

Gendered dynamics of Twitter engagement: An analysis of Colombian parliamentarians during electoral and non-electoral periods

Dinámicas de género en el 'engagement' en Twitter: un análisis de los parlamentarios colombianos durante períodos electorales y no electorales

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ABSTRACT: This study investigates the gender dynamics in how Colombian members of Congress use Twitter during electoral and non-electoral periods. Using a quantitative analysis of 689,576 tweets collected in 2020 and 2022, the findings reveal nuanced differences in social media behaviour between male and female politicians. While male politicians generally have a larger follower base and higher retweet rates during non-electoral periods, these advantages diminish or even reverse during elections. Female politicians show relative gains in retweets and follower acquisition during electoral periods, suggesting that heightened competition and visibility create a more level playing field for engagement.

Contrary to expectations, male politicians tweet more frequently overall, but female politicians increase their activity significantly during elections. These findings suggest that gender disparities in political communication on Twitter are not static but context-dependent, with electoral periods offering unique opportunities for female politicians to amplify their messages. While further research is needed to explore the role of content and audience behaviour, this study highlights the complex interplay of gender, visibility, and engagement in online political communication.

Keywords: female politicians; gender political equality; political communication; engagement; Twitter; Colombia.

RESUMEN: Este estudio investiga las dinámicas de género en el uso de Twitter por parte de los congresistas colombianos durante períodos electorales y no electorales. A través de un análisis cuantitativo de 689,576 tweets recopilados en 2020 y 2022, los hallazgos revelan diferencias matizadas en el comportamiento en redes sociales entre políticos hombres y mujeres. Mientras que los hombres generalmente tienen una base de seguidores más amplia y mayores tasas de retweets durante los períodos no electorales, estas ventajas disminuyen o incluso se revierten durante las elecciones.

Las mujeres muestran incrementos relativos en retweets y adquisición de seguidores durante los períodos electorales, lo que sugiere que la mayor competencia y visibilidad de estos momentos genera un terreno más equilibrado para el engagement.

Contrario a las expectativas, los hombres publican tweets con mayor frecuencia en general, pero las mujeres aumentan significativamente su actividad durante las elecciones. Estos hallazgos sugieren que las disparidades de género en la comunicación política en Twitter no son estáticas, sino contextuales, y que los períodos electorales ofrecen oportunidades únicas para que las mujeres amplifiquen sus mensajes. Si bien se requiere más investigación para explorar el papel del contenido y el comportamiento de las audiencias, este estudio resalta la compleja interacción entre género, visibilidad y engagement en la comunicación política en línea.

Palabras clave: mujeres políticas; igualdad política de género; comunicación política; engagement; Twitter; Colombia.

1. Introduction

The fight for gender equality in political representation remains a pressing issue. Research increasingly highlights the limitations and obstacles faced by women in professional spheres, particularly in politics (Dittmar, 2015; Eagly, 2005). Recent years have witnessed a growing body of research dedicated to exposing gender biases embedded within political systems. These differences not only affect access to power but also lead to the emergence of stereotypes that undermine women's political capabilities (Bustelo & Mazur, 2023; Bauer & Santia, 2021; Banwart, 2010). Scholars have argued that dismantling these entrenched structures requires government action to promote genuine gender equality and break the cycle of unbalanced treatment (Lowndes, 2020).

Traditionally, limited media visibility stood as a significant barrier to women's political success. Mainstream media coverage often focused on women's personal lives rather than their political platforms and leadership skills, further marginalizing their voices (Rao & Taboada, 2021; Aaldering & Van Der Pas, 2020). The rise of social media, however, offered a glimmer of hope.

Initially viewed as a potential equalizer, social media platforms provided women with an option to bypass traditional media gatekeepers and connect directly with voters (Piscopo & Kenny, 2020). However, recent research paints a more nuanced picture. Studies suggest that even online, women face challenges related to content visibility and the perception of their leadership styles (Hrbková & Macková, 2021; Colleen & Bauer, 2021; Guerrero-Solé & Perales-García, 2021). This raises a critical question: Does social media truly offer a level playing field for political communication across genders?

This study contributes to the ongoing conversation about gender and political communication by examining how male and female Colombian Congress members utilize Twitter (now X). By analysing a large dataset of tweets (689,576), this study investigates whether quantitative differences exist in their online behaviour.

Using data for election and non-election periods in our analysis, we can isolate the potential influence of gender bias on both everyday political communication and campaign-driven communication. This approach offers valuable insights into the effectiveness of social media platforms in promoting equal opportunities for female politicians in the digital age.

2. Literature review

2.1. The persistence of the double bind in politics

Different studies in psychology, communication, and political science have sought to understand whether certain gender biases can influence voters' decisions and produce an unfavourable political impact on women. Several investigations have shown that the type of media coverage

received by politicians and the effect produced by politicians' leadership skills and decisions affect citizens' electoral decisions (Duval & Bouchard, 2021; Harp, Loke & Bachmann, 2016; Denmark, Ward & Bean, 2012; Fridkin & Kenney, 2009; Fulton et al., 2006; Rudman & Fairchild, 2004).

Voters' attitudes towards gender also shape their electoral preferences. Long, Dawe and Suhay (2021) argued that the effects of gender attitudes can be observed in voters' preferences; nevertheless, they are not unidirectional. These preferences interact with voters' perceptions of candidates in complex ways that depend not only on the candidates' gender but also on their relevant characteristics and values.

In the same theoretical vein, Anderson (2017) argued that gender stereotypes create a situation where women are inherently disadvantaged in "change" elections. As an example, Anderson studied the 2016 US presidential elections and concluded that Hillary Clinton was the wrong candidate for a 'change' election. For the author, Clinton was the wrong woman for the presidency because every woman is the wrong woman. She further suggested that Clinton was constrained by the 'paradox of female presidentialism', which asserts that any electable female presidential candidate is at the same time ineligible for a 'change' campaign.

As a woman to demonstrate your electability, you must become that which ultimately will make you unelectable in a 'change' campaign: a well-connected political insider with decades of political experience. In this particular case, the type of political change endorsed by Trump exacerbated the effects of the female presidential paradox (p.134).

The Banwart (2010) study reinforces the idea that traditional gender stereotypes are still applied to female candidates. These stereotypes can be used to delegitimize their actions and paint them in a negative light. For example, a strong female leader might be called "bossy," while a similar male leader would be seen as "assertive." This can fuel personal attacks that focus on appearance, personality, or anything other than their qualifications.

The paradox creates a situation where female politicians face a higher bar and are subjected to harsher criticism. This can lead to the kind of personal attacks seen in the case of Dilma Rousseff, in 2016. An analysis of public posters in street demonstrations revealed that allusions to Rousseff ranged from sexist remarks to desires for her death, removal through a violent coup d'état, or expulsion from office (Meneguelli & Ferré-Pavia, 2016). This incident exemplifies the vicious personal attacks some female politicians face (Bartolomé et al., 2024; Wagner, Gainous & Holman, 2017).

The "paradox of female presidentialism" suggests that women are inherently disadvantaged in elections seeking major change. However, a recent shift in media portrayal offers a potential solution. In countries with a higher number of female leaders, like Australia and Canada, studies like Wagner et al. (2022) show a change in media coverage. This study examined the news coverage of regional government leaders. The results show that journalists gave similar leadership evaluations to both newly elected female and male leaders. Notably, they highlighted collaboration, a traditionally "feminine" trait, as a key leadership quality for both genders. Over time, media focus on male leaders shifted more towards likability and emotions. These findings suggest a positive trend: media perceptions of effective leadership are expanding, making it easier for women to be seen as strong leaders.

This shift aligns with broader societal changes. Eagly et al. (2020) meta-analysis of public opinion polls reveals a growing acceptance of female competence. While "feminine" traits like collaboration are gaining recognition, traditional stereotypes regarding "masculine" traits—like ambition—haven't entirely disappeared. However, the analysis highlights a crucial point: the public's perception of competence is becoming more equal, with some polls even suggesting a slight female advantage. This suggests that gender stereotypes are slowly changing, paving the way for a more level playing field for female politicians, particularly those seeking major change.

This shift in media portrayal suggests a future with less ingrained gender stereotypes in political culture. This could be a breakthrough for political communication, fundamentally changing how female politicians are perceived by voters. By showcasing a broader definition of leadership, the media can help women overcome the “paradox” and be seen as both electable and agents of change. These studies offer a glimmer of hope, suggesting that voters are increasingly looking beyond gender and focusing on a candidate’s qualifications and values.

Nevertheless, overcoming the “paradox” requires more than just media reform. Research by Coffé, Helimäki and Von Schoultz (2023), Evans, Cordova and Sipole (2014), and Panagopoulos (2004) suggests that female candidates can leverage strategic communication to their advantage. This involves tailoring their campaign messaging to emphasize both traditionally feminine and masculine strengths. By focusing on building a perception of competence, likability, and reliability, they can connect with voters in a way that transcends gender stereotypes.

The challenge, however, is not uniform across the globe. Studies by Beaulieu and Hyde (2009) highlight a persistent “tilted playing field” in Latin America, particularly concerning access to resources. Despite seemingly fair electoral processes, cultural perceptions and limited financial resources disadvantage female candidates (Freidenberg, 2017; Welp, 2017). These financial constraints can significantly restrict campaign budgets, impacting the quality of their communication teams and social media strategies. This underscores the need for broader systemic changes to ensure a truly level playing field for all candidates, regardless of gender.

2.2. Navigating the hybrid media landscape: social media and women in politics

Modern political campaigns operate in a complex “hybrid media system” (Skogerbø & Krumsvik, 2015). This system combines traditional media with social media, requiring candidates to be adept at both to succeed. Mastering social media is as crucial as a well-oiled ground campaign team (Paatelainen, Kannasto & Isotalus, 2022).

Twitter, for example, offers a unique platform for political engagement. Russell, Macdonald and Hua (2023) found that politicians can use Twitter strategically to craft a public image that resonates with voters through emotional language. These emotionally charged messages often generate headlines, grabbing the attention of voters and traditional media, who then amplify them (Russell et al., 2023). Twitter’s network structure facilitates this spread, allowing messages to go viral and reach large audiences.

However, social media effectiveness goes beyond simply broadcasting messages. For successful political communication, candidates need to understand their strengths and navigate the cognitive biases of their audience. This is particularly important for women in politics. Studies have shown that Twitter allows female candidates to connect directly with voters (Rizkika & Haryanto, 2021; Graham & Schwanholz, 2020; Ross, Jansen & Van de Wijngaert, 2019), yet gender remains a significant factor in how women are perceived on these platforms (Beltran et al., 2021; Hosseini, 2019; Haraldsson & Wängnerud, 2019; Evans & Clark, 2016).

Female candidates often face a communication dilemma. They can either reinforce traditional gender stereotypes or strive to combat them by focusing on policy issues (Windett, 2014). They must also decide how to respond to male opponents while defining their overall campaign strategy (Berasategi, Pando & Rodríguez, 2024).

Despite these challenges, Twitter remains a valuable tool for female politicians. Research by Russell et al. (2023) highlights how women use the platform to build relationships with voters, connect with audiences, and promote their electoral program (Russell et al., 2023). Moreover, in his study on the use of Twitter in Latin America, Haman (2023) analyses how parliamentarians in the region utilize this platform. The results indicate that female parliamentarians are more likely than their male counterparts to use Twitter and tend to be more active on the platform.

The author argues that there is a significant relationship between gender and the use of this social network, highlighting that female parliamentarians not only adopt Twitter more frequently but also engage with it more intensively compared to male parliamentarians.

However, existing research suggests that gender stereotypes continue to affect the reach and effectiveness of women's social media campaigns (Russell et al., 2023; Carpinella & Bauer, 2021; Meeks, 2016; Bauer & Santia, 2021). Traditional gender roles are readily transferred to the online political sphere (Carpinella & Bauer, 2021). Female candidates are often subjected to criticism, questioning their competence and suitability for traditionally masculine leadership positions (Meeks, 2016). This challenge is further amplified by the association of masculinity with political leadership (Bauer & Santia, 2021).

For example, Coates and De Maio's (2019) analysis of Twitter propaganda against Hillary Clinton in 2016 revealed the use of gender stereotypes based on physical appearance, negative female traits, and sexist ideas. Similarly, Esposito and Breeze's (2022) study on online hostility against female politicians in the UK found that women received a disproportionate amount of abuse focused on appearance, sexuality, and violence. These findings underscore how online abuse against female politicians is rooted in societal expectations regarding women's proper role in politics. In Chile, Saldaña and Rosenberg (2020) demonstrated how political and gender biases in news coverage influenced online discussions during the election. The authors also observed that levels of incivility in discourse were significantly higher when the conversation involved female politicians, particularly former President Michelle Bachelet. According to the findings, Bachelet received 50% more disrespectful comments compared to right-wing candidate Sebastián Piñera. These results highlight that women are disproportionately targeted by offensive discourse on social media and are more likely to face verbal attacks based on their actions or what they represent. This pattern underscores the gendered nature of online incivility, particularly in political discussions.

While few quantitative studies have explored gender differences in how politicians use social media, recent research by Guerrero-Solé and Perales-García (2021) sheds light on this topic. Their findings suggest that the number of tweets posted by male and female members of the Spanish Congress is similar, indicating comparable activity levels across genders. However, a significant disparity emerges when we consider how tweets are amplified and reach audiences. Men enjoy a clear advantage, garnering more retweets and attracting larger audiences compared to their female counterparts. This gap widens further when examining results by party affiliation. In most parties, male politicians benefit from a stronger internal amplification network, receiving more retweets from their party colleagues. Interestingly, parties led by women appear to neutralize this bias, exhibiting no statistically significant gender difference in internal amplification. This complex picture presents the idea of a difficult online landscape for female politicians.

Another quantitative study by González and Ferré-Pavía (2023) sheds light on the Colombian case. Interestingly, the research finds no significant difference in how male and female politicians reach audiences or amplify their messages on Twitter. This suggests that the platform might offer a more equal opportunity for visibility compared to traditional media, which is known to be biased against women. However, the study doesn't entirely exonerate gender as a challenge. It highlights that factors such as political polarization and ideology pose even greater obstacles for women seeking political success in Colombia.

2.3. The Colombian case study

In the Colombian context, numerous studies have explored the challenges women face in achieving greater inclusion in politics (Bernal-Olarte et al., 2023; Bernal-Olarte, 2011; Wills-Obregón, 2007). This research emphasizes the urgent need for more effective measures to increase female participation in political spaces. Beyond gender biases and individual attributes

of women, the literature highlights structural barriers that significantly hinder their access to and representation in positions of power.

For instance, Wills-Obregón (2007) identifies “glass ceilings” and “glass walls” as critical obstacles restricting women’s advancement to high-ranking positions in Colombia. While women have achieved moderate inclusion in spaces traditionally dominated by men, such as politics and academia, their level of representation—defined as their ability to influence decision-making processes within these spaces—remains considerably limited. Similarly, Bernal-Olarte et al. (2023) underscore persistent barriers to female representation in the legislative domain. These challenges include the limited effectiveness of the quota law in open-list electoral systems, the high entry barriers imposed by the Colombian electoral framework, and inequities in the financing system, which disproportionately benefit individuals with personal wealth or access to significant financial networks, further marginalizing women and other underrepresented groups.

In addition to these structural barriers, the role of political communication and social networks has become a pivotal area of inquiry. Social media platforms are increasingly seen as essential tools for female politicians to establish their visibility and connect directly with voters. For example, Duque (2022) highlights the transformative potential of social networks for women disengaged from traditional political structures and conventional parties. The author notes that these platforms have served as powerful mechanisms of political empowerment, enabling women to secure congressional seats in the 2022 elections by fostering direct engagement with the electorate and building strong, independent support bases.

At the same time, gendered dynamics in the use of social networks reveal distinct challenges for female politicians. López et al. (2021) suggest a potential causal relationship between gender biases and the hostility directed at female political figures, such as Claudia López, during her campaign for Mayor of Bogotá (Mayor 2020-2024). Compared to other candidates, she was more frequently subjected to ad hominem attacks and received a greater number of negatively toned messages on Twitter. These findings underscore the disproportionate scrutiny and hostility faced by women in political communication on digital platforms.

In line with this analysis, González and Ferré-Pavía (2023) investigated gender differences in the use of Twitter among Colombian parliamentarians. Their findings indicate that, while Colombia ranks below the global average in terms of political gender equality, male and female parliamentarians utilize Twitter in similar ways. The study demonstrates that both groups are relatively influential in terms of volume, amplification, audience reach, and message effectiveness, with no significant gender-based disparities in amplification or audience engagement. However, the data reveal notable differences tied to political party affiliation and ideological beliefs, suggesting that these factors play a more significant role than gender in shaping the dynamics of political communication.

A critical question remains: Does Twitter provide an equitable platform for all politicians, particularly concerning gender dynamics? This study addresses this question through a quantitative analysis of how Colombian members of Congress use Twitter. The hypothesis posits that a gender gap exists in the amplification of messages and follower counts between male and female congressmembers. In the context of Colombia, selected as the case study, León (2022) argues that while women’s representation in the country has improved over the past decade, it still lags behind other nations in the region in adopting measures to strengthen its electoral gender system. Despite the implementation of affirmative action policies, Colombia remains among the countries with the lowest proportion of women in its National Congress.

This study focuses on identifying potential disparities in activity levels and engagement metrics between male and female politicians, using data from both electoral and non-electoral periods. Key variables analysed include daily tweet frequency, follower acquisition rates, platform influence, and the effectiveness of messaging strategies. By examining these metrics, the

research aims to determine whether these quantitative differences result in unequal impacts in terms of message amplification and visibility.

Ultimately, this investigation seeks to evaluate whether Colombia's current social media landscape provides a level playing field for all politicians or if gendered barriers persist, limiting the digital empowerment of female political leaders.

3. Method

This study employs an exploratory research design to investigate potential gender differences in how Colombian members of Congress utilize Twitter and the impact they achieve. Exploratory research is valuable in the initial stages of research to gain a deeper understanding of a phenomenon and identify potential relationships between variables.

Quantitative analysis will be the primary method used to examine these relationships, with the analysis of a dataset of tweets from Colombian Congress members during both electoral and non-electoral periods.

3.1. The Colombian political landscape: Parties, gender representation, and context

Colombia adheres to a presidential political system. From 2018 to 2022, a total of 13 political parties gained at least one seat in the Senate. However, the five parties that account for 71% of the seats follow a right-wing or centre-right ideology. A similar case was observed in the House of Representatives, where 16 political groups won at least one seat, with five political parties constituting 83% of the total number of seats and representing a right-wing or centre-right ideology.¹ As this article was being written, after the 2022 elections, the country was undergoing intense political polarization.

During the 2018–2022 period in Colombia, women occupied only 32 of the 171 seats in the House of Representatives and 23 of the 108 seats in the Senate. This is equivalent to 19.9% female representation in the national legislature (UN Women, 2021).

Until 2022, Colombia had been one of the countries in Latin America with the lowest levels of female political representation in Congress, despite the existence of a gender quota law established in 2000. This law aimed to promote the equal participation of women in the highest positions of the state by adopting a quota requiring at least 30% of positions in public power to be held by women.

3.2. System indicators

To answer the research question and hypothesis, this study employs an exploratory research design through the indicators of number of tweets, retweet rate, follower acquisition, share of tweets, efficacy rate, and influence rate (Guerrero-Solé & Perales-García, 2021; González, A. K. & Ferré-Pavia, C., 2023).

This analysis began with a t-test that allows us to compare simple differences in means between men and women in each of the periods analysed for the different engagement measures, assuming the data follow a normal distribution². This allows us to make an initial analysis of gender differences in Twitter usage. Secondly, and taking advantage of the data structure, we use a two-way fixed effects model. This model allows us to obtain gender differences in electoral and non-electoral periods after controlling for the fixed effects of each user and day.

¹ The results of these elections can be consulted at <https://www.registraduria.gov.co/-Historico-de-Resultados-3635-3635-3635-3635-3635>.

² Having a large sample ($n > 30$), the central limit theorem ensures that the mean of the data tends to follow a normal distribution, even if the data itself is not normally distributed.

For example, all those characteristics of a user that do not change during the analysed periods, such as gender and, in some cases, political affiliations and preferences, will be controlled for in this analysis. Similarly, by controlling for the fixed effects of each day, the results of this analysis already consider that some days there may be events that affect the participation of all users of the social network equally, such as political discussion topics or pop culture trends that make users more active. The fixed effects model is calculated according to the following equation:

$$Y_{it} = \beta_0 + \beta_1 \times Gender_i + \beta_2 \times (Electoral\ Period_t) + \beta_3 \times (Gender_i \times Electoral\ Period_t) + \mu_i + \eta_t + \epsilon_{it}$$

where Y_{it} represents interaction related to engagement; β_1 and β_2 estimate the effects of gender and electoral period; β_3 , the parameter of interest, measures the differential effect of men in electoral periods. The model includes user and day-fixed effects. Since gender is time-invariant for each user and the electoral period is invariant between users after controlling for the day, β_1 and β_2 cannot be obtained in the main regression. We analyse results with and without fixed effects to observe differences.

The interest measures of engagement, Y_{it} , are:

- *New followers per tweet*: the difference between the number of followers a member of Congress had before posting a tweet and the number of followers they have after posting the tweet. In other words, the number of people who started following a member of Congress after they posted a tweet is:

$$NewFollowers = Followers_{it} - Followers_{i(t-1)}$$

- *New followers' rate per tweet*: This variable is similar to “new followers per tweet,” but it takes into account the fact that some members of Congress have more followers than others. To calculate this variable, the “new followers per tweet” variable is divided by the number of followers the member of Congress had before posting the tweet. This standardizes the variable and allows for a more accurate comparison of the rates of new followers gained by members of Congress with different numbers of followers:

$$NewFollowersRate_{it} = \frac{Followers_{it} - Followers_{i(t-1)}}{Followers_{i(t-1)}} \times 1000$$

- *Retweet rate per tweet*: This rate is calculated by dividing the number of retweets a tweet received by the number of followers the member of Congress had before posting the tweet. This variable is also standardized per thousand followers:

$$ReTweetRate_{it} = \frac{ReTweet_{it}}{Followers_{i(t-1)}} \times 1000$$

- *Share of tweets*: The proportion of tweets that each member of Congress made in each of the periods over the total number of tweets analysed for that period. From now on, in each of the following equations, i refers to the author of the tweet, while p refers to each period analysed (non-election and election):

$$ShareTweets_{ip} = \frac{Tweets_i}{Total\ Tweets_p}$$

- *Influence using new followers*: This index is the average number of new followers a member of Congress has after each tweet, multiplied by their share of tweets in that period. This allows us to measure the influence by how many new followers a member of Congress gained, considering their participation in the total discussion (share of tweets):

$$Influence_{it} = NewFollowers_{ip} \times ShareTweets_{ip}$$

- *Influence using new followers' rate (per thousand followers)*: This index is the same as the previous one, but it is divided by the number of followers the member of Congress had before the tweet and then multiplied by one thousand. Unlike the previous one, this influence index takes into account that a new follower can be much more important for a small Twitter user than it is for a large Twitter user:

$$Influence_{ip} = NewFollowersRate_{ip} \times ShareTweets_{ip}$$

- *Efficacy*: This index indicates how many retweets a post had divided by the number of followers the Twitter user had when they posted and multiplied by the share of tweets:

$$Efficacy_{ip} = \frac{Avg Retweet_{ip} \times 1000}{Avg Followers_{ip}}$$

3.3. Standardized data

Each metric will be standardized by dividing it by the maximum value observed in the dataset. This allows for a more accurate comparison of activity levels across members of Congress with varying follower counts and engagement levels. For example, if Gustavo Petro (now President of Colombia) had the highest influence score, all other members' scores would be expressed as a percentage of his score. Therefore, to measure the influence index of all members of Congress, the result was divided by this level, thus giving Gustavo Petro a level of 1, and the rest of the data is compared relatively to him. In other words, the data for each member of Congress is expressed as a percentage of the data for Gustavo Petro. This allows for a more accurate comparison of the influence and efficacy of different members of Congress, even if they have different numbers of followers or different levels of engagement.

3.4. Limitations

It is important to note that this research represents a specific case study where the indicators do not determine or signify the existence of "success" cases at the political level by the congressmen and congresswomen. These variables are neither transferable nor comparable to the individual political performance of each politician. Therefore, they only reflect performance in the use of social media platforms. However, it is also necessary to note that this study has the limitation of not being able to consider the restrictions imposed by social media algorithms, which undoubtedly affect the visibility of Twitter accounts in different ways (Erickson, Yan & Huang, 2023; Theocharis et al., 2020; Pariser, 2011). Lastly, the study data is also limited to the period during which it was gathered, since each user can delete past tweets, retweets, shares, or comments. The data presented in the following section covers the distribution of members of Congress according to gender.

Sample

This study collected tweets, shares, replies, and retweets between July 1, 2020, and August 1, 2021, a full legislative year, and between January 1, 2022, and June 19, 2022, which coincides with the electoral cycle and involves the parliamentary and presidential elections. The sample consisted of 689,576 tweets collected via web scraping using the Brandwatch platform. This study leveraged the data analysis capabilities of the tidyverse and tidytext libraries in R for both data manipulation and statistical analysis. Additionally, Stata was used to complement the analysis, potentially for specific statistical tests or visualizations that might be better suited for that software. Table 1 shows the gender distribution of the sample.

Table 1. Tweet distribution by gender

GENDER	NUMBER OF TWEETS
M	523,983
F	165,593

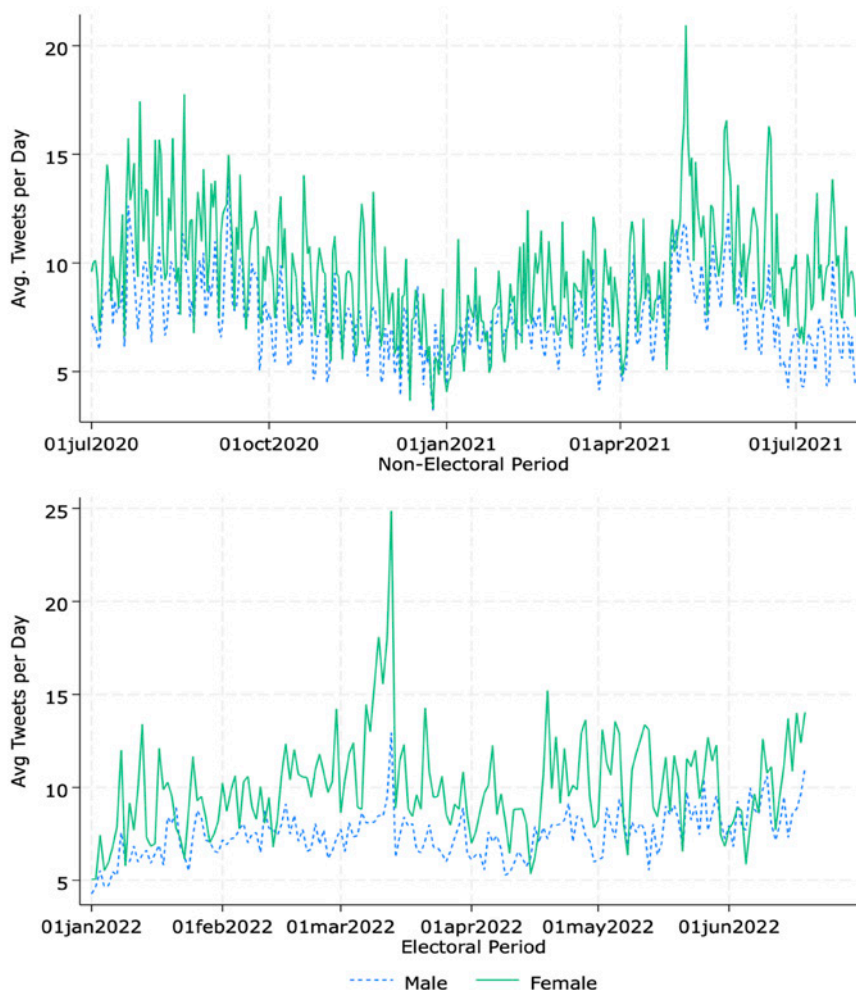
Source: All graphics and tables by the authors (2024). Data from www.twitter.com

4. Results

4.1. Unveiling differences in conversation patterns: A look at volume and impact

This section delves into the core of our investigation: the volume and impact of conversations generated by Colombian members of Congress on Twitter. The present investigation commences by examining tweet frequency across genders and electoral periods (Figure 1). Intriguingly, the data reveals that during non-election periods, there is no significant difference in tweet volume between male and female members of Congress. However, a distinct pattern emerges during elections, where female members of Congress exhibit a notably higher average number of daily tweets compared to their male counterparts. This finding suggests a potential strategic shift by female politicians, who may be leveraging Twitter more actively to amplify their voices and engage with the electorate during these critical periods. Figure 1 shows the gender frequency of tweets during election periods.

Figure 1. Average of tweets per day by gender



To delve deeper into these comparisons, Table 2 presents the differences in means for key metrics between female and male members of Congress during both non-election and election periods.

Table 2. Simple difference in means

	Female	Male	Mean Difference (Male)-(Fem)
a. New Followers			
Total New Followers			
Non-electoral period	5.527 (164.646)	6.688 (320.992)	1.161 [0.739]
Electoral period	8.115 (159.644)	12.030 (176.552)	3.914*** [0.923]
New Followers per each 1000 previous followers			
Non-electoral period	0.462 (29.666)	0.194 (23.190)	-0.288** [0.098]
Electoral period	0.091 (1.385)	0.110 (2.117)	0.019** [0.009]
b. Retweet on own posts			
Total Retweets on post			
Non-electoral period	142.255 (355.502)	199.248 (641.041)	56.99*** (2.581)
Electoral period	269.572 (606.484)	283.096 (1007.015)	13.525** (6.773)
Retweet per each 1000 previous followers			
Non-electoral period	1.674 (6.162)	2.494 (10.646)	0.820*** [0.044]
Electoral period	2.524 (7.496)	1.983 (10.265)	-0.541*** [0.078]

p-value ***<0.01, **<0.05, *<0.1

Note: The numbers in parentheses represent the standard deviations, the asterisks next to the mean difference values (Male-Female) indicate the level of statistical significance, and the brackets show the standard errors of the difference estimates.

The analysis reveals a trend of male members of Congress acquiring more new followers than their female counterparts. This difference is statistically significant in both electoral and non-electoral periods. Interestingly, the gap widens when examining the rate of follower acquisition per existing follower. This suggests that males might be more efficient at converting existing followers into active participants who engage with their content.

Furthermore, the data indicates a larger disparity in follower growth between genders during election periods. This could imply that male politicians leverage campaign strategies on Twitter more efficiently, leading to a surge in new followers.

Similarly, males generally receive more retweets on their tweets compared to females. This difference is statistically significant across both electoral and non-electoral periods. However, a deeper look reveals that the gap narrows when examining the retweet rate per existing follower. This suggests that men might be crafting content that resonates more strongly with their audience, leading to a higher shareability of their tweets.

Interestingly, the difference in retweet rate between genders narrows during election periods. This could be because both male and female politicians increase their activity on Twitter during elections, potentially leading to a more level playing field in terms of retweet engagement.

Table 3 examines the interaction between gender and electoral periods using a two-way fixed effects model. This method isolates the specific effect of being male during election periods compared to being female in non-election periods while controlling for day-specific events or trends that affect all members of Congress equally. By focusing on this interaction, the analysis provides a deeper understanding of how gender and electoral contexts influence various metrics of social media engagement.

Table 3. Two-way fixed effects: Gender#Period

	Female	Male	Mean Difference (Male)-(Fem)
a. New Followers			
Total New Followers			
Non-electoral period	5.527 (164.646)	6.688 (320.992)	1.161 [0.739]
Electoral period	8.115 (159.644)	12.030 (176.552)	3.914*** [0.923]
New Followers per each 1000 previous followers			
Non-electoral period	0.462 (29.666)	0.194 (23.190)	-0.288** [0.098]
Electoral period	0.091 (1.385)	0.110 (2.117)	0.019** [0.009]
b. Retweet on own posts			
Total Retweets on post			
Non-electoral period	142.255 (355.502)	199.248 (641.041)	56.99*** (2.581)
Electoral period	269.572 (606.484)	283.096 (1007.015)	13.525** (6.773)
Retweet per each 1000 previous followers			
Non-electoral period	1.674 (6.162)	2.494 (10.646)	0.820*** [0.044]
Electoral period	2.524 (7.496)	1.983 (10.265)	-0.541*** [0.078]

p-value ***<0.01, **<0.05, *<0.1

The data reveals several key patterns that merit further analysis to better understand the interaction between gender and electoral periods in social media engagement.

First, the relationship between gender and electoral context demonstrates how the political environment influences follower acquisition. During non-electoral periods, the difference in total new followers between men and women is small and not statistically significant, with men gaining an average of 1.161 more followers than women. However, this difference becomes statistically significant during electoral periods, with men gaining an additional 3.914 followers on average compared to their female counterparts. When focusing on new followers relative to existing followers (per 1,000 followers), women outperform men in non-electoral periods, gaining 0.288 more followers than men. Interestingly, this trend reverses slightly during elections, with men gaining a small but significant relative advantage of 0.019 additional followers per 1,000 followers.

These results suggest that while electoral periods boost engagement for both genders, they also narrow the gender gap in relative follower acquisition, particularly in favour of women. This implies that the electoral context could help women catch up, at least in terms of relative follower growth, reducing the disparity between genders and giving women a modest advantage in this specific metric. In simpler terms, while elections drive more attention to all politicians, they appear to level the playing field somewhat, helping women gain followers at a rate closer to that of men.

Second, retweet dynamics show a distinct pattern across gender and time. During non-electoral periods, male politicians' tweets receive significantly more retweets than those of female politicians, with an average difference of 0.820 retweets per 1,000 followers. This advantage diminishes during electoral periods, where men experience a statistically significant decline, showing 0.541 fewer retweets per 1,000 followers compared to women. This reversal indicates that female politicians may resonate more with audiences during high-visibility periods, potentially due to differences in messaging strategies or shifts in audience engagement dynamics.

Third, variability in social media engagement metrics is notably different between male and female politicians. For men, the high standard deviations in both new followers and retweet rates, particularly during non-electoral periods, highlight a significant concentration of engagement among a small subset of prominent individuals. This suggests that social media performance among male politicians is uneven, with a few individuals driving the majority of the observed metrics. In contrast, the variability in engagement metrics for women is much lower, with more consistent standard deviations across both periods and metrics. For instance, the standard deviations for new followers and retweets among women are significantly smaller than those for men, indicating a more uniform distribution of engagement across female politicians. This suggests that, unlike men, social media performance among women does not rely as heavily on a select few high-profile individuals.

Overall, while male politicians exhibit higher variability in engagement metrics, with a concentration of influence among a minority, female politicians show a more homogeneous distribution of social media engagement.

Finally, electoral periods, overall, act as amplifiers of social media engagement for both genders. Both men and women experience substantial increases in new followers during these times. Women gain an average of 2.588 additional followers during electoral periods compared to non-electoral periods, while men observe an even larger increase, with an average gain of 5.342 additional followers. Retweet rates also show a slight overall increase during elections, but gender-specific trends show that women may benefit more in terms of relative engagement during these high-stakes periods. Figures 2 and 3 show the indexes of influence and efficacy by gender.

Figure 2. Influence index by gender

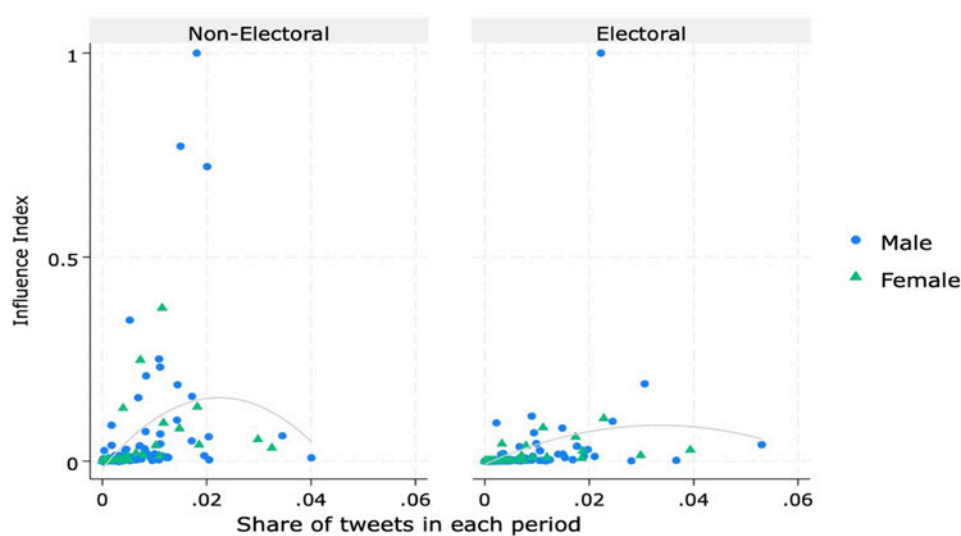
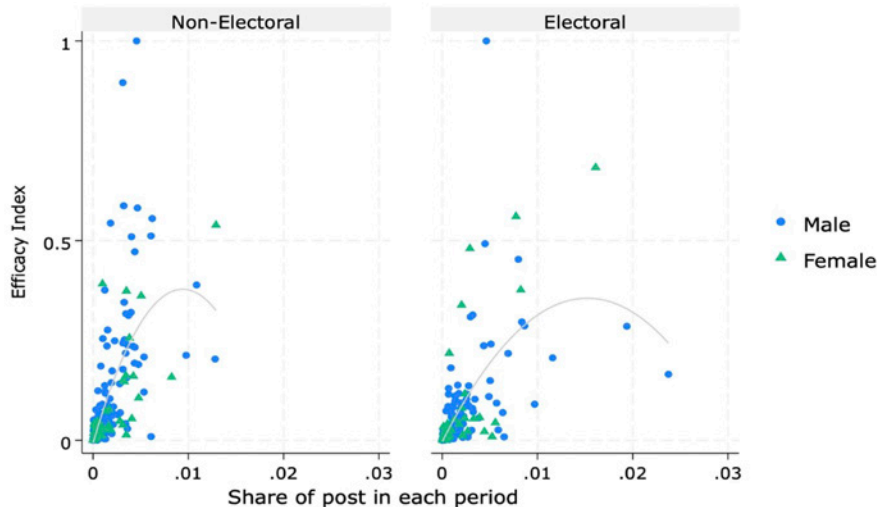
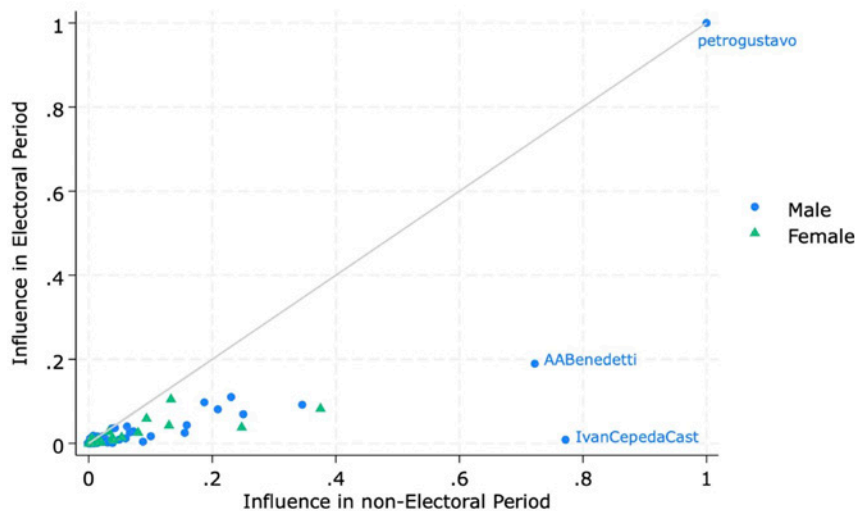


Figure 3. Efficacy index by gender



The following graphs, figures 4 and 5, depict how the influence and efficacy indexes of Colombian members of Congress change between non-election and election periods. Each point on the graph represents a single member of Congress, with their position relative to the diagonal 45-degree line indicating their change in index score. Members of Congress positioned above the line experienced an improvement in their respective indexes during the election period compared to the non-election period. Conversely, those positioned below the line saw a decline in their index score during the elections.

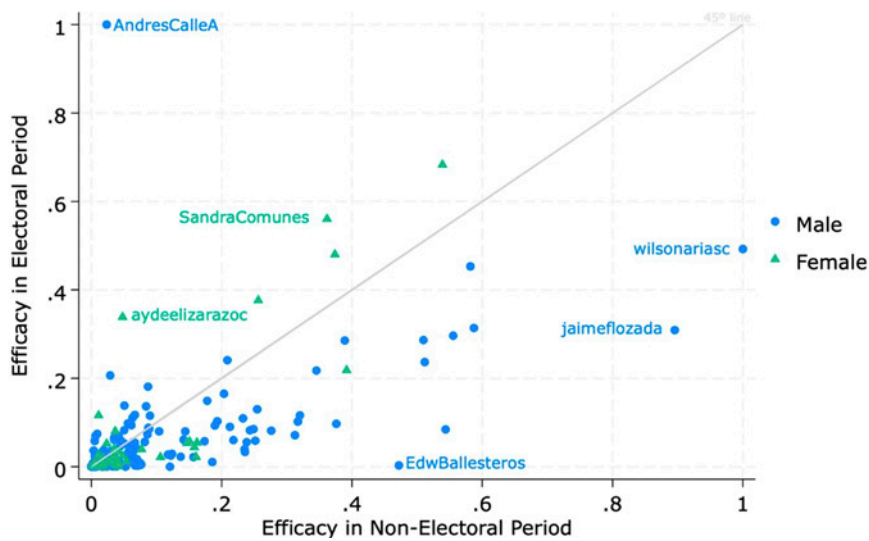
Figure 4. Influence index standardized



It is important to note that Figure 4 focuses on the influence index, a measure of a member of Congress's overall reach and visibility on Twitter. Interestingly, the data reveals that for most members of Congress, the influence index decreases during the electoral period compared to the non-election period. This suggests that the heightened competition and noise associated with election campaigns might negatively impact a member's overall visibility on the platform. One notable exception is Gustavo Petro, who consistently maintains the highest influence index across both periods.

Figure 5 explores changes in the efficacy index, which measures the retweet rate adjusted for follower count and tweet share. Like the influence index, the data suggests that for many members of Congress, efficacy also declines during the electoral period compared to the non-election period. This finding could indicate that while tweet volume might increase during elections, the overall effectiveness of the messaging strategies employed might decrease.

Figure 5. Efficacy index standardized



Finally, table 4 presents the results of the aggregated indexes, indicating no significant gender gap in terms of influence or efficacy overall. However, during electoral periods, a statistically significant decrease in the efficacy indicator is observed for men, as evidenced by the negative coefficient for the interaction term (Male#Electoral). This finding suggests that the heightened intensity and competition of electoral campaigns may negatively impact the effectiveness of Twitter communication strategies for male politicians in particular, while women appear to be less affected by this dynamic.

In general, the research findings reveal distinct patterns in follower acquisition, retweet rates, and the influence and efficacy of messaging strategies across genders and electoral periods. These results highlight the importance of considering gender as a key factor in understanding the nuances of online political visibility and engagement. However, the findings also underscore the complexity of online political communication on Twitter, as these dynamics are shaped by interactions between gender, electoral context, and variability in individual performance.

Table 4. Influence and efficacy index

	Influence		Efficacy	
	(1)	(2)	(3)	(4)
Gender (Male==1)	-0.00329 (0.0131)		0.00549 (0.0210)	
Period (Electoral==1)	-0.0184 (0.0111)		0.00569 (0.0315)	
Gender#Period (Male#Electoral)	0.00349 (0.0148)	0.00460 (0.0106)	-0.0372 (0.0342)	-0.0375* (0.0167)
Constant	0.0301** (0.0105)	0.0192*** (0.00497)	0.0813*** (0.0180)	0.0932*** (0.00797)
N	461	436	453	426
adj. R-sq	0.001	0.693	0.006	0.608
Author FE	NO	YES	NO	YES
Date FE	NO	YES	NO	YES

p-value ***<0.01, **<0.05, *<0.1

5. Discussion

This study sought to identify gender differences in the use of Twitter by female and male parliamentarians, analysing data from both electoral and non-electoral periods. By comparing metrics such as the number of tweets per day, retweets, shares, new followers, influence, and efficacy of their messages on the platform, the results suggest that there are meaningful differences in how male and female delegates engage with Twitter, at least in quantitative terms.

The study provides evidence of gender differences in follower acquisition and retweet rates, though these differences are nuanced and context dependent. While Colombian male politicians generally attract more followers and retweets during non-electoral periods, these advantages diminish or even reverse during electoral periods. For instance, men exhibit significantly higher retweet rates per 1,000 followers during non-electoral periods, but this gap narrows during elections, as female politicians experience relatively larger increases in retweet rates. These findings align partially with Guerrero-Solé and Perales-García (2021), who highlight significant gender-based differences in the number of followers and how tweets are amplified to reach audiences. However, this study emphasizes that these disparities are not static; instead, they shift depending on the electoral context, suggesting that heightened visibility and competition during elections may create a more level playing field for engagement on Twitter between male and female politicians.

Following the results from González and Ferré-Pavía (2023), the two-way fixed effects model reveals that male members of Congress slightly outperform their female counterparts in follower acquisition, particularly in absolute terms during electoral periods. However, in relative terms (followers per 1,000 existing followers), women outperform men during non-electoral periods, suggesting that the dynamics of follower acquisition are highly context dependent. Being male is not associated with a significant difference in new follower acquisition during non-electoral periods, but it is during elections, where men gain significantly more followers on average.

While the study does not explicitly analyse content, these findings suggest that factors beyond gender, such as content strategy, may play a key role in follower acquisition and retweet engagement. Male tweets resonate more strongly in non-electoral periods, as evidenced by their significant retweet advantage, but the disparity in retweets shrinks during elections, even favouring female politicians. This shift may result from increased activity by both genders during elections, creating a more level playing field for engagement. Further research is needed to explore how content quality and audience behaviour influence these patterns.

The study reveals a notable trend in tweet frequency during elections. On average, male members of Congress tweet more frequently than their female counterparts, differently to Haman's (2023) results. However, female members of Congress show a significant increase in daily tweet volume during electoral periods. This heightened activity may reflect a strategic use of Twitter to bypass traditional media and connect directly with voters. While Beltran et al. (2021) and Hosseini (2019) highlight the challenges faced by women online, including harassment and negativity, the potential advantages of using Twitter as a campaign tool may outweigh these risks. This finding aligns with research by Paatelainen et al. (2022) and Russell et al. (2023), which emphasize the platform's effectiveness in amplifying political communication during campaigns.

Another interesting finding is that quantity alone isn't enough to guarantee better performance for Colombian politicians. The results suggest that there is no significant difference in influence and efficacy indexes across genders or electoral periods. Simply tweeting a lot or having a larger number of followers does not ensure a high impact. While the data do not explicitly measure content quality, the observed narrowing of gender gaps during elections suggests that content strategy may play a critical role in driving engagement. There may be a sweet spot for tweet volume, as excessive posting does not necessarily lead to better outcomes. Ultimately, a

tweet's virality and engagement with the audience might depend on factors beyond gender, such as strategic communication, audience characteristics, or political prominence, all of which appear to play a significant role in shaping outcomes.

The research shows as elections introduce heightened competition on Twitter, which may stifle some aspects of engagement. For male politicians, there is a statistically significant decrease in efficacy during elections. However, there is no evidence of a similar effect for female politicians, suggesting that women are less affected by the heightened competition in terms of efficacy. Contrary to general assumptions, the study does not find a significant overall decrease in visibility or influence for either gender during elections. These findings highlight the complex dynamics of online political engagement during campaign periods and suggest that gender-specific effects may vary depending on the metric analysed, as highlighted by González and Ferré-Pavia (2024).

6. Conclusions

This study revealed nuanced gender differences in the number of followers and retweet rates on Twitter. Men exhibit an advantage in total follower acquisition and retweets during non-electoral periods, but this advantage diminishes or reverses during electoral periods, where women close the gap or outperform men in some relative engagement metrics. These findings align partially with existing research, as they highlight dynamic gendered patterns rather than consistent challenges faced by female politicians.

While the study found a gender gap in some metrics, it is plausible that the content of tweets, rather than the politician's gender, plays a more significant role in determining how often tweets are shared. Understanding "impact" as a combination of retweet rate (efficacy) and reach (influence), future research could explore how the nature of political messaging contributes to engagement and visibility, regardless of gender. These results underscore the complexity of online political communication and the need to consider contextual factors when evaluating gendered dynamics on platforms like Twitter/X.

Finally, the limitations of this research must be discussed. Because the results were derived from a case study, the data were determined by the contextual characteristics of the country and the data collection period. In addition, this paper considers variables that affect the use of Twitter and cannot be applied to qualify the political performance of a specific politician. Moreover, since this was a quantitative study, it cannot define variables with significant data implications—such as style, tone, and type of discourse used by politicians in their messages—that could help understand the differences in terms of gender and ideology in the politicians' use of Twitter. Also, these observations are based solely on gender variables. Other factors, such as party affiliation or political experience, could also influence social media activity. Analysing tweet content could reveal further insights into potential differences in communication styles between genders. This might be related to Long et al.'s (2021) theory regarding gender attitudes and voter preferences, suggesting it depends not only on the candidate's gender but also on the gender-related characteristics and values they express.

Similarly, this study is limited because it cannot incorporate the constraints associated with social media algorithms, which can undoubtedly impact the visibility of politicians' Twitter accounts, such as filter bubbles in social media (Theocharis et al., 2020; Pariser, 2011), echo chambers, and 'selective attention' processes (Erickson et al., 2023; Aruguete & Calvo, 2018; Barberá, 2015; Himelboim, Smith & Shneiderman, 2013), concepts linked to affective polarization and ideological positions, that claim that social media prioritize the type of content they show to a user based on their ideas, likes, or interests.

Overall, the study reveals the complexity of online political communication on Twitter. Future research could enhance its value by integrating this type of analysis with qualitative studies. These studies could delve into the challenges encountered by women in Latin America when crafting messages to position their candidatures, explore the difficulties they face in managing interactions on social media, and examine the treatment they receive from users. Furthermore, it would be interesting to understand, especially in societies as polarized as Colombia's, the role political ideologies and emotions play in the type of communication constructed by campaigns and distributed through media such as Twitter (now X).

7. Contribution

Task	Author 1	Author 2
Conceptualization	x	x
Formal analysis		x
Funding acquisition		
Project administration	x	x
Investigation		x
Methodology	x	x
Data curation		x
Resources	x	
Software		x
Supervision	x	
Validation	x	
Visualization		x
Writing – original draft		x
Writing – review and editing	x	

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