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Non-verbal communication in financial reports: ethnic diversity, intersectionality, and the construction of meaning in facial images

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This study investigates how companies visually represent ethnic diversity through facial imagery in financial reports and how such representations contribute to the construction of corporate identity and legitimacy through impression management. Drawing on social semiotics and impression management theory, the analysis examines whether these visual portrayals reflect substantive inclusion or function primarily as aesthetic forms of compliance with prevailing social expectations. Using a mixed-methods approach that combines qualitative and quantitative techniques, the dataset was compiled through web scraping of annual financial reports issued by firms regulated by the Chilean Financial Markets Commission (CMF) between 2004 and 2020. From 3,670 PDF reports, facial images were extracted and matched with firm-level data, yielding a final yearly sample of 2,085 reports from 234 unique firms. The results indicate that higher levels of displayed happiness and periods of stronger economic growth are associated with lower levels of ethnic diversity in visual disclosures. In addition, ethnic diversity shows limited intersection with stereotypical portrayals of women—typically depicted as young and smiling—pointing to the persistence of gendered and aestheticized visual patterns. Overall, the findings suggest that firms selectively mobilize visual diversity to signal inclusivity while simultaneously reproducing dominant norms embedded in corporate identity. This study contributes to research on visual corporate communication by providing large-scale evidence on intersectional diversity in financial reporting and highlighting the limitations of inclusion strategies based solely on visibility.

KEYWORDS

corporate identity, ethnic diversity, facial images, impression management, intersectionality, non-verbal communication, semiotic social

1 Introduction

Financial reports are traditionally conceived as instruments of accountability and transparency, designed to communicate firms' economic performance through standardized numerical data and textual narratives. However, the increasing incorporation of visual elements—particularly photographs of individuals—has transformed these documents into platforms for

symbolic communication, where images contribute to the construction of corporate identity and the management of stakeholder perceptions (Davison, 2015; Hellmann et al., 2024). Because visual content in financial reports is largely unregulated, firms enjoy substantial discretion in selecting which images to display and how to present them. As a result, photographs can function as vehicles of impression management and legitimacy signaling (Ang et al., 2020; Illia et al., 2014; Dhanani and Kennedy, 2023).

Within this visual domain, facial imagery is particularly salient, as faces convey social cues related to identity, emotion, age, gender, and ethnicity. Prior research has examined specific aspects of facial features, including the influence of facial attractiveness on corporate philanthropic behavior (Agnihotri and Bhattacharya, 2021), the presence of gender stereotypes in financial reports (Jeldes-Delgado et al., 2024), and the formation of social impressions based on facial cues (Xie et al., 2021). Taken together, these studies show that facial imagery in corporate reporting is consequential, yet typically examined through narrow and disconnected analytical lenses. Parallel work highlights how structural characteristics of photographs—such as size, placement, and visual prominence—shape attention and evaluative judgments, particularly among investors (Ang et al., 2020), while interpretive approaches emphasize that images operate within social and cultural contexts to construct corporate meaning and identity (Cook and Over, 2021).

Despite these advances, the literature remains fragmented. Existing studies tend to focus on isolated facial attributes or specific outcomes, without offering an integrated, large-scale analysis of how facial imagery is used in financial reports to construct narratives of inclusion—particularly with respect to ethnic diversity. Moreover, little is known about how ethnic diversity is visually represented in conjunction with other dimensions of diversity, such as gender, age, and emotional expression, or whether such representations reflect substantive inclusion or aesthetic compliance with prevailing social expectations.

This gap becomes particularly relevant in the context of growing societal and institutional attention to inclusion, as articulated in Sustainable Development Goal 10, which calls for the promotion of equality and the elimination of discriminatory practices (United Nations, 2024). While diversity—understood as compositional differences among individuals, including ethnicity and gender (Roberson, 2019)—is increasingly emphasized in corporate discourse, visual representations remain largely discretionary and potentially susceptible to symbolic or superficial forms of compliance.

In light of the discretionary nature of visual disclosures and the growing societal emphasis on diversity and inclusion, this study examines how ethnic diversity is visually constructed through facial imagery in corporate financial reports. Drawing on impression management theory and social semiotics, we address the following research questions:

RQ1: How is ethnic diversity mobilized through facial imagery in annual financial reports to shape public perceptions and corporate impressions?

RQ2: How is ethnic diversity visually associated with gender representation in financial report images, and how does this association influence perceptions of inclusion?

RQ3: How is the visual representation of ethnic diversity in financial reports associated with the depiction of age, and what does this reveal about intergenerational inclusion?

RQ4: How do the emotional expressions shown in ethnically diverse facial images relate to the construction of corporate identity and narratives of inclusion?

RQ5: How does the intersection between ethnic diversity and stereotypical representations of women (e.g., young and smiling faces) shape the portrayal of inclusion in corporate financial reports?

To answer these questions, we draw on impression management theory (Goffman, 1959) and social semiotics (Kress and van Leeuwen, 2020) and examine the intersection between ethnic diversity and other facial attributes, including gender, age, and emotional expression. Using a mixed-methods approach that combines automated image analysis with firm-level data, we analyze facial imagery extracted from annual financial reports published by Chilean regulated firms between 2004 and 2020.

Chile provides a particularly suitable empirical setting for this investigation. The country is a member of the OECD, has experienced a sharp increase in immigration since the 1990s, and has undergone significant demographic transformation in recent decades (INE, 2024). These dynamics, together with increasing public debates around diversity and inclusion, make Chilean corporate reporting a relevant context for examining how ethnic diversity is visually constructed and communicated.

Building on this framework, we further investigate how ethnic diversity intersects with gendered and age-related representations and whether emotionally positive portrayals (e.g., young, smiling faces) contribute to a stylized and potentially superficial depiction of inclusion. By doing so, this study advances the literature on visual corporate communication by providing large-scale evidence on the patterns of use of facial imagery and by introducing a replicable, image-based measure of ethnic diversity in financial report visuals.

2 Theoretical analysis and development of the hypothesis

2.1 Impression management and legitimacy

According to Goffman (1959), individuals manage the impressions they seek to project during social interactions. A similar dynamic operates within organizations, which also attempt to influence how they are perceived by external audiences. To this end, organizations employ self-presentation strategies aimed at shaping stakeholder perceptions and controlling projected images (Bolino et al., 2008; Rim and Ferguson, 2020). These strategies include managing the information disclosed and the use of nonverbal signals, such as visual cues (Goffman, 1959).

In corporate settings, impression management helps explain how organizations and their representatives adapt communication strategies to different contexts in order to influence stakeholder evaluations. For instance, directors and executives deploy impression management tactics during public interactions, such as question-and-answer sessions in board meetings (Pernelet and Brennan, 2023). In shareholder letters, firms rely on rhetorical strategies to project competence and leadership (Aerts and Yan, 2017). Similarly, during corporate social responsibility (CSR) crises, organizations use impression management mechanisms to

restore legitimacy and rebuild stakeholder trust following negative events (Rim and Ferguson, 2020). Visual elements, including images, are recurrent tools in both for-profit and non-profit organizations and play an important role in shaping perceptions of credibility, legitimacy, and social commitment (Bolino et al., 2008; Dhanani and Kennedy, 2023).

The literature on impression management in corporate reporting highlights the central role of visual elements in organizational self-presentation, as they function not only as supplementary information but also as symbolic mechanisms aimed at shaping stakeholder perceptions (Davison, 2015). In this context, diversity, including ethnic diversity, has been identified as a strategic visual resource, particularly in reports related to diversity, equity, and inclusion (DEI) initiatives (Walwema and Bay, 2024). Prior research shows that organizations adapt the photographic content of their reports in response to external pressures and social expectations, selectively representing diversity as a signal of legitimacy, even when such images do not fully reflect internal organizational practices (Duff, 2011; Mookerjee, 2022).

As expectations regarding inclusion and diversity gain prominence among stakeholders, organizations increasingly manage how their commitment to these values is visually communicated. In practice, firms select and curate facial imagery as a means of signaling attention to ethnic diversity. The discretionary selection of faces in financial reports therefore enables organizations to project an image of sensitivity to diversity-related concerns.

Based on this perspective, we propose the following hypothesis:

H1: Companies vary in the extent to which images of faces denoting ethnic diversity are included in their corporate financial reports.

2.2 Social semiotic theory—construction of meaning

Semiotics, originating in linguistics with the work of de Saussure (1974), refers to the study of signs within social contexts (Aiello and Van Leeuwen, 2023). Building on this tradition, social semiotics—developed notably by Kress and van Leeuwen (2020)—provides a framework for analyzing visual elements and the meanings they convey. This approach distinguishes between representational meaning, which concerns how participants and their relationships are depicted in images, and compositional meaning, which focuses on the arrangement and informational value of visual elements within an image (Wang et al., 2023).

Social semiotics has been applied in prior research across multiple domains. For example, it has been used to analyze how textbook images convey explicit and implicit messages about gender roles (Wang et al., 2023), to examine visually persuasive messages in sustainability-related photographs (Chong et al., 2023), and to assess the quality of social responsibility reports through visual narratives (Yekini et al., 2021). Related studies have also examined how companies visually structure information about their business models in corporate reports as part of legitimacy management processes (Di Tullio et al., 2020) and how culturally adapted visual identities influence consumer perceptions through images and corporate logos (Mohamed et al., 2025).

The construction of meaning through images is not static but varies according to social interactions and power relations embedded within diversity networks (Dennissen et al., 2020). Corporate identity is therefore not shaped solely through the representation of a single dimension of diversity, such as ethnicity, but emerges from the combination of multiple identities within a single visual context.

Intersectionality captures how identity categories—including ethnicity, gender, age, and emotional expression—interact and are experienced simultaneously (Crenshaw, 1989).

Within organizational research, Rosette et al. (2018) describe intersectionality as an analytical lens for examining how multiple social categories jointly shape experiences and perceptions. This perspective has been used to understand how gender and race interact within organizations, how age intersects with other minority identities over the life course, and how emotions associated with marginalized identities influence workplace experiences (Rosette et al., 2018; Webster et al., 2018; Thatcher et al., 2023). Recent work also suggests the relevance of examining how ethnic diversity intersects with stereotypical representations of women—often portrayed as young and smiling—in corporate financial reports (Jeldes-Delgado et al., 2024).

From an impression management perspective, images can be interpreted as strategic tools used to project a favorable organizational image to external audiences rather than as transparent reflections of internal practices. From a social semiotic standpoint, these visual representations help explain how organizations construct meanings around diversity and inclusion. Critical semiotic research indicates that although women and racially and ethnically minoritized individuals are frequently present at a denotative level in corporate imagery, they are often positioned connotatively in subordinate or stereotypical roles, which may result in symbolic or superficial forms of inclusion (Bujaki et al., 2021; Usmani et al., 2020). Such visual configurations may reinforce normative narratives of diversity without corresponding substantive change.

Accordingly, when financial reports include facial imagery representing diversity across ethnicity, gender, age, and emotional expression, organizations project messages not only about ethnic diversity but also about broader commitments to inclusion and equity. Intersectionality further implies that organizations may emphasize how these categories interact to construct an inclusive narrative aligned with societal expectations.

Based on this framework, we propose the following hypotheses:

H2: Ethnic diversity in financial reporting images is frequently associated with female gender representation, reinforcing perceptions of companies as more inclusive by combining multiple dimensions of diversity.

H3: The visual representation of ethnic diversity in financial reports is associated with the inclusion of older individuals, suggesting an emphasis on intergenerational and ethnic inclusion.

H4: The inclusion of ethnically diverse faces combined with positive emotional expressions (e.g., happiness) is associated with firms' attempts to project an inclusive and emotionally positive organizational environment.

H5: The intersection between ethnic diversity and stereotypical representations of women portrayed as young and happy in financial reports is associated with corporate narratives that emphasize symbolic rather than substantive inclusion.

3 Methodology

3.1 Financial report dataset definition

Financial data from the firms were obtained from the Economatica^R Database. The dataset of financial reports was compiled through a

structured web scraping process applied to the official website of the Chilean Financial Markets Commission (CMF), which publicly hosts annual financial reports (“Memorias Anuales”) issued by regulated firms¹. The scraping covered the period from 2004 to 2020, corresponding to the full availability of digital reports within the study window.

A custom Python-based script was developed to automatically navigate the CMF repository. The script accessed individual firm profiles, identified report entries by year, and systematically downloaded the corresponding PDF files labeled as annual financial reports. This automated procedure ensured consistency in report selection across firms and years.

From the downloaded corpus, a total of 3,670 PDF reports were processed for image extraction. Facial images were identified and extracted using a computer vision pipeline, after which reports without detectable faces were excluded. The resulting dataset was then merged with firm-level financial information obtained from the Economatica^R database. After matching visual and financial data, the final firm-year sample consisted of 2,085 annual reports corresponding to 234 unique firms.

3.2 Facial feature coding and operationalization

To analyze visual representations in corporate financial reports, we implemented an automated facial feature coding procedure based on widely used deep learning models². This approach ensures consistency and replicability across a large corpus of documents.

Each page of the financial reports was first converted from PDF format into PNG images. Face detection was then performed using the RetinaFace algorithm, implemented via the DeepFace Python library. RetinaFace was selected for its robustness in detecting faces under heterogeneous conditions, including variations in resolution, lighting, pose, and partial occlusion—features commonly observed in scanned or low-quality corporate reports.

The face detection process identifies bounding boxes and facial landmarks for each detected face. All detections were performed using a consistent configuration across the full sample to ensure comparability.

For each detected face, we extracted a pre-specified set of facial attributes using DeepFace’s pretrained models. The selected parameters correspond to facial characteristics that are (i) directly observable in images, (ii) commonly used in the computer vision literature, and (iii) relevant for analyzing visual corporate communication. Specifically, the following features were coded:

- i Face size: measured as the pixel area of the detected face bounding box;
- ii Estimated race/ethnicity category: continuous model outputs for six categories (Asian, Indian, Black, White, Middle Eastern, and Latino/Hispanic);
- iii Estimated age: continuous age prediction based on facial features;

- iv Gender classification: binary model-based inference from facial appearance;
- v Facial emotional expressions: probabilistic scores for six basic emotions—happiness, surprise, sadness, anger, fear, and disgust.

All features were generated automatically by the model, and no manual labeling or intervention was applied, thereby minimizing subjective bias in the coding process.

To account for differences in visual salience across faces, we standardized facial features using a size-based weighting scheme. For each report, a face-size ratio was computed as the area of each detected face divided by the total facial area detected in that report. This weighting ensures that visually prominent faces exert a proportionally greater influence on aggregated measures.

Report-level variables were then constructed by computing the weighted average of each facial feature across all faces detected within a given financial report.

3.3 Ethnic diversity index (EDI)—formula definition

The construction of the Ethnic Diversity Index (EDI) in this study adapts the conceptual framework developed by Ed-Data, based on ethnicity reporting standards developed by the California Department of Education³. In this framework, diversity is defined as the evenness of distribution across racial and ethnic categories rather than the prevalence of any particular group.

The index reaches its maximum value when representation is evenly distributed across categories and approaches zero as observations become increasingly concentrated in a single category. This approach assigns equal weight to all categories and is explicitly designed to capture distributional balance rather than social, economic, or normative attributes of the population.

We adopt this framework and adapt it to continuous race-score outputs obtained from facial image analysis in corporate reports, thereby extending the Ed-Data methodology to the domain of visual corporate disclosures.

The computation of the Ethnic Diversity Index (EDI) is based on report-level race shares derived from facial image analysis. Specifically, each race share is computed as the size-weighted average of the corresponding race scores across all detected faces within a given financial report. Face-level race scores are first obtained from the facial recognition model and then weighted by the relative size of each face, measured as the pixel area of its bounding box. This weighting procedure accounts for differences in visual salience across faces, ensuring that more prominent facial representations contribute proportionally more to the report-level race distribution. The resulting weighted race shares provide a comprehensive and visually grounded representation of the racial composition portrayed in each financial report and serve as the inputs for the construction of the EDI.

1 Appendix A1 provides a concise pseudo-code description of the web-scraping procedure used to collect annual financial report PDFs from the Financial Markets Commission (CMF) website. The appendix documents the main steps of the automated process, including firm identification, navigation to report sections, year filtering, and file downloading.

2 Appendix A2 provides a concise Python pseudo-code description of the facial image extraction and analysis pipeline, including PDF-to-image conversion, face detection, facial attribute extraction, parameter settings, and data storage procedures.

3 A detailed conceptual discussion and step-by-step computational description of the Ethnic Diversity Index, including its interpretation as a distribution-based measure of diversity, is provided by Ed-Data, based on ethnicity reporting standards of the California Department of Education available at: <https://www.ed-data.org/article/Ethnic-Diversity-Index#What>.

The Ethnic Diversity Index (EDI) is then defined as follows: Let the report-level race shares (expressed as proportions) be:

$$A_r = \text{Asian}, I_r = \text{Indian}, B_r = \text{Black}, W_r = \text{White}, M_r = \text{Middle Eastern}, L_r = \frac{\text{Latino}}{\text{Hispanic}}$$

such that :

$$A_r + I_r + B_r + W_r + M_r + L_r = 1$$

Step 1. Squared deviation from uniform distribution:

$$S_r = \left(A_r - \frac{1}{6}\right)^2 + \left(I_r - \frac{1}{6}\right)^2 + \left(B_r - \frac{1}{6}\right)^2 + \left(W_r - \frac{1}{6}\right)^2 + \left(M_r - \frac{1}{6}\right)^2 + \left(L_r - \frac{1}{6}\right)^2$$

Step 2. Distance from uniform distribution:

$$\Delta_r = \text{sqrt}(S_r)$$

Step 3. The Ethnic Diversity Index (EDI) for each firm financial report is defined as follows:

$$EDI_r = 100 - 100 * \left(\frac{\text{sqrt}(6 * (6 - 1))}{(6 - 1)}\right) * \Delta_r$$

By construction, $EDI_r = 100$ equals 100 when the distribution across the six categories is perfectly even, and approaches 0 as the distribution becomes more concentrated.

3.4 Research design

To test the hypotheses, we employed a mixed-methods approach combining qualitative and quantitative techniques. Data were obtained from two secondary sources. First, faces were collected from 3,670 PDF files of financial reports, extracted from the annual reports available on the website of the Chilean Financial Markets Commission (CMF) for the period 2004–2020. Second, company characteristics and financial data were obtained from the Economatrica^R database. By integrating both sources, we obtained a final sample of 2,085 annual reports corresponding to 234 unique firms.

The analysis incorporates variables related to gender, age, and sentiment, along with firm-level characteristics such as performance and size, and macroeconomic variables including country-level economic growth and economic uncertainty. The study empirically estimates the factors influencing EDI using fixed-effects regression models with year and industry controls. The analysis also examines the interaction between diversity variables, such as gender and performance, exploring how this affects EDI representation.

To test the hypotheses, we employ the following models (Equations 1–5):

$$EDI_{it} = \beta_0 + \beta_1 \text{Age}_{it} + \beta_2 \text{Women}_{it} + \beta_3 (\text{Age} * \text{Women})_{it} + \gamma X_{it} + \text{FE}_{\text{Industry}} + \text{FE}_{\text{Year}} + \varepsilon_{it} \tag{1}$$

$$EDI_{it} = \beta_0 + \beta_1 \text{Emotion}_{it} + \gamma X_{it} + \text{FE}_{\text{Industry}} + \text{FE}_{\text{Year}} + \varepsilon_{it} \tag{2}$$

$$EDI_{it} = \beta_0 + \beta_1 \text{Age}_{it} + \beta_2 \text{Emotion}_{it} + \beta_3 (\text{Age} * \text{Emotion})_{it} + \gamma X_{it} + \text{FE}_{\text{Industry}} + \text{FE}_{\text{Year}} + \varepsilon_{it} \tag{3}$$

$$EDI_{it} = \beta_0 + \beta_1 \text{Women}_{it} + \beta_2 \text{Emotion}_{it} + \beta_3 (\text{Women} * \text{Emotion})_{it} + \gamma X_{it} + \text{FE}_{\text{Industry}} + \text{FE}_{\text{Year}} + \varepsilon_{it} \tag{4}$$

$$EDI_{it} = \beta_0 + \beta_1 \text{Sales}_{it} + \beta_2 \text{GDP Growth}_{it} + \beta_3 \text{EPU}_{it} + \gamma X_{it} + \text{FE}_{\text{Industry}} + \text{FE}_{\text{Year}} + \varepsilon_{it} \tag{5}$$

Where each variable is defined as follows:

EDI: Ethnic Diversity Index, defined above.

Women: ratio of size-weighted faces depicting women to the total number of size-weighted faces depicting both women and men.

Age: denotes the average age of all extracted faces, adjusted by their size.

Emotion: Neutrality, Happiness, Sadness, Anger, Surprise, Fear, or Disgust. These sentiments were measured using a scoring system that assessed the intensity of each emotion present in the extracted facial expressions. This scoring system assigned a numerical value to each sentiment, indicating its level of prominence or intensity in the facial expressions detected. These numerical values were then averaged across all extracted facial expressions within each financial report, providing an overview of the sentiment distribution within the images. Additionally, to account for variations in the size of the facial expressions, the scores were adjusted based on the size of each individual face, ensuring a more accurate representation of the sentiments portrayed.

GDP growth: This is the annual growth rate of Chile's Gross Domestic Product (GDP), expressed as a percentage.

EPU⁴: Economic policy uncertainty in Chile, captured through a news-based index constructed by Cerda et al. (2016), which applies the methodological framework introduced by Baker et al. (2016).

Women's financial inclusion is measured using two indicators, analyzed separately:

- Proportion of Women Checking Account Balances: This is the average yearly ratio of the balance in checking accounts held by women divided by the total balance of all individuals.
- Proportion of Women Checking Account Quantity: the average yearly ratio of the number of checking accounts held by women compared to the total number of individuals. The data for calculating these variables were sourced from the Central Bank of Chile⁵.

4 The dataset is openly available at https://www.policyuncertainty.com/chile_monthly.html.

5 The dataset is openly available at https://si3.bcentral.cl/Siete/ES/Siete/Cuadro/CAP_ESTADIST_GENERO/MN_GENERO1/EST_GEN_POB_01.

Tangibility: Refers to the proportion of tangible assets within a company’s total assets, providing insight into its asset composition. It is defined as property, plant, and equipment divided by total assets.

Size: Represents the natural logarithm of a company’s total assets, often used as a proxy for firm size in financial analysis.

MTB: Market-to-book, which represents the ratio of a company’s market value to its book value.

4 Results

4.1 Descriptive statistics

Table 1A provides a summary of the descriptive statistics of the variables used in the study, showing the number of observations, mean, standard deviation, minimum value, and maximum value for each variable. These statistics provide an overview of the characteristics and distribution of the analyzed variables.

The Ethnic Diversity Index (EDI) has a mean of 48.205 and a standard deviation of 16.899, ranging from 0 to 88.658 points (see Figure 1). This indicates considerable variability in ethnic diversity in financial reports, suggesting that some companies show high diversity, while others show low or no diversity. This variability suggests that the selection of facial imagery is not uniform across firms, which is consistent with the predictions of impression management theory (Goffman, 1959). Overall the descriptive evidence is consistent with Hypothesis 1.

The average age of the individuals represented is 35.04 years, with a standard deviation of 4.76 years and a range of 21 to 56 years. This relatively narrow age distribution suggests a limited variation in the representation of age in financial reports.

The emotions represented also show variability. Neutrality has a mean of 26.299 with a standard deviation of 18.425, while happiness has a mean of 36.595 and a standard deviation of 23.317. Sadness and

anger exhibit mean values of 17.514 and 7.734, respectively, with standard deviations of 15.193 and 9.956. These figures indicate that happiness is the most commonly represented emotion, followed by neutrality and sadness. On the other hand, surprise and disgust have low means, 1.13 and 0.226, respectively, indicating that these emotions are rarely represented in the sampled reports.

As for the financial variables, tangibility which measures the proportion of tangible assets, has a mean of 0.396 and a standard deviation of 0.278, indicating that, on average, 39.6% of firms’ assets are tangible. Firm size, measured by the natural logarithm of total assets, has a mean of 12.774 and a standard deviation of 1.743, showing considerable variability in firm size. The market-to-book ratio has a mean of 1.479 and a standard deviation of 1.359, with a range of 0.115 to 9.564, indicating variability in how the market is valued compared to the book value of the companies.

Finally, macroeconomic variables also show significant variability. GDP growth has a mean of 2.612% and a standard deviation of 3.271%, ranging from -6.143 to 6.674%. Economic uncertainty, as measured by the EPU, has a mean of 111.865 and a standard deviation of 44.769.

Table 1B presents the pairwise correlations between the study variables, providing insight into their relationships. The Ethnic Diversity Index (EDI) shows significant correlations with several variables. In particular, it shows a negative correlation with happiness (-0.105, $p < 0.1$) and with GDP growth (-0.086, $p < 0.1$). This suggests that a higher representation of happiness in the images included in corporate reports, together with greater economic growth, is associated with lower ethnic diversity in financial disclosures. On the other hand, EDI is positively correlated with sadness (0.111, $p < 0.1$) and fear (0.060, $p < 0.1$), indicating that a higher presence of these emotions in the images is associated with a higher ethnic diversity. Furthermore, EDI shows positive correlations with tangibility (0.059, $p < 0.1$) and economic uncertainty (EPU) (0.075, $p < 0.1$).

Age is positively correlated with happiness (0.178, $p < 0.1$) and negatively correlated with sadness (-0.267, $p < 0.1$) and fear (-0.239,

TABLE 1A Summary statistics.

Variable	Obs.	Mean	Std. dev.	Min	Max
EDI	2,085	48.205	16.899	0	88.658
Age	2,085	35.04	4.76	21	56
Women	2,085	16.161	20.497	0	100
Neutrality	2,085	26.299	18.425	0	100
Happiness	2,085	36.595	23.317	0	100
Sadness	2,085	17.514	15.193	0	100
Angriness	2,085	7.734	9.956	0	99.982
Surprise	2,085	1.13	3.058	0	53.094
Fear	2,085	10.501	11.938	0	99.8
Disgustingness	2,085	0.226	1.265	0	28.06
Tangibility	2,085	0.396	0.278	0	0.913
Size	2,085	12.774	1.743	8.696	16.833
Market-to-book	906	1.479	1.359	0.115	9.564
Sales	2,039	11.759	2.047	5.285	16.048
GDP Growth	2,085	2.612	3.271	-6.143	6.674
EPU	2,085	111.865	44.769	31.601	210.953

TABLE 1B Pairwise correlations.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1) EDI	1.000															
(2) Age	-0.004	1.000														
(3) Women	-0.040*	-0.285*	1.000													
(4) Neutrality	0.006	0.171*	-0.144*	1.000												
(5) Happiness	-0.105*	0.178*	0.250*	-0.451*	1.000											
(6) Sadness	0.111*	-0.267*	-0.115*	-0.195*	-0.503*	1.000										
(7) Angriiness	0.008	-0.022	-0.111*	-0.167*	-0.287*	-0.019	1.000									
(8) Surprise	-0.036	-0.074*	0.114*	-0.104*	-0.056*	-0.052*	-0.003	1.000								
(9) Fear	0.060*	-0.239*	-0.053*	-0.245*	-0.360*	0.042*	0.006	0.083*	1.000							
(10) Disgustingness	-0.013	0.051*	-0.047*	-0.025	-0.032	-0.026	0.032	-0.009	0.004	1.000						
(11) Tangibility	0.059*	0.048*	-0.112*	0.044*	-0.086*	0.060*	0.042*	-0.006	-0.007	-0.011	1.000					
(12) Size	-0.032	0.037*	0.108*	-0.079*	0.128*	-0.049*	0.006	0.003	-0.071*	0.004	-0.059*	1.000				
(13) Market-to-book	-0.026	-0.002	0.051	0.169*	-0.139*	-0.022	-0.021	0.014	0.054	-0.012	0.199*	-0.067*	1.000			
(14) Sales	-0.059*	0.001	0.121*	-0.057*	0.102*	-0.052*	-0.010	0.033	-0.047*	0.024	0.031	0.831*	0.034	1.000		
(15) GDP Growth	-0.086*	-0.030	-0.116*	0.050*	-0.061*	0.017	0.017	-0.033	0.011	0.032	0.048*	-0.077*	0.116*	-0.011	1.000	
(16) EPU	0.075*	0.035	0.086*	-0.050*	0.075*	-0.044*	-0.008	0.039*	-0.011	-0.037*	-0.062*	0.085*	-0.096*	0.013	-0.808*	1.000

(1) * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$. (2) Robust standard errors in parentheses. (3) Dependent variable: ethnic diversity index. (4) Each model is estimated independently.

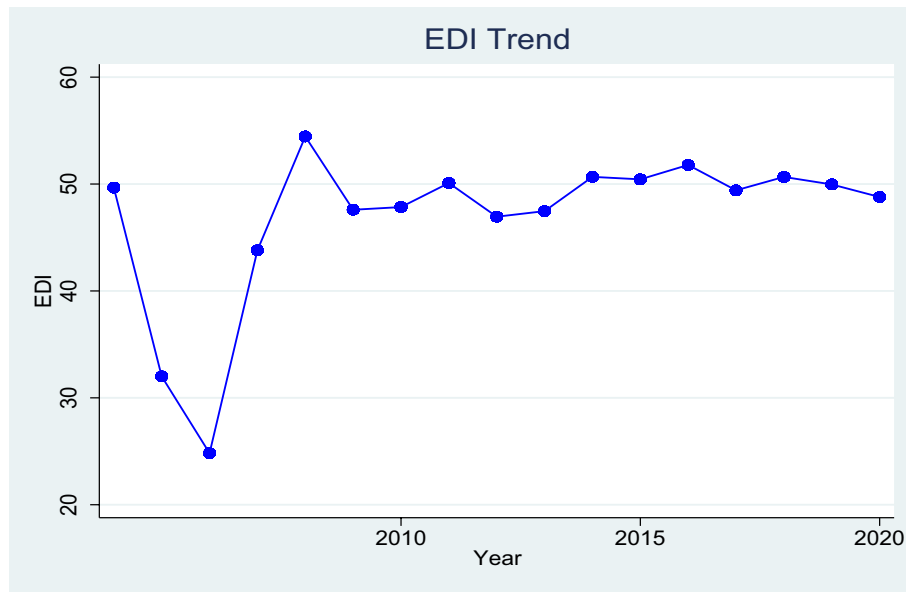


FIGURE 1
Summary statistics.

$p < 0.1$). This suggests that older individuals tend to be associated with a higher representation of happiness, whereas sadness and fear are less represented with age. Happiness has a negative correlation with sadness (-0.503 , $p < 0.1$) and neutrality (-0.451 , $p < 0.1$), suggesting that these emotions tend to be mutually exclusive. In addition, it shows negative correlations with surprise (-0.056 , $p < 0.1$) and disgust (-0.03 , $p < 0.1$).

4.2 Regression model results

Tables 2–6 present the results of the regressions, where the dependent variable is the Ethnic Diversity Index (EDI). Each model is estimated independently to assess how different explanatory variables affect the EDI. The main results of these models are interpreted below:

In Table 2, the results indicate that the age of individuals represented in financial reports significantly negatively affects the Ethnic Diversity Index (EDI). In Model 2, the coefficient for age is -0.274 ($p < 0.01$), confirming that as age increases, the EDI decreases. The presence of women also has a significant negative impact on EDI, with a coefficient of -0.092 ($p < 0.01$, model 4), indicating that a higher presence of women is associated with less ethnic diversity in financial reporting. However, the interaction between the presence of women and age shows a positive coefficient of 0.025 ($p < 0.01$, model 8), suggesting that the negative impact of age on EDI is moderated when the presence of women is high. The other variables, such as tangibility, size, and market-to-book, do not significantly affect EDI in the estimated models. These findings are inconsistent with Hypotheses 2 and 3 and highlight the importance of considering demographic factors and specific interactions when analyzing ethnic diversity in financial reporting.

Table 3 presents the impact of different sentiments and the market-to-book relationship on the Ethnic Diversity Index (EDI) in financial reports. The results indicate that the sentiments represented in the financial reports significantly impact the Ethnic Diversity Index (EDI). Happiness and sadness have mixed effects depending on the context, with happiness negatively associated with EDI in different models and sadness consistently positively associated. In some models, anger and fear have positive effects, whereas surprise has a significant negative

impact. These findings show the importance of considering the influence of feelings on the representation of ethnic diversity in financial reports, highlighting that different emotions can have varied and contextually dependent effects. Accordingly, Hypothesis 4 receives partial support.

Table 4 presents the results of the interactions between age and different sentiments on the Ethnic Diversity Index (EDI) in financial reports. The interactions between age and different sentiments have significant and varied effects on the Ethnic Diversity Index (EDI). The interaction between age and anger has a significant negative impact, suggesting that anger reduces ethnic diversity as the age of the individuals represented increases. On the other hand, the interactions between age and surprise, fear, and disgust have significant positive effects, indicating that these feelings increase ethnic diversity as individuals get older. These findings highlight the importance of considering interactions between demographic and emotional factors when analyzing the representation of ethnic diversity in financial reports, as different combinations can have very different impacts.

Table 5 presents the results of the interactions between the presence of women and different sentiments on the Ethnic Diversity Index (EDI) in the financial reports. The results indicate that the interactions between the presence of women and different sentiments have significant and varied effects on the Ethnic Diversity Index (EDI). The interaction between the presence of women and sadness has a positive impact, increasing the represented ethnic diversity. On the other hand, the interaction between the presence of women and anger also has a significant positive effect. However, the interaction between the presence of women and surprise has a significant negative impact, reducing ethnic diversity. These findings emphasize the importance of considering how the presence of women and the emotions represented interact to influence ethnic diversity in financial reports, highlighting that different combinations of these factors can have very different impacts. These results are inconsistent with Hypothesis 5.

Table 6 presents the results of several regressions analyzing the Ethnic Diversity Index (EDI) as a function of different financial variables. The results indicate that sales and GDP growth have a negative and significant relationship with EDI. Meanwhile, other variables,

TABLE 2 Demographic determinants of ethnic diversity (EDI).

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	EDI	EDI	EDI	EDI	EDI	EDI	EDI	EDI
Age	-0.218** (0.100)	-0.274* (0.150)			-0.303*** (0.107)	-0.424*** (0.157)	-0.389*** (0.120)	-0.588*** (0.180)
Women			-0.050** (0.021)	-0.092** (0.038)	-0.071*** (0.023)	-0.124*** (0.038)	-0.398** (0.163)	-0.921*** (0.305)
Women # Age							0.010** (0.005)	0.025*** (0.009)
Tangibility	-0.099 (1.609)	-2.607 (2.273)	-0.506 (1.609)	-3.016 (2.316)	-0.285 (1.614)	-2.823 (2.283)	-0.184 (1.610)	-2.922 (2.307)
Size	-0.170 (0.227)	-0.454 (0.308)	-0.119 (0.232)	-0.283 (0.304)	-0.092 (0.234)	-0.179 (0.310)	-0.103 (0.232)	-0.294 (0.309)
Market-to-book		-0.163 (0.531)		-0.199 (0.536)		-0.122 (0.545)		-0.083 (0.554)
Observations	2,085	906	2,085	906	2,085	906	2,085	906
R ²	0.174	0.121	0.174	0.126	0.180	0.140	0.182	0.150
Adjusted R ²	0.159	0.089	0.159	0.094	0.165	0.107	0.166	0.117
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

(1) *p < 0.10 **p < 0.05 ***p < 0.01. (2) Robust standard errors in parentheses. (3) Dependent variable: ethnic diversity index. (4) Each model is estimated independently.

TABLE 3 Emotional expressions and their association with ethnic diversity (EDI).

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	EDI	EDI	EDI	EDI	EDI	EDI	EDI	EDI	EDI	EDI	EDI	EDI
Happiness	-0.088*** (0.020)	-0.097*** (0.030)										
Surprise			-0.151 (0.121)	-0.452** (0.195)								
Sadness					0.123*** (0.031)	0.139*** (0.046)						
Angriness							0.053 (0.048)	0.137* (0.075)				
Fear									0.086** (0.035)	0.056 (0.064)		
Disgustingness											0.126 (0.415)	-0.495 (0.496)
Market-to-book		-0.412 (0.528)		-0.190 (0.532)		-0.160 (0.524)		-0.173 (0.523)		-0.234 (0.526)		-0.218 (0.528)
Tangibility	-0.526 (1.598)	-2.701 (2.364)	-0.336 (1.609)	-2.816 (2.309)	-0.547 (1.606)	-3.667 (2.337)	-0.357 (1.602)	-2.603 (2.249)	-0.236 (1.608)	-2.842 (2.324)	-0.309 (1.609)	-2.776 (2.309)
Size	-0.025 (0.232)	-0.230 (0.324)	-0.178 (0.226)	-0.490 (0.305)	-0.145 (0.230)	-0.434 (0.312)	-0.178 (0.226)	-0.441 (0.302)	-0.135 (0.227)	-0.444 (0.310)	-0.175 (0.226)	-0.468 (0.302)
Observations	2,085	906	2,085	906	2,085	906	2,085	906	2,085	906	2,085	906
R ²	0.184	0.132	0.172	0.122	0.182	0.131	0.172	0.120	0.174	0.116	0.171	0.116
Adjusted R ²	0.170	0.100	0.157	0.090	0.168	0.099	0.157	0.088	0.159	0.084	0.156	0.083
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No

(1) *p < 0.10 **p < 0.05 ***p < 0.01. (2) Robust standard errors in parentheses. (3) Dependent variable: ethnic diversity index. (4) Each model is estimated independently.

TABLE 4 Interaction effects between age and emotional expressions on EDI.

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	EDI	EDI	EDI	EDI	EDI	EDI	EDI	EDI
Age # Angriness	-0.012* (0.007)	-0.020* (0.012)						
Age # Surprise			0.096*** (0.025)	0.101** (0.043)				
Age # Fear					0.020** (0.010)	0.022 (0.018)		
Age # Disgustingness							0.148*** (0.035)	0.237** (0.104)
Age	-0.123 (0.117)	-0.118 (0.178)	-0.300*** (0.106)	-0.367** (0.160)	-0.344*** (0.130)	-0.422** (0.175)	-0.251** (0.100)	-0.308** (0.153)
Angriness	0.465* (0.251)	0.815** (0.395)						
Surprise			-3.391*** (0.861)	-3.844*** (1.399)				
Fear					-0.590* (0.309)	-0.685 (0.565)		
Disgustingness							-5.560*** (1.509)	-8.774*** (3.338)
Constant	54.172*** (5.007)	58.801*** (7.013)	60.852*** (4.611)	69.589*** (6.210)	60.974*** (5.249)	71.033*** (7.073)	59.137*** (4.466)	67.264*** (6.061)
Observations	2,085	906	2,085	906	2,085	906	2,085	906
R ²	0.177	0.130	0.180	0.134	0.182	0.129	0.178	0.127
Adjusted R ²	0.162	0.096	0.164	0.100	0.166	0.095	0.163	0.093
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

(1) * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$. (2) Robust standard errors in parentheses. (3) Dependent variable: ethnic diversity index. (4) Each model is estimated independently.

TABLE 5 Gender-emotion interaction effects on ethnic diversity (EDI).

Variable	(1)	(2)	(3)	(4)	(5)	(6)
	EDI	EDI	EDI	EDI	EDI	EDI
Women # Sadness	0.002* (0.001)	0.003 (0.002)				
Women # Angriness			0.002 (0.001)	0.003* (0.002)		
Women # Surprise					-0.011** (0.004)	-0.015*** (0.005)
Women	-0.076*** (0.028)	-0.130** (0.061)	-0.059** (0.023)	-0.111*** (0.041)	-0.032 (0.022)	-0.054 (0.038)
Sadness	0.095*** (0.034)	0.102* (0.055)				
Angriness			0.026 (0.054)	0.068 (0.095)		
Surprise					0.159 (0.179)	0.218 (0.293)
Observations	2,085	906	2,085	906	2,085	906
R ²	0.186	0.143	0.175	0.133	0.177	0.140
Adjusted R ²	0.171	0.110	0.159	0.100	0.162	0.106
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

(1) * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$. (2) Robust standard errors in parentheses. (3) Dependent variable: ethnic diversity index. (4) Each model is estimated independently.

TABLE 6 Macroeconomic and firm-level predictors of ethnic diversity (EDI).

Variable	(1)	(2)	(3)	(4)
	EDI	EDI	EDI	EDI
Sales	−0.673* (0.388)	−0.785* (0.405)	−0.808** (0.400)	−0.786* (0.404)
GDP Growth		−0.428*** (0.144)		−0.441** (0.217)
EPU			0.025*** (0.009)	−0.001 (0.014)
Tangibility	0.198 (1.627)	−0.986 (1.644)	−0.947 (1.650)	−0.990 (1.650)
Size	0.454 (0.413)	0.728* (0.429)	0.756* (0.424)	0.730* (0.428)
Observations	2,039	2,039	2,039	2,039
R ²	0.178	0.079	0.077	0.079
Adjusted R ²	0.163	0.069	0.067	0.069
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes

(1) * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$. (2) Robust standard errors in parentheses. (3) Dependent variable: ethnic diversity index. (4) Each model is estimated independently.

such as tangibility, size, change in earnings, and the market-to-book ratio, do not show significant effects on the EDI. These findings underscore the importance of sales and GDP growth in determining ethnic diversity in financial reports.

In summary, the results presented in Tables 2 through 6 provide an integrated view of the factors affecting the Ethnic Diversity Index (EDI) in companies' financial reports. The influence of feelings represented in financial reports is also significant, varying depending on the type of emotion and the specific context. Feelings such as sadness and anger tend to increase ethnic diversity, while surprise tends to reduce it. The interaction between the presence of women and these feelings also produces varying effects, underscoring the importance of considering how emotions and demographics interact to influence the representation of ethnic diversity.

5 Discussion and conclusions

This study aimed to examine the role of intersectionality in the visual representation of faces, identifying how different dimensions of diversity (ethnicity, gender, age, and emotion) interact in the construction of the corporate identity projected in financial reports. These results should be interpreted in light of organizational impression management and social semiotics, as images function not only as aesthetic choices but also as communicative strategies aimed at constructing meaning and legitimacy vis-à-vis external audiences (Davison, 2015; Walwema and Bay, 2024). The findings indicate that, although most hypotheses are not supported, meaningful patterns can still be observed. Specifically, companies differ substantially in the level of ethnic diversity displayed in their financial reports. This variation is consistent with the view that visual diversity is used selectively as part of impression management practices, influenced by institutional contexts and stakeholder pressures. These results are consistent with prior evidence showing that some companies adopt impression management strategies by using images consistent with stakeholder demands for corporate social commitment (Iazzi et al., 2025). In this way, companies project a positive corporate image, gain legitimacy, and mitigate potential reputational damage (Dhanani and Kennedy, 2023).

Secondly, although based on social semiotics we observe companies that present faces in financial reports that project ethnic diversity, this representation does not interact directly with sociodemographic characteristics (gender, age), although it does interact with some emotions. From this perspective, these results suggest that ethnic diversity does not acquire meaning in isolation, but rather through its articulation, or lack thereof, with other visual signs such as gender, age, and emotional expressions.

In fact, the presence of women has a negative impact on EDI, i.e., when women's faces are presented, they tend to be represented in a homogeneous manner, i.e., ethnically exclusive. This is consistent with the idea that companies continue to reproduce the hegemonic and exclusionary ideals (beautiful, white, or "acceptable" mixed-race women and racialized individuals), thereby limiting the transformative potential of diversity representations (Bujaki et al., 2021; Kele and Cassell, 2023). Likewise, the presence of older people in financial report images does not show interaction with EDI, suggesting that companies that display ethnic diversity do not necessarily convey intergenerational inclusion. This lack of interaction suggests that ethnic diversity is communicated independently of intergenerational inclusion. This coincides with previous evidence on the limited integration and recognition of generational diversity in organizational contexts, perpetuating generational characterization and difference even within broader discourses of inclusion (Ravid et al., 2025; Walwema and Bay, 2024).

Interestingly, the visual representation of ethnic diversity does not match the image of a positive or supportive work environment; on the contrary, faces that display ethnic diversity are often shown with sad, fearful, or unhappy expressions, revealing an implicit contradiction in the way inclusion is visually communicated. This contradiction highlights how visual elements may convey unintended or ambivalent meanings, reinforcing the idea that corporate imagery is not a neutral reflection of organizational values but a contested space where multiple interpretations coexist (Davison, 2015; Usmani et al., 2020).

In line with the literature on impression management and critical semiotics, these findings suggest that corporate representations of ethnic diversity may be motivated primarily by regulatory compliance rather than by substantive inclusion, reflecting a form of strategic invisibility used to meet regulatory expectations (Bendl et al., 2024). Beyond strategic invisibility or normative compliance, these

emotional expressions may also position ethnically diverse individuals in ways that evoke vulnerability or dependency, potentially aligning with narratives of care or assistance rather than full occupational inclusion.

Finally, the representation of ethnic diversity is not related to common gender images in financial reports, where women are often represented as young, cheerful, and idealized (Jeldes-Delgado et al., 2024). Instead, hegemonic gender norms seem to dominate within ethnically uniform visual narratives, suggesting that stereotypes coexist hierarchically, with one exerting greater symbolic power than the other. This pattern suggests that female representation in financial reports may function as a marker of normatively acceptable femininity and corporate elitism, particularly in the local context. Such visual norms are not neutral, as they shape which forms of femininity and ethnicity are rendered visible and legitimate. For women of color, who are often subject to intersectional invisibility and pressured to conform to prototypical norms within organizational contexts, this implies a recurring need to adapt their behavior, language, accent, and/or appearance in order to be perceived as fitting or acceptable (Opara et al., 2023).

Overall, the findings broaden our understanding of corporate image management in the visual realm of financial reporting. Consistent with a social semiotic perspective, organizations appear to construct images of ethnic diversity and inclusion in response to social and institutional pressures. However, the persistence of deeply rooted gender and ethnic stereotypes embedded in organizational culture suggests that these efforts often remain performative, reflecting compliance with social expectations rather than genuine transformation.

5.1 Theoretical and practical implications

Theoretically, this study contributes to the literature on impression management and corporate identity by highlighting the visual and intersectional nature of diversity representation. By analyzing how ethnic, gender, generational, and emotional cues interrelate in images of faces in financial reports, it offers a more nuanced understanding of how organizations build legitimacy through visual representations of diversity. This perspective positions visual diversity as both a communication strategy and a social response to external demands for equity and representation.

Accordingly, companies are encouraged to design more holistic strategies that integrate human resources, corporate communications, and sustainability functions to ensure that diversity is not only represented but also communicated in a way that reflects genuine inclusion and respect. In addition, legislators and ESG standard-setting bodies could strengthen diversity metrics to assess not only the visibility of difference but also the authenticity and emotional tone through which inclusion is expressed.

5.2 Limitations and future research

While this study offers detailed insights into how corporate identity is constructed through the visual representation of ethnic diversity in financial reports, it has several limitations that open up new avenues for future research.

First, the analysis is limited by the scope of the sample, as it deals with companies listed in a Chilean context, which limits the ability to

infer causal relationships. Future studies could address this limitation by examining similar patterns in different countries and institutional contexts. Furthermore, the cross-sectional nature of this research restricts the ability to infer causality; longitudinal designs could better capture the evolution of ethnic diversity practices over time.

From a methodological perspective on image processing, future research could refine analytical models by incorporating more diverse training data and applying multi-class ethnic diversity models. Using improved image preprocessing techniques and including manual validation would help mitigate existing biases and improve accuracy.

Finally, in light of current migration flows, qualitative studies exploring the perceptions of visual diversity by the public and stakeholders could offer greater insight into the sociocultural meanings implicit in corporate imagery.

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.

Author contributions

TA: Investigation, Writing – review & editing, Data curation, Validation, Supervision, Formal analysis, Methodology. FJ: Writing – review & editing, Conceptualization, Investigation, Project administration, Writing – original draft. RO-H: Validation, Investigation, Writing – original draft, Formal analysis.

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Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fcomm.2026.1759350/full#supplementary-material>

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