government of Canada, 2023a) over the last few years. As of 2021, 23% of the population is or has been a landed immigrant or permanent resident in Canada, the highest level since Confederation (Statistics Canada, 2022). Although Canadians generally hold favorable attitudes toward immigrants, refugees, and asylum seekers, there is a noted cleavage in terms of support toward welcoming newcomers to Canada (EnviroNics Institute for Survey Research, 2023). This is not just a Canadian issue, however, as “the complex phenomenon of immigration is one of the most hotly debated topics in much of the world” (Vecchione et al., 2012, p. 359).

To successfully integrate immigrants into their receiving countries and to increase social cohesion, it is imperative to first understand what motivates and drives the different sentiments toward them (Rowe et al., 2021). Social media plays an important role in this endeavor, serving as a valuable tool for gauging public reactions and attitudes toward immigrants. Indeed, social media provides platforms for individuals to express their opinions, beliefs, and sentiments openly. Furthermore, the importance of studying public sentiment toward immigrants through social media is underscored by research demonstrating its tangible impact on real-life behavior. For example, studies have revealed a direct connection between the type of language used on social media and incidents of violence and protest (Mooijman et al., 2018; Brady et al., 2020).

Pivotal to the study of attitudes toward immigrants and immigration are *personal values*. Personal values, or the broad principles guiding one’s life (Schwartz, 2007), are used to understand divergent views on immigration as they provide the psychological rationale behind the perception of immigration as either positive or negative (Vecchione et al., 2012). Indeed, they have been proven to be one of the drivers of polarized attitudes toward immigration (Schwartz, 2007; Davidov et al., 2008, 2020; Vecchione et al., 2012).

Two gaps are evident in previous research on personal values in the context of immigration. First, despite the wealth of data available on social media, few studies have leveraged this resource to identify whether individuals spontaneously use personal values to express their opinions related to immigration (Rowe et al., 2021). This is important because of the known repercussions of social media content on real-life behavior. Second, most research assumes personal values, and their expression, remain stable over time (Vecchione et al., 2016), but emerging literature suggests that external events, such as the passing of a new law or a pandemic, can influence individuals’ attitudes and values, demonstrating a top-down effect (Tankard and Paluck, 2017; Arcila-Calderón et al., 2021; Rowe et al., 2021). However, limited research has explored how such external events, particularly new immigration-related laws, impact how people communicate about immigration.

To address these two limitations, in the current research we focus on the context of the closure of Roxham Road, an unofficial border crossing between the United States and Canada used by asylum seekers. It is estimated that more than 100,000 asylum seekers crossed into Canada using Roxham Road over the years

(Champagne, 2023). This large number of asylum seekers crossing through Roxham Road led to a divisive debate on its closure, with some emphasizing the need for border security and others highlighting humanitarian values. Ultimately, Roxham Road closed on March 25, 2023 due to a change in the Safe Third Country law in Canada (Government of Canada, 2023b).

As this debate was highly salient in the media, many took to social media to share their opinions on the subject. Social media data thus becomes an optimal form of data to examine whether people used personal values to express their views on Roxham Road and more broadly, on immigration. Furthermore, as we collected social media data spanning a week, encompassing a few days before the closure of Roxham Road, during the closure of Roxham Road, and a few days after the closure of Roxham Road, we could also investigate whether the enforcement of this new law impacted how people used personal values to discuss this issue online. Finally, as a subsidiary issue, we also compare the results obtained with personal values to another theory that shares theoretical similarities: Moral Foundations Theory (Graham et al., 2013; Feldman, 2021; Zapko-Willmes et al., 2021). This allows us to examine the distinct role that personal values play in explaining attitudes toward immigration in this context.

Personal values

Personal values are “broad goals that serve as guiding principles in people’s lives” (Sagiv and Schwartz, 2022, p. 519). According to Schwartz’ (1992) Theory of Basic Values, there are 10 broad values. These values are likely universal because they help individuals cope with three levels of needs: individual needs, social interaction needs, and group survival and welfare needs. The 10 values are ordered into two bipolar dimensions, resulting in four higher order values (Schwartz, 2012, 2022; Sagiv and Schwartz, 2022). The first is *Conservation* (encompassing the values of security, conformity and tradition) vs. *Openness to change* (representing values of self-direction, stimulation, and hedonism). The second is *Self-transcendence* (reflecting values of universalism and benevolence) vs. *Self-enhancement* (bringing together the values of power and achievement).¹

¹ Definitions of each value (retrieved from The Open University, 2024):

- *Conservation: Security*: individuals tend to prioritize safety and stability. *Conformity*: motivated by social acceptance, including restraint of actions, inclinations, and impulses likely to upset convention. *Tradition*: respect, commitment, and acceptance of the customs and ideas that one’s culture or religion provides.
- *Self-transcendence: Benevolence*: preserving and enhancing the welfare of others. *Universalism*: understanding, appreciation, tolerance, and protection for the welfare of all people and for nature.
- *Openness to change: Self-direction*: independence of thought and action. Individuals value choice, creativity, exploration. *Stimulation*: innovation, excitement, and overcoming challenges.
- *Self-enhancement—Hedonism*: individuals who derive motivation from pleasure or sensuous fulfillment.

Personal values and immigration

Past survey research has found that individuals who more strongly endorse the higher-order value of *conservation* are more likely to have negative attitude toward immigration while those who endorse *self-transcendence* are more likely to have positive attitudes toward immigration (Schwartz, 1994; Sagiv and Schwartz, 1995; Freire-Vidal et al., 2021). This is likely because those who believe in conservation are likely to perceive immigration as threatening established traditions, norms, and security (Sagiv and Schwartz, 1995; Freire-Vidal et al., 2021). Conversely, those who believe in self-transcendence are likely to perceive that immigration benefits the welfare and interests of others (Schwartz, 1994).

In a study conducted across 19 countries by Davidov et al. (2008), conservation and self-transcendence were shown to predict attitudes toward immigration. The results were consistent for 15 of the 19 countries, with conservation predicting more negative attitudes and self-transcendence predicting more positive attitudes. These consistent results suggest that the relation between beliefs in the higher-order values of conservation and self-transcendence and attitudes toward immigration is robust and may be at the root of a nearly universal mechanism.

The role of conservation and self-transcendence in predicting sentiments toward migration was further confirmed by Vecchione et al. (2012) and Davidov et al. (2020) who found that universalism (a component of self-transcendence) and security (a component of conservation) were the most significant predictors of attitudes toward immigration.

However, these studies do not assess whether individuals express these values in online communications to explain their opinions about immigration. This is a significant gap as it is documented that online content influence real-life behavior. Indeed, research has shown a direct connection between the type of language used on social media and incidents of violence and protest, suggesting that online platforms play a pivotal role in shaping public discourse and behavior (Mooijman et al., 2018; Brady et al., 2020).

For example, Mooijman et al. (2018) analyzed 18 million Tweets during the 2015 Baltimore protests, and conducted three behavioral experiments, and found that online echo chambers contribute to violence through moralization. This risk isn't solely due to moralization but also to perceived moral convergence that can be perceived through social media. In other words, people use these platforms not only to express their views but also to gauge the moral sentiment present in society, underscoring their role in shaping collective behavior. Thus, studying mentions of conservation and self-transcendence in online discussions about immigration is vital for understanding how values shape digital discourse and societal attitudes.

A second limitation of the literature is that past research on personal values in the context of immigration has also neglected to consider how changes in policies concerning immigration may

influence people's personal values. There is evidence to suggest that macro-level circumstances within society, such as a pandemic or the introduction of new laws, can exert a substantial influence on people's attitudes and values (Tankard and Paluck, 2017; Arcila-Calderón et al., 2021; Rowe et al., 2021; Kil et al., 2023). In such circumstances, real-time, frequent, comprehensive, and globally representative information becomes imperative to monitor evolving attitudes (Rowe et al., 2021). However, traditional methods of collecting data such as survey research do not normally hold these attributes as it is too costly and complex to do so. Social media, and in particular X (formerly Twitter), offers data to fill these gaps as it provides the possibility to monitor in real-time the attitudes and expression of values of its users. Hence, the analysis of social media data enables the monitoring of immigration sentiments with unparalleled temporal granularity, opening the door to evaluating the effects of macro events on attitudes toward immigration and the values expressed in relation to these attitudes.

Social media analyses and attitudes toward immigration

Although little research has focused on understanding how people use personal values to discuss issues related to immigration online, some research has begun to focus on identifying, through social media data, the different attitudes that people have about immigration.

For example, Freire-Vidal et al. (2021) examined discussions of immigration in Chile through analysis of Twitter content. Their results revealed that a substantial majority of the profiles analyzed, around 72%, expressed positive and empathetic sentiments toward immigration. A smaller proportion, ~25%, exhibited negative attitudes. Of interest, users displaying negative, anti-immigration profiles tended to be more prolific, generating up to 50% more content per user compared to those displaying positive immigration profiles. The study also highlighted that negative sentiments and advocacy for stricter immigration regulations were often expressed along with concerns regarding labor competition from immigrants. Tweets expressing positive sentiments primarily centered on advocating for immigrants' human and civil rights.

In another study, Grover et al. (2019) delved into ideological nuances through language analysis in pro- and anti-immigration Tweets. Their study, guided by Moral Foundations Theory, illuminates the moral and emotional divides evident in these discussions. Pro-immigration Tweets emphasized moral foundations like care, fairness, and loyalty, whereas anti-immigration Tweets tend to emphasize authority, cognitive rigidity, and negative emotions, providing insights into the complex ideological conflicts prevalent in online discourse surrounding immigration-related issues.

These studies show the depth of information that online platforms can provide. Although the studies bring to light different explanations as to why there is polarized discourse on immigration, they do not focus on whether individuals use personal values in their communications to justify their attitudes toward immigration.

- Achievement: personal success through demonstrating competence according to social standards. Power: relates to having social status and prestige, control or influence over people and resources."

Expression of personal values through time

A second limitation in the literature is that past research on personal values in the context of immigration has also neglected to consider how *changes in policies* concerning immigration may influence the way personal values are expressed. Indeed, most theorists have asserted that fundamental personal values tend to remain relatively consistent over time, supported by studies emphasizing their stability attributed to temperamental and heritable factors (Schwartz, 1992; Knafo and Spinath, 2011).

However, there is growing evidence to suggest that macro-level circumstances within society can exert a substantial influence on people's expressed attitudes and values. For instance, Tankard and Paluck (2017) employed a longitudinal research design to demonstrate how a Supreme Court decision in favor of gay marriage brought about a significant shift in the perceived normative support for gay marriage and the acceptance of homosexual individuals.

Other literature has demonstrated that people adopt more conservative attitudes after threat-inducing events like terror attacks and in anticipation of future threats such as global warming (Sales, 1973; Doty et al., 1991; Bonanno and Jost, 2006; Echebarria-Echabe and Fernández-Guede, 2006; Huddy and Feldman, 2011; Fritsche et al., 2012). This shift may stem from adaptive changes in how political actions are morally evaluated and deemed necessary during threatening times.

Other studies have investigated how external events like COVID-19 influenced sentiments about immigration using online content from Twitter. Rowe et al.'s (2021) study, which drew on a sample of over 30 million Tweets across Germany, Italy, Spain, the United Kingdom, and the United States collected between December 1, 2019 and April 30, 2020, aimed to measure changes in immigration sentiment during the COVID-19 pandemic. Their analysis revealed a significant surge in immigration-related Tweets coinciding with periods of escalating COVID-19 cases and subsequent lockdowns. Furthermore, they discovered indications of a moderate rise in immigration-related Tweets expressing negative sentiments amid the period of surging COVID-19 cases from late February to mid-April in Germany, the United Kingdom, and the United States.

In another study, Arcila-Calderón et al. (2021) investigated hate speech online, particularly surrounding Spain's decision to accept the boat Aquarius in 2018, a boat which carried 630 migrants. Analyzing Twitter messages before and after this pivotal announcement, their research unearthed interesting dynamics. They observed an increase in hate expressions toward refugees after the announcement, often supported by stereotypes and misinformation. Despite this increase in hate, however, the overall sentiment of messages exhibited a shift toward positivity after the announcement. This study elucidates how high-profile events can evoke nuanced responses online, with both hate and positive sentiments increasing.

As evidenced by the studies discussed above, social media analysis is an important tool to uncover the complexities of immigration-related discussions. As the higher-order values of self-transcendence and conservation have been shown to be important predictors of sentiments toward immigration, it is useful

to investigate if these values are used in online discussions to justify one's position on immigration. Furthermore, as Tankard and Paluck (2017), Arcila-Calderón et al. (2021), and Rowe et al. (2021) demonstrate, external events, such as a change in the law or a policy, can influence the discussion around immigration. Capitalizing on the ability of social media data to capture the evolution of personal values through time can allow us to deepen our knowledge of how individuals use their values to express their opinion through a period of important changes in policy.

Theory of Basic Values vs. Moral Foundations Theory

In our current study, we also seek to contrast our findings focused on personal values by conducting subsidiary analyses to compare them with another theory that shares similar theoretical underpinnings: Moral Foundations Theory (Graham et al., 2013). Moral Foundation Theory proposes that morality comprises at least five foundations, categorized into *Binding foundations*, which emphasize group-level concerns such as authority, purity, and ingroup loyalty, and *Individualizing foundations*, which prioritize care and fairness for others.² It coincides theoretically with the Theory of Basic Values since Conservation and Binding foundations both focus on giving priority to security and stability, while Self-transcendence and Individualizing foundations focus on giving priority to social issues (Zapko-Willmes et al., 2021).

Research that has sought to compare these theories has found that although they do overlap conceptually and empirically, they are also distinct (Feldman, 2021). For example, Zapko-Willmes et al. (2021) found, through a twin study, that value orientation dimensions exhibit higher heritability compared to moral foundations, suggesting potential differences in their origins (core vs. surface) within personality. The distinction between the two theories may also come from the fact that morality often comes with establishing what norms and beliefs are right or wrong which is often learned through socialization (Cornwell and Higgins, 2019), while personal values encompass a broader range of values beyond morality, including personal goals, aspirations, and guiding principles that influence behavior across various domains of life.

By juxtaposing the results obtained from The Theory of Basic Values with those from Moral Foundations Theory, we aim to elucidate the distinct role that personal values play in shaping attitudes toward immigration online.

² Binding: *Authority* is centered on respecting traditions and hierarchical social structures, *purity* emphasizes disgust sensitivity, striving for an elevated way of life, and preserving cultural sacredness, and *ingroup loyalty* represents feelings of obligations regarding one's group affiliation. Individualizing: *Care* emphasizes preventing suffering and showing empathy and care toward others, and *fairness* revolves around concepts of justice, reciprocity, and impartial treatment.

Overview of study and hypotheses

The present research is grounded in the unique context of Roxham Road, an irregular border crossing located between the United States and Canada. For many years asylum seekers have used Roxham Road to cross the border because of a loophole in the Safe Third Country Agreement, a treaty between the United States and Canada established in 2004 (Government of Canada, 2023b). This agreement mandates that individuals seeking refugee status must make their claims in the first country in which they arrive, unless they qualify for an exemption (Government of Canada, 2023b). Roxham Road became an appealing alternative for those who did not qualify for exemptions, as it allowed asylum seekers to enter Canada without the requirement to return to the United States, thanks to its unofficial border crossing status (Chishti and Gelatt, 2023; Major, 2023).

In 2016 and 2017, this location gained significant attention following two pivotal events (National Post, 2023). First, the election of Donald Trump in the United States in 2016 ushered in stricter immigration policies, prompting a considerable number of migrants to seek asylum in Canada. Second, in 2017 Canadian Prime Minister Justin Trudeau tweeted “To those fleeing persecution, terror and war, Canadians will welcome you, regardless of your faith. Diversity is our strength #WelcomeToCanada” which seemed to further encourage crossings at Roxham Road.

In 2022, at the height of the crossings at Roxham Road, it was estimated that around 40,000 asylum seekers, predominantly originating from Haiti, Turkey, Colombia, Chile, Pakistan, and Venezuela, crossed the border that year (Blouin et al., 2023). As large numbers of asylum seekers employed this irregular crossing, demands for its closure increased and became an intensely polarizing issue. On one side of the debate were those who argued that closing the unofficial border crossing was a necessary step to uphold the integrity of immigration laws and border security (Liley, 2023). Furthermore, as resources were becoming thin to welcome these asylum seekers properly, some people argued that Canada was over-extending itself (Gollom, 2023; O’Kane, 2023).

Conversely, there were those who vehemently opposed the closure, viewing it as a direct challenge to Canada’s humanitarian values and commitment to welcoming refugees. This group was concerned that closing Roxham Road would not deter asylum seekers but instead force them to resort to riskier, more dangerous methods of crossing the border (Paquette, 2023; Stevenson, 2023).

Ultimately, it was announced on March 24, 2023 that Roxham Road would close 24h later, at midnight on March 25, 2023 (Government of Canada, 2023b).

As Roxham Road and its closure became a highly polarized issue, it is an interesting context in which to evaluate whether individuals use values of conservation and self-transcendence to justify their points of view on asylum-related issues, and whether the use of these values is associated with positive and negative sentiments. In examining these issues, we hypothesized that:

- 1) Words and concepts associated with the values of conservation and self-transcendence would be prevalent in the Tweets surrounding the closure of Roxham Road.

- 2) Since Conservation emphasizes order and security and Self-transcendence emphasizes concern for the welfare and interests of others, we hypothesize that Tweets with words and concepts related to conservation would have a negative sentiment about the asylum seekers and Roxham Road, and Tweets with words and concepts of self-transcendence would have a positive sentiment about the asylum seekers and Roxham Road.

Furthermore, as the closure of Roxham Road was at the center of an extensive debate on asylum seekers and immigration in Canada, the announcement of its closure was an important event nationally. As research has shown that external events can influence attitudes, at this moment of high polarization, it is possible that individuals changed the way they describe the event to emphasize their point. As a result, we also hypothesized that:

- 3) The prevalence of conservation and self-transcendence words and concepts would be especially high at the time of the closure and immediately after.
- 4) Immediately at the closure of Roxham road and immediately after, conservation should be at its most negative while self-transcendence should be at its most positive.

To test for divergent validity, that is to evaluate whether the Schwartz Theory of Basic Values (Schwartz, 1992) uniquely captures specific elements of the Tweets around the closure of Roxham Road, we compared the results obtained through the framework of the Theory of Basic Values with those obtained with Moral Foundations Theory (Graham et al., 2013). In this way, we can discern whether our measurements are tapping into distinct aspects of value systems, thereby enhancing the robustness of our findings.

Method

To test our hypotheses, we analyzed social media content on Twitter (now known as X). Twitter is the third largest online platform through which individuals consume news (Suciu, 2019). Twitter is also a microblogging platform that allows its users to express their opinions in short posts (Hansen et al., 2011). The combination of sharing news and expressing opinions about the news means that Twitter is well-suited for testing our hypotheses about views on immigration and the closure of Roxham Road.

Procedure

To develop a comprehensive dataset of Twitter’s content, we employed Twitter’s API. APIs are computer software that define specific calls or requests, including the method of execution and the data format for the output (Ponizovski et al., 2020). In the present research, we used JSON to gather Tweets as it also offers the flexibility to apply filters by parameters like username, language, and date. Our data collection targeted three keywords: Roxham, #Roxham, and #CloseRoxham. Through this API, we could not

account for location, meaning that we collected all the Tweets that were generated by our query, no matter the country of origin. This is a common issue as only 3% of Tweets have geographical data (Rowe et al., 2021). We scraped and amassed Tweets spanning an entire week (March 22–29, 2023), encompassing the days leading up to the closure of Roxham Road, the day of closure, and several subsequent days, resulting in 33,459 Tweets.

Measures

Personal values

To measure the higher-order values of conservation and self-transcendence from the data collected from Twitter, we used the Personal Values Dictionary (PVD) developed by Ponizovskiy et al. (2020). The Personal Values Dictionary uses an extensive list of words to represent each value of Schwartz's universal values model. This list allows for the assessment of references to personal values in everyday life. This approach is based on the assumption that references to values within the text of the Tweets can be considered expressive behaviors corresponding to these values.

We first used the list developed for the values of self-transcendence and conservation, as these are the two social values expected to be most closely aligned with individuals' views on immigration and the closure of Roxham Road, as demonstrated by previous research (Davidov et al., 2008, 2020; Vecchione et al., 2012). For comparison, we then used the list for the two other values, openness to change and self-enhancement.

To categorize Tweets based on the values they predominantly reflect, we utilized the frequencies of words associated with each value present in each Tweet. For example, if more words reflecting self-transcendence than any other value were present in a Tweet, this Tweet was classified as reflecting the value of self-transcendence. Tweets that had the same frequency of words for multiple values were removed from the analyses.

Sentiment of the Tweets

To conduct the sentiment analysis, we employed the Valence Aware Dictionary and Sentiment Reasoner (VADER) as it is specifically attuned to sentiments expressed on social media (Hutto and Gilbert, 2014). Just as the Personal Values Dictionary, VADER uses a dictionary of words which was developed using several well-established sentiment word-banks such as LIWC and ANEW. It was also supplemented with additional lexical features commonly used to express sentiment in social media text such as emoticons and slang. Furthermore, it considers five simple heuristics that are often used in microblogs like Twitter (Zaw and Wai, 2020). These are: punctuation (e.g., using several exclamation points), capitalization (e.g., writing a word in all capital letters), degree modifiers (e.g., using a word to change the meaning such as, *sort of cute*), shift in polarity due to "but" (e.g., using *but* to change the meaning in I love you, *but...*), and examining the three words that come before a sentiment-loaded word to detect if the meaning is negated (e.g., using negator words to change the sentiment of a sentence).

In total, 7,500 lexical features and heuristics were selected and are included in the VADER dictionary (Hutto and Gilbert, 2014). Each lexical feature and heuristic was given a valence score between -4 (most negative) and 4 (most positive) by a panel of experts.

For VADER to determine the sentiment of a Tweet, it creates a compound score for each Tweet. This score results from averaging the valence scores associated with each lexical feature and heuristics present in each Tweet. Seeing that each lexical feature and heuristic are coded between -4 and 4 , the compound score for each Tweet is thus situated between these two limits. This score is then normalized to range between -1 (most negative) and $+1$ (most positive). A compound score ≥ 0.05 indicates a positive sentiment, a compound score between -0.05 and < 0.05 reveals a neutral sentiment, and a compound score ≤ -0.05 reflects a negative sentiment.

Moral Foundations Theory

To measure the presence of moral foundations within the Tweets, we used the Moral Foundations Dictionary developed by Graham and Haidt (2024). This dictionary comprises an extensive list of words for each moral foundation.

Just as for personal values, to categorize Tweets according to the moral foundation that they most reflect, we utilized the frequencies of words associated with each foundation present in each Tweet. We then grouped the Tweets according to the most prominent moral foundation (binding or individualization) in that Tweet. Tweets that had the same frequency of words for both foundations were removed from the analyses.

Results

Preliminary analyses

In total, we collected 33,459 Tweets over the course of 1 week. As our values and sentiment measures can only be used with the English language, we used FastText to filter out the Tweets that were written in a language other than English. FastText is an open-source library that allows users to understand and categorize text. It can identify up to 157 different languages. The top three languages that were used in our dataset were English (25,592 Tweets), French (7,570 Tweets), and Spanish (202 Tweets). We continued our analyses with only the Tweets in English. As 4.15% of these Tweets had the same frequency of words for multiple values, we removed them from the subsequent analyses. We were left with 24,531 Tweets.

To verify whether the Tweets did refer to the people crossing the border, we calculated the percentage of Tweets that include key words (i.e., asylum seeker, migrant, immigrant, refugee, and refugee claimant). In total 25.25% of the Tweets had these words. The word with the most mentions was migrant, which was present in 14.59% of the Tweets, followed by asylum seeker (7.22%), refugee (2.16%), immigrant (1.21%), and refugee claimant (0.08%). The word policy was only mentioned in 0.15% of the Tweets.

To test Hypotheses 3 and 4, that is to capture the effect of the closure on the use of personal values to discuss Roxham Road, and the relation between expressing these values and Tweet sentiment,

TABLE 1 Example of Tweets representing conservation and self-transcendence.

Conservation	Self-transcendence
<p>- “Roxham road was a glaring loophole to this agreement, if we close it only to open the loophole at legal points of entry then what was the point?”</p> <p>- “Closing Roxham Rd will not decrease #’s. In fact, #’s will explode since security checks probably won’t be done until much later; people can’t be found to deport, like now.”</p> <p>- “It was a national security threat and should have been closed long ago”</p>	<p>- “RIP Roxham Road: With the new agreement between Canada and the U.S., the days of seeking asylum at irregular crossings have come to an end. Let’s hope for a fair and compassionate future for those in need. #RefugeesWelcome #ImmigrationReform #polcan”</p> <p>- “Irregular migrants arriving at Roxham were *never* illegal under Canadian or international immigration law, no matter how many times the term is used by some. They have a right to seek safety; the countries they seek help from have the responsibility to treat them with dignity.”</p> <p>- “Open Roxham Rd to save lives. Immigrants need more help”</p>

we divided the data into four time points: before the closure (March 22–23, 2023; $n = 3,927$), at announcement of closure and closure (March 24–25, 2023; $n = 4,511$), immediately after the closure (March 26–27, 2023; $n = 13,141$), and several days after the closure (March 28–29, 2023; $n = 2,953$).

Main analyses

Hypotheses 1 and 2

In total, values were present in 34.09% of Tweets. 9.87% of the Tweets expressed the value of conservation while 15.36% of the Tweets expressed the value of self-transcendence (6.06% openness to change and 2.80% self-enhancement; see Table 1 for example of Tweets representing conservation and self-transcendence).

To evaluate the sentiment associated with self-transcendence and conservation, we conducted a sentiment analysis with the Valence Aware Dictionary and Sentiment Reasoner (VADER).

We find that Tweets that express the value of conservation clearly have a negative tone to them (compound score = -0.24 , $SD = 0.34$; compound score is below the -0.05 threshold). For the Tweets that express the value of self-transcendence, we find that these Tweets clearly have a positive tone as the compound score is 0.40 (above the 0.05 threshold, $SD = 0.46$).

To test whether there is a significant difference in sentiment between tweets that express the two values, we conducted a t -test. The results confirm our expectations that there is a significant difference between the sentiment in Tweets that reflect the value of conservation vs. those that reflect the value of self-transcendence, $t_{(6,185)} = 60.79$, $p < 0.001$.

Hypotheses 3 and 4

Next, we explore the effect of the announcement of the closure of Roxham Road on the Tweets. We examined whether the prevalence of the expression of the values in the Tweets increased over time and peaked at the time of the announcement and closure of Roxham Road and immediately after. We found that

Tweets that expressed the value of conservation seemed to increase immediately after the closure of Roxham Road but then returned to their pre-closure level. As for self-transcendence, the number of Tweets expressing this value more than doubled from 7.51% to nearly 20% immediately after the closure, sustaining this higher level in the following days (see Table 2). The results point to the fact that there is a spike in using both values when discussing Roxham Road on Twitter immediately after its closure. This spike is maintained several days after the closure for self-transcendence but not for conservation.

As for openness to change and self-enhancement, this peak was not observed (see Table 2).

To evaluate whether the closure of Roxham Road influences the sentiment of the Tweets for those reflecting the value of conservation and self-transcendence, we conducted a 2×4 ANOVA. The means and standard deviations for sentiment for each value at each time period are presented in Table 3.

The results indicated a significant main effect for values, $F_{(1,6,179)} = 1,378.73$, $p < 0.001$, a significant main effect for time, $F_{(3,6,179)} = 446.14$, $p < 0.001$, and a significant interaction between values and time, $F_{(4,6,179)} = 1,243.64$, $p < 0.001$.

Post-hoc testing using Tukey’s HSD indicated that, for the Tweets reflecting conservation, there is a significant difference in sentiment between the Tweets that were shared before the closure, compared to those that were shared at the closure ($p < 0.001$), immediately after the closure ($p < 0.001$) and a few days after the closure ($p < 0.001$), as the sentiment became less negative at the announcement and onward. The three latter time periods did not differ on sentiment among them.

As for the Tweets that reflect self-transcendence, they were most positive immediately after closure, and this period is significantly more positive than all the other periods: before the closure ($p < 0.001$), at announcement and closure ($p < 0.001$), and several days after closure ($p < 0.001$). In addition, both the period at announcement and closure and the period several days after closure were significantly less positive compared to before the closure ($p < 0.001$).

Contrast with Moral Foundations Theory

Our analyses of Tweets for moral foundations reveal that moral foundations are only present in 8.16% of the Tweets in our sample, as opposed to values which were present in 34.09% of the Tweets in our sample. The category of moral foundations that is the most prominent is the *Binding foundations*, which was present in 6.41% of the Tweets, compared to 9.87% of the Tweets for conservation. As for the *Individualizing foundations* they are only present in 1.18% of the Tweets, fewer than the 15.36% for self-transcendence.

Similar to personal values, we find that there is a significant difference between the sentiment of Tweets that reflect Binding foundations vs. those that reflect Individualizing foundations, $t_{(1,720)} = 17.80$, $p < 0.001$. Tweets that express Binding foundations have a negative tone to them (compound score = -0.24 , $SD = 0.41$; compound score is below the -0.05 threshold), whereas Tweets that express Individualizing foundations clearly have a positive

TABLE 2 Percentages of the Tweets containing values of conservation, self-transcendence, openness to change, and self-enhancement at each time point.

	Before the closure	At announcement and closure	Immediately after closure	Several days after closure
Conservation	8.30	7.47	12.06	5.82
Self-transcendence	7.36	7.51	19.77	18.32
Openness to change	6.90	9.78	5.36	2.37
Self-enhancement	3.36	3.81	1.97	4.19

TABLE 3 Mean and standard deviation of sentiment associated with Tweets expressing the values of conservation and self-transcendence for each time period.

	Before the closure	At announcement and closure	Immediately after closure	Several days after closure
Conservation	-0.49	-0.21	-0.20	-0.24
	(0.45)	(0.37)	(0.28)	(0.37)
Self-transcendence	0.24	0.02	0.56	0.02
	(0.41)	(0.61)	(0.34)	(0.44)

tone as the compound score is 0.34 (above the 0.05 threshold, SD = 0.32).

To evaluate whether the closure of Roxham Road influences the sentiment of the Tweets depending on the type of foundation (Binding vs. Individualizing), we conducted a 2x4 ANOVA.

The results indicated a significant main effect on sentiment, for the moral foundations $F_{(1,1,825)} = 350.95$ $p < 0.001$ a significant main effect for time, $F_{(3,1,825)} = 11.95$, $p < 0.001$, and no significant interaction between moral foundations and time, $F_{(4,1,825)} = 0.34$, $p = 0.80$.

Discussion

As 100's of millions of people migrate internationally each year (Natarajan et al., 2022), it is imperative to identify the factors that foster the integration of these migrants in receiving societies. In the present research, we focus on understanding what may drive divergent attitudes toward asylum seekers within potential receiving countries. Specifically, we focus on the role of personal values in these attitudes as they may provide the psychological rationale behind perception of migrants and their entry into a country as either positive or negative (Vecchione et al., 2012). Specifically, we focus on two personal values: *conservation* (emphasizing order, self-restriction, preserving the past, and resistance to change), and *self-transcendence* (emphasizing concern for the welfare and interests of others; Schwartz, 2007; Davidov et al., 2008, 2020; Vecchione et al., 2012; Sagiv and Schwartz, 2022).

Previous studies have revealed that individuals who strongly align with the conservation value tend to harbor negative attitudes toward immigrants because they view immigration as a challenge to established norms and security (Sagiv and Schwartz, 1995; Freire-Vidal et al., 2021). Conversely, those who believe in self-transcendence exhibit more positive views on immigration (Vecchione et al., 2012; Davidov et al., 2020) since they prioritize values like universalism, emphasizing tolerance and concern for all human welfare (Schwartz, 1994).

These studies have mostly been conducted using survey research, however, and have not explored whether individuals use these two values to express immigration-related opinions, including on social media. This is important because one in three people worldwide are estimated to be active social media users (Ortiz-Ospina, 2019) and recent research has found a link between the type of language used online with real-world actions (Mooijman et al., 2018; Brady et al., 2020). Additionally, while many studies assume stability in personal values, emerging evidence indicates that external events, such as immigration-related laws or a pandemic, can influence the expression of attitudes and values (Tankard and Paluck, 2017; Arcila-Calderón et al., 2021; Rowe et al., 2021).

This study addresses these gaps by examining the closure of Roxham Road, a contentious border crossing used by asylum seekers between the United States and Canada. The closure sparked a heated debate, making it an ideal context to analyze polarized attitudes toward migration via social media. Data collected from Tweets before, during, and after the closure allow investigation into how this significant policy change impacted online discussions about the issue.

Key results

The analyses provided support for all four hypotheses. First, the results show that the values of conservation and self-transcendence were prevalent in the discourse surrounding the closure of Roxham Road online; that is, people did use these values to express their opinions on immigration in the context of Roxham Road. In addition, we found a significant difference between the values conveyed in the Tweets and the sentiment of the Tweets. The Tweets categorized as reflecting conservation are negative while the Tweets reflecting self-transcendence are positive.

The closure of Roxham Road also did impact how people communicated about the situation, as there is a noted increase in the use of these personal values once the closure was announced, especially for self-transcendence. Further, the results show that

the closure of Roxham Road did influence the way people communicated about the event on social media, as the Tweets including values of conservation became less negative at the closure and onward. The Tweets that included values of self-transcendence became more positive immediately after the closure.

To assess divergent validity, examining whether the Schwartz Theory of Basic Values (Schwartz, 1992) uniquely encompasses particular aspects of the Tweets regarding the closure of Roxham Road, we utilized Moral Foundations Theory (Graham et al., 2013). By comparing the prevalence of values vs. foundations in the Tweets, we were able to determine whether people were more likely to use values than foundations to explain their responses to the border crossing closure, thereby strengthening the reliability of our results.

We found that the value of conservation was more present than Binding foundations (9.87 vs. 6.41% of the Tweets). This can be explained by the fact that attitudes surrounding the closure of Roxham Road may originate more from individual concerns and preferences. Authority and loyalty (binding foundations), are moral foundations which involve social hierarchies and power dynamics, may be less central to individual experiences and beliefs about Roxham Road and therefore less prevalent in public discourse.

Similarly, the value of self-transcendence was more present than Individualizing foundations (15.36 vs. 1.18% of the Tweets). This may be so because discussions related to self-transcendence extend beyond mere fairness and care (individualizing foundations) to include concerns for the welfare of all individuals. The closure of Roxham Road may have prompted discussions that touch upon broader humanitarian and environmental concerns, which align more closely with self-transcendence values than with the individualizing foundations.

The additional analyses show that there is a difference in the sentiment of the Tweets, the Tweets reflecting the Binding foundations being negative while the Tweets reflecting the Individualizing foundations being positive. There was also an effect of time.

However, contrary to what was observed with personal values, there was no interaction between the foundations and time on sentiment.

Research contributions

This research was conducted using social media data, an underused technology in the study of attitudes toward immigrants and immigration. Several advantages derive from using social media data in research as these data bypass many well-known issues associated with self-reported data, including response biases, participant fatigue, and the high costs of data collection (Paulhus and Vazire, 2007). Social media data also allow us to observe when and how attitudes and values are spontaneously being expressed.

Furthermore, social media offers the possibility to monitor in real-time the attitudes of its users, opening the door to the analysis of how macro events influence the attitudes of its users. This is particularly important in the context of the current research as there is evidence to suggest that macro-level circumstances

within society, can exert a substantial influence on people's attitudes and values.

Using social media data in the current research deepened our understanding of how public discourse evolves in response to immigration-related events as it revealed the dynamic interplay between societal events (such as the closure of Roxham Road), personal values (conservation and self-transcendence), and expressed sentiments. The observed surge in the expression of self-transcendence values and related sentiments post-closure of Roxham Road, in contrast to the Tweets becoming less negative, but staying negative nonetheless for conservation values, highlights a potential change in public focus, possibly signaling a heightened concern for humanitarian aspects and the safety of asylum seekers following the road's closure.

Limitations

Some limitations need to be considered. First, Twitter users might not represent the entire population; demographics, opinions, and behaviors might differ from those of the general population. For example, it is documented that Twitter users are younger, more highly educated and wealthier than the general population (Wojcik and Hughes, 2019).

Furthermore, the study's reliance on English-language tweets also introduces limitations in understanding diverse perspectives and sentiments expressed in other languages, such as French which is the native tongue in the Province of Quebec where the Canadian entry point of Roxham Road is situated. The French Tweets could not be analyzed as the Personal Values Dictionary is not available in French. This omission of French Tweets results in the loss of a relevant and potentially distinctive Francophone perspective on policies regarding asylum-seeking. Therefore, there is a pressing need for the development of discourse analysis tools capable of effectively capturing diverse perspectives on social issues within multilingual contexts.

Finally, another limitation of the study is that the dictionaries used could not fully analyze the content of the Tweets and therefore it is not clear whether the sentiments are directed at the immigrants themselves or public policy surrounding immigrants. To overcome this limitation, we evaluated whether the Tweets did mention asylum seekers, immigrants or refugee and found that the Tweets did. Very few Tweets mentioned the word policy (0.15%). In future research, it would be useful to adopt AI classifier models to generate, through a bottom-up approach, the most important themes within the Tweets. This would provide a general picture of what the major themes are within the Tweets and would facilitate the interpretations of the results.

Conclusion

In conclusion, this research highlights the utility of leveraging social media data to explore the dynamic interplay between personal values, sentiments, and real-world events, particularly in the context of immigration. By focusing on the closure of Roxham Road and analyzing Twitter data, the study provides valuable insights into the evolving nature of public opinions on

immigration-related issues. Moreover, it opens avenues for future studies to explore how personal values evolve in response to policy changes and events.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

Ethical approval was not required for the study involving humans in accordance with the local legislation and institutional requirements. Written informed consent to participate in this study was not required from the participants or the participants' legal guardians/next of kin in accordance with the national legislation and the institutional requirements.

Author contributions

LF: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Software, Validation, Writing – original draft, Writing – review & editing. VE: Conceptualization, Supervision, Validation, Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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