Uncovering Organisational Pride and Psychological Safety from Glassdoor Reviews

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Abstract

Understanding employee experiences and attitudes is crucial for promoting a positive work environment, and enhancing engagement, satisfaction, productivity, and innovation. Organisational culture, represented by constructs like organisational pride (OP) and psychological safety (PS), captures these experiences. OP reflects employees' emotional attachment and dedication to an organisation, while PS embodies the collective perception of safety for risk-taking and open communication. Together, these constructs offer a rich perspective, providing a top-to-bottom view of employee experiences and attitudes. To evaluate OP and PS, we developed a deep-learning framework utilising language embeddings and applied it on 430,000 employee reviews spanning 2008 to 2020, encompassing 318 major U.S. companies. Our analysis revealed significant sector-specific variations in these constructs, highlighting the unique strengths and challenges within each sector. We found that OP, which applies to the company as a whole, is high in utility and energy sectors but low in consumer and communications, while PS, which reflects the team level, is high in IT and low in communications and healthcare. Our automatic rationalisation of these organisational constructs paves the way towards the development of automated psychometric assessments at the workplace.

Keywords: organisational pride, psychological safety, workplace, deep learning, automatic psychometric assessment, companies

1 Introduction

"Psychological safety isn't about being nice. It's about giving candid feedback, openly admitting mistakes, and learning from each other" [1] — Amy Edmondson

Understanding employees' work experiences offers valuable insights into an organization's culture, contributing to employee engagement, job satisfaction, and overall productivity [2]. A positive workplace environment can enhance innovation and creativity by encouraging employees to share ideas and take initiative [3]. To maintain a supportive culture, many organizations proactively address workplace challenges through open communication channels, which helps improve employee well-being and reduce stress [4]. However, companies today face significant pressures from global disruptions such as the COVID-19 pandemic [5], geopolitical conflicts [6], and shifts in the talent market [7], which impact workforce dynamics and raise the need for strong organizational cultures. Consequently, a deep understanding of employees' perceptions—from their attitudes towards company strategy to team-level culture—allows organizations to strengthen their public reputation, align strategic goals, and foster resilience in a rapidly evolving business landscape.

Companies commonly rely on psychological constructs to measure various aspects of organisational culture. Organisational culture encompasses the shared values, beliefs, and practices of a company's employees [8], and it emerges from the interplay of top-down expectations and bottom-up norms [9]. Given its multidimensional nature [10], various aspects of organisational culture are captured, ranging from leadership, resolving conflicts and negotiating, independence, and freedom to make decisions, to training and teaching others [8]. Two widely discussed aspects of organisational culture are *organisational pride* (OP) and *psychological safety* (PS). Both OP and PS are significant aspects of organisational culture that shape employee values, beliefs, and practices [11–14]. Employees' pride in their workplace (OP) often indicates a positive and healthy organisational culture [11, 12, 15, 16]. OP reflects employees' emotional and attitudinal attachment to their organisation, influencing employee behaviour, creativity, turnover, and commitment. It serves as both an antecedent and a consequence of corporate success [11, 15, 17]. On the other hand, PS pertains to employees' shared perception that it is safe to take interpersonal risks, express ideas, and voice opinions without fear of negative consequences or judgement. It enables a supportive work environment where employees feel comfortable being themselves and contributing their perspectives [1, 13]. OP is acknowledged as a key component in shaping organisational culture, yet its impact has not been extensively quantified on a large scale. Our focus on OP stems from substantial qualitative evidence suggesting its significant role in company culture. However, OP alone does not fully capture the grassroots aspects of organisational culture. Indeed, organisational culture is not a mere aggregation of elements; it evolves from the intricate interaction of various factors [8], including both

OP and PS. PS plays a crucial role in building organisational resilience and fostering a culture where employees can navigate uncertainty and challenges effectively [1, 14, 18–20]. Hence, we integrate PS with OP to comprehensively understand organisational culture's emergence from this dynamic and multifaceted interaction [12, 15, 21, 22]. Traditionally, these constructs have been assessed through surveys, which can be costly [23] and limited to self-selected participants, posing challenges to generalisability [24–26]. In this work, we developed automated methods for assessing aspects of organisational culture, and, in so doing, we made three contributions:

1. We implemented a deep-learning Natural Language Processing (NLP) framework that accurately captures OP and PS at company-level (§4).
2. We applied this framework to over 430,000 publicly available Glassdoor employee reviews, and validated it internally in terms of keywords expressed in high OP/PS companies, and externally in terms of associations of company OP/PS scores with the ratings. We also surfaced variations in OP/PS levels across different industry sectors from 318 of S&P 500 companies. Lastly, we uncovered that despite being correlated aspects of organizational culture, OP and PS each independently contribute to predicting employee satisfaction (§5).

Our automatic operationalisation of these two pivotal organisational constructs suggests avenues for the development of *automated psychometric assessment*, allowing for analysing organisational culture across sectors and countries, in addition to exploring the interactions between various organisational constructs. Ultimately, the results generated from this process could contribute to the creation of more satisfying and productive work environments (§6).

2 Background and Related Work

First, we provide the reader with a background on psychological constructs commonly used to assess organisational culture, as discussed in the Organisational Behaviour Literature, with a focus on our two constructs of interest: *organisational pride* and *psychological safety*. Following that, we place our work within the broader context of existing literature on Natural Language Processing (NLP) research in Computational Social Science, which attempted at capturing aspects of organisational culture on a large scale.

2.1 Organisational Behaviour Literature

Organisational Culture (OC) refers to the shared values, beliefs, assumptions, norms, and behaviours that collectively shape the identity and character of an organisation [27]. It significantly impacts how employees align their actions with the organisation's goals and expectations, ultimately influencing work attitudes and overall performance [28].

2.1.1 Organisational Pride (OP)

It refers to the emotional and attitudinal attachment that employees develop towards their organisation [15]. It encompasses both the emotional attachment triggered by

perceiving a successful organisational event and the lasting cognitive attitude resulting from a general perception of the organisation [11, 29, 30]. As a psychological construct, OP serves as an indicator of both internal and external organisational reputation and can act as both a driver and an outcome of corporate success [11, 15, 17, 31].

Previous research has identified various factors that contribute to the development of employees' OP. Companies that provide job autonomy, job variety, rewards, recognition, and demonstrate success, social responsibility, and internal sustainability are more likely to evoke a sense of pride among their employees [17, 29]. In turn, OP influences employee behaviour in several positive ways. It leads to favourable job perceptions, customer-oriented behaviour, enhanced creativity, reduced turnover, increased commitment, and pro-environmental behaviours [11, 12, 31–36]. Furthermore, OP is positively correlated with organisational attractiveness and job pursuit intentions among prospective employees [12, 32–34]. It has also been found to mediate the relationship between corporate social responsibility (CSR) and organisational citizenship behaviour (OCB) [37, 38].

The measurement and monitoring of OP are crucial for organisations due to its impact on company reputation, employee outcomes, and turnover [33, 39, 40]. However, there is still a need for a comprehensive examination of the conceptual scope and structural properties of OP. Previous empirical studies have often relied on small survey samples from a limited number of organisation's, raising concerns about unreliability [33, 34, 39–42]. While these studies have explored various antecedents and consequences of OP, such as length of affiliation, work-related emotions, and corporate social responsibility, the limited availability of data has hindered the examination of these consequences at higher-order levels of analysis [12, 33, 34, 40, 41, 43]. Consequently, potential macro-level influences and outcomes across industries and geographical regions have remained unexplored [33, 34, 44, 45].

2.1.2 Psychological Safety (PS)

It encompasses the shared belief among employees that they can take interpersonal risks within the workplace [1, 13, 19, 20, 46]. This includes freely expressing ideas, voicing opinions, and being authentic, without the fear of facing negative consequences or judgement, encouraging employee engagement and the integration of diverse perspectives [13].

Traditionally, psychological safety has primarily been assessed at the team level using measurement items developed by Edmondson [1]. While a few studies have examined the measurement of psychological safety at the organisational level [14, 47, 48], they typically modified the team-level items by substituting "team" with "organization" [49]. However, reaching a consensus on psychological safety can be challenging in larger organisations, where employees may have diverse experiences within their respective teams [50, 51]—leadership style and team dynamics shape the perception of psychological safety [49]. For this reason, previous research indicates that psychological safety has a more substantial impact at the team level compared to the organisational level. Additionally, it has been suggested that smaller organisations with frequent collaboration and strong corporate cultures are more likely to foster a climate of psychological safety, although further empirical evidence is needed [49].

Furthermore, studies have explored potential adverse outcomes associated with excessively high levels of psychological safety within teams, such as unethical behaviours and reduced organisational performance [14, 46].

Researchers have traditionally relied on qualitative interviews to gain insights into psychological safety at both the team and individual levels. However, in order to evaluate levels of psychological safety within teams or organisations, the use of observational methods has been proposed as an alternative approach [49]. Despite its potential to provide valuable insights into the dynamics of psychological safety, including macro-level influences and outcomes across various industries and geographical regions, this complementary approach, similar to OP, has been scarce.

2.2 NLP Research in Computational Social Science

Das Swain et al. [8] introduced the use of natural language processing techniques on Glassdoor review data to automatically evaluate OC using psychological constructs similar to those in our study, such as the Organisation Cultural Inventory [52], the Organisation Culture Profile [53], Hofstede's Organisation Culture Questionnaire [54], and the Organisation Culture Survey [55]. They compared word-level vector representations of descriptions of organisational constructs with embeddings of Glassdoor reviews and successfully demonstrated the face and construct validity of their language model-based assessment of organisational culture. Additionally, they provided empirical evidence, based on Fortune 500 companies, of the connection between OC and job performance. Similarly, Sen et al. [56] and Ceccarini et al. [57] utilised Glassdoor reviews to examine Internal Sustainability Efforts (ISEs) at the organisational level within S&P 500 companies. They confirmed the positive associations between ISEs and stock growth. Furthermore, Lee [58] quantified internal corporate social responsibility (CSR) and discovered a positive impact on Organisational Citizenship Behaviour (OCB), which encompasses voluntary actions by employees that go beyond their formal job requirements. In line with these findings, Šćepanović et al. [59] analysed thousands of Glassdoor reviews and uncovered that different types of stress contribute differently to companies' success. Specifically, companies whose employees tend to perceive stress positively (i.e., describing it in terms of a high-growth and collaborative work environment) enjoy higher stock growth compared to those whose employees perceive stress negatively.

At the time of writing, there is a noticeable gap in comprehensive empirical research that explores OP and PS, two constructs that hold significant importance in understanding employee experiences in the workplace. What sets them apart from other constructs like OC, CSR, and ISEs is their assessment using established psychological measures [1, 41]. Unlike these constructs, which have been measured on a large scale but with adapted definitions and descriptions, OP and PS metrics can rely on validated measures. Hence, they presents valuable opportunities to develop empirical methodologies that quantify organisational constructs based on validated psychological measures, while encompassing comprehensive aspects of the workplace, from the global organisation level to the team level, using online data.

3 Datasets

3.1 Description and Statistics

We collected data from Glassdoor, a well-known platform for company reviews, where individuals, including current and former employees, share their reviews and experiences regarding various aspects of their corporate life. The platform ensures high-quality reviews through three key measures. First, it employs both proprietary automated tools and manual moderation to oversee content, while also allowing users to flag inappropriate posts. This dual approach helps reduce the risk of fake reviews, such as those submitted under coercion from employers to post positive feedback. Second, users are required to contribute at least one review before gaining access to others' content. This policy fosters a more balanced range of opinions and helps mitigate *non-response bias*, where the views of respondents might significantly differ from those who choose not to participate. Lastly, the platform limits each employee to a single review per company per year. This cap prevents individuals from dominating the review landscape, addressing *sampling bias*, which occurs when certain perspectives are overrepresented in the data. As discussed in the related work section, this data collection has been previously employed in studies examining other organisational constructs on a large scale [8, 56, 59]. However, we acknowledge that Glassdoor reviews, like any source of self-reported data, are not free from bias and should be seen as a complementary source rather than a replacement for survey data.

In addition to being efficient and low-cost, a potentially unique advantage of using Glassdoor reviews is their relative independence from organizational-level psychological safety. In traditional surveys conducted within organizations, employees may feel pressured to inflate their assessments of organizational culture or job satisfaction due to fear of repercussions, especially in environments where psychological safety is low. This bias may be less prevalent in anonymous Glassdoor reviews, offering a distinct perspective on employee experiences.

The dataset used in this study consisted of Glassdoor reviews spanning a twelve-year period from 2008 to 2020. Each review in the dataset contained various components, including a title, a 'pro' section highlighting positive aspects of the company, a 'con' section discussing negative aspects, four ratings (ranging from 0 to 5) evaluating the company's *career opportunities*, *work-life balance*, *culture*, and *management*, as well as an *overall rating* of the company. Some reviewers also provided their location, enabling us to identify the states for a subset of the reviews. To ensure the reliability and robustness of our text processing method, we applied specific criteria for dataset selection. We retained companies that had a minimum of 100 reviews, resulting in a final dataset of 430,788 reviews from 318 US-based companies, which represents 99.1% of the original dataset. Notably, 80% of these companies were listed in the S&P 500 index. To assess the representativeness of these 318 companies, we examined the distribution of industry sectors, which was found to be comparable to that of the S&P 500 companies. Additionally, we computed the correlation between the number of reviews per state and the total number of employment positions per state, and found that they are highly correlated ($r = 0.97$, $p < 0.001$) as shown in Figure 7 in the Appendix.

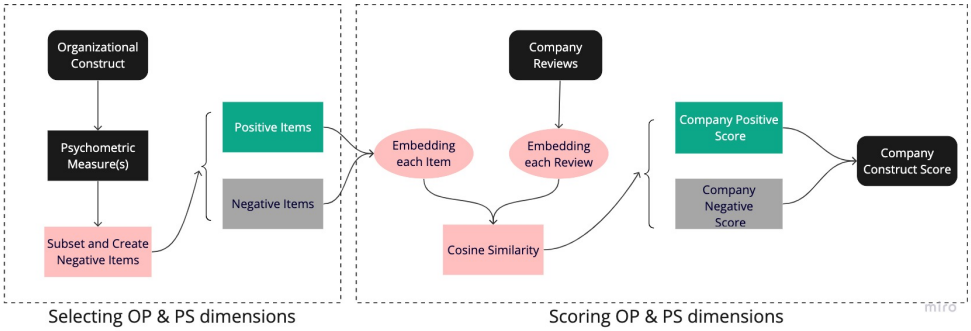

Fig. 1: **The framework for measuring an organisational construct score (e.g., OP or PS score) from company reviews.** Starting from the validated psychometric measures for the construct of interest, we subset negative from positive items, and, if no negative items were present, we first create them as opposites to the positive items. We then embed each item and measure its similarity to the embedding of the company reviews. For each company, the proportion of reviews found similar to the positive statements, gives company positive score, and the proportion of reviews found similar to the negative statements, gives company negative score. The final company score for the given construct is calculated as the difference between positive and negative scores.

4 Framework for Automatically Assessing OP and PS

We employed a mixed-method approach to develop and validate an automated, language-based assessment of OP and PS, similar to Sen et al. [56]'s framework for measuring ISEs (Figure 1). We identified key language features related to OP and PS by reviewing the organisational behaviour and psychometrics literature for existing assessments. We separated the positive and negative items and created opposing negative items when they were not initially available. We then employed the sentence-level BERT (SBERT) model [60] to generate embeddings for each item and subsequently calculated their similarity with the embeddings of company reviews. Specifically, we used `sentence-t5-xl` for its effectiveness in similarity comparisons while still being computationally efficient [61]. It has been trained on the Massive Text Embedding Benchmark, an evaluation benchmark across 58 datasets and 112 languages for embedding for tasks such as classification, clustering, and semantic textual similarity [62]. Adhering to the recommendations by Reimers and Gurevych [60], we used SBERT with its default settings and specifically set the maximum sequence length to 256 and employed token-based pooling.

SBERT is adept at capturing and processing the semantics of noisy reviews. This deep learning-based model is designed to interpret and process text that contains irregularities such as typos and grammatically inconsistent language by using subword embeddings [63, 64]. For example, the word "learning" could be divided into subwords like "learn" and "ing". The model then learns vector representations for each

subword. This allows the model to infer meanings of words it has not seen before by understanding their component subwords. Hence, unlike traditional natural language processing techniques, SBERT allows for bypassing conventional preprocessing steps like stemming or lemmatization.

To assess the company's positive score, we determined the proportion of reviews aligning with positive statements. Similarly, the negative score was determined by examining the proportion of reviews aligning with negative statements. Finally, we obtained the overall company score for the specific construct by taking the difference between the positive and negative scores.

4.1 Step 1: Selecting the OP and PS dimensions

4.1.1 Curating Positive OP and PS Items

To begin with, we resorted to validated psychological scales to construct items for OP and PS. Next, we explain the curation process.

Organisational Pride. In Psychology, three widely used measures for organisational pride are developed by Jones [41], Turban et al. [12], and Cable and Turban [32]. These three measures have demonstrated high reliability (i.e., with reliability coefficients of at least .80). Considering that Glassdoor reviews were mostly expressed in the past tense, we deliberately omitted items that included future tense language. As a result, we chose four specific items from the measure developed by Jones [41] (OP1 to OP4 in Table 1).

Psychological Safety. To measure PS at both the company and team levels, we utilised the items from Edmondson [1], which is the most commonly used measure in the literature on organisational behaviour and psychometrics [49]. Note that we needed to paraphrase one item from *"No one on this team would deliberately act in a way that undermines my efforts."* to *"Everyone on this team would act in a supportive manner towards my efforts."* to avoid a double negative, which would otherwise introduce more noise when extracting embeddings from the deep learning model (PS1 to PS4 in Table 1).

4.1.2 Creating Negative OP and PS Items

Glassdoor requires users to separate their reviews into pros and cons sections. This helps to ensure a fair evaluation that covers both the positive and negative aspects of a company, allowing users to make informed decisions about job opportunities and company cultures. Therefore, this separation of pros and cons allowed us to align the items with their corresponding sentiments in the reviews, leading to a more precise evaluation of similarity. The original OP measure includes only positive items to assess OP. We manually developed additional items reflecting opposite valence to those in the original OP measure. These items assess 'lack of organisational pride' (LOP), showing absence of positive attachment and identification with the organisation (LOP1 to LOP4 in Table 1). Since the original measure includes both positive and negative items, for PS, we separated existing negative items from positive ones to gauge 'lack of

Table 1: Final selected or adapted items from psychometric measures for measuring OP and PS.

Abbr.	Organisational Pride (OP) [41]
OP1	I am proud to work for this firm.
OP2	People respect what this firm does.
OP3	I am proud to be associated with this firm.
OP4	I am proud of what this firm accomplishes.
	Lack of OP (LOP) adapted from [41]
LOP1	I am displeased to work for this firm.
LOP2	People look down upon what this firm does.
LOP3	I am displeased to be associated with this firm.
LOP4	I am dissatisfied with how this firm accomplishes what it does.

Abbr.	Psychological Safety (PS) [1]
PS1	Members of this team are able to bring up problems and tough issues.
PS2	It is safe to take a risk on this team.
PS3	Everyone on this team would act in a supportive manner towards my efforts.
PS4	Working with members of this team, my unique skills and talents are valued and utilized.
	Lack of PS (LPS) [1]
LPS1	If you make a mistake on this team, it is often held against you.
LPS2	People on this team sometimes reject others for being different.
LPS3	It is difficult to ask other members of this team for help.

psychological safety' (LPS), which involves shared perception of fear about potential negative consequences for speaking up (LPS1 to LPS3 in Table 1). Note that because the original PS scale has seven items total, we ended up with four positive and three negative items.

4.1.3 Final OP and PS Items

Combining the previous two steps, we were left with a total of 15 items: 8 for measuring OP construct, and 7 for measuring PS construct (Table 1).

4.2 Step 2: Scoring the OP and PS dimensions

4.2.1 Calculating Separate Item Scores

We examined the 15 items at the company-level (denoted as u) to quantify organisational behaviour across multiple companies. To achieve this, we defined the score $s(u, i)$ of the i^{th} item for company u by calculating the fraction of reviews mentioning i within company u.

$$s(u, i) = \frac{\sum_{p \in R(u)} sim_t(v_p, v_i)}{|R(u)|} \quad (1)$$

Here, $R(u)$ represents the collection of reviews for company u, v_i denotes the SBERT (Sentence-BERT) vector corresponding to item i, and $sim_t(v_p, v_i)$ refers to the *thresholded* SBERT similarity score [60] between the SBERT vector of review p and the SBERT vector associated with item i. We applied this similarity thresholding technique to account for noise and potential variations in review expressions. For instances of missing data, specifically reviews without accompanying text or which are too short, this similarity thresholding effectively filtered out such instances since they yielded low similarity scores and were thus excluded from our analysis. Items with similarity scores below a certain threshold are considered dissimilar and assigned a score of 0, while those above the threshold retain their similarity scores. To be more specific, the

definition of $sim_t(v_p, v_i)$ is as follows:

$$sim_t(v_p, v_i) = \begin{cases} sim(v_p, v_i), & \text{if } sim(v_p, v_i) > \max(\theta, p_{50}(i)) \\ 0, & \text{otherwise} \end{cases} \tag{2}$$

We chose the threshold as the maximum value between θ and $p_{50}(i)$, where θ is the average value of the median similarities (one for pros and one for cons), and $p_{50}(i)$ is the median similarities for item i.

Additionally, it is important to highlight that we empirically identified a connection between OP/PS and the pros, as well as between LOP/LPS and the cons, using similarity scores. Pairing the cons with OP and PS (or pros with LOP and LPS) was found to negatively affect the performance of our framework during the validation phase of our mixed-method approach. Specifically, when cons were paired with OP/PS, negative statements about the company or teams were sometimes misinterpreted as similar to our items, thereby contributing to the construct scores despite their opposite meanings. This issue arises because the similarity measure struggles to handle negations effectively. To mitigate such inconsistencies, we naturally aligned positive construct items with pros and negative ones with cons.

4.2.2 Combining Item Scores

To derive composite scores for the constructs, namely OP and PS, we aggregated the scores of individual items. This aggregation enabled us to create more comprehensive representations of these underlying constructs. For OP, we calculated $\bar{OP}_u$ for company u by averaging the scores of four items, as shown in Equation 3:

$$\bar{OP}_u = \frac{s(u, OP1) + s(u, OP2) + s(u, OP3) + s(u, OP4)}{4} \tag{3}$$

The same approach was then applied to calculate composite scores for PS, LOP, and LPS. Subsequently, we standardised the values for each category by subtracting the mean and dividing it by the standard deviation, yielding the z-score. This process is illustrated in the following equation.

$$z_{OP,u} = \frac{\bar{OP}_u - \mu(\bar{OP})}{\sigma(\bar{OP})} \tag{4}$$

$$z_{PS,u} = \frac{\bar{PS}_u - \mu(\bar{PS})}{\sigma(\bar{PS})} \tag{5}$$

$$z_{LOP,u} = \frac{L\bar{OP}_u - \mu(L\bar{OP})}{\sigma(L\bar{OP})} \tag{6}$$

$$z_{LPS,u} = \frac{L\bar{PS}_u - \mu(L\bar{PS})}{\sigma(L\bar{PS})} \tag{7}$$

Finally, the OP and PS scores for company u were obtained by subtracting the z-score of the pro construct category from the con construct category.

$$OP_{\text{score},u} = z_{OP,u} - z_{LOP,u} \tag{8}$$

$$PS_{\text{score},u} = z_{PS,u} - z_{LPS,u} \tag{9}$$

4.3 Step 3: Validating the scoring of OP and PS

We focused on OP and PS since neither was previously studied and captured on a large scale. That means that there are no ground truth labels nor previous work to compare to. Hence, we assessed the effectiveness of our proposed method in two steps as follows. First, we implemented a baseline approach using extracted keywords from the OP and PS statements for the two construct measures. We automatically identified keywords and phrases from each construct item using the Rapid Automatic Keyword Extraction (RAKE) algorithm. This domain-independent method identifies key phrases—such as single keywords, bigrams and n-grams—by analyzing word frequency and co-occurrence patterns within the text as outlined in [65]. We then labelled a review as belonging to a certain construct, if we could find any of the phrases associated with that construct in the review, and scored the strength of the association based on the number of such phrases identified.

We randomly sampled 400 reviews: 200 from pros and 200 from cons. For pros, for each of the two positive constructs (OP and PS), we took 50 reviews with composite scores (Eq. 3) above the 75^{th} percentile (i.e., corresponding to a high construct value), and 100 with a composite score of 0 (i.e., not pertaining to any of the two constructs). Similarly, we sampled 200 reviews from cons. This stratified sampling ensured that we covered all the cases, i.e., reviews that were high or low in either of the constructs, and their combinations, or that did not express either of them. Three independent annotators then manually assessed the relevance of these reviews. Finally, we compared our proposed framework against the keyword-based method, as a lower bound baseline, on the set of manually labelled reviews. Additionally, we also benchmarked our method against predictions from GPT-4o-mini [66], a state-of-the art Large Language Model [67], as a more competitive baseline.

4.4 Step 4: Analysing OP and PS

To understand what characterises OP and PS, we adopted a linguistic approach, previously explored by Das Swain et al. [8], through which we identified the most frequent keywords, including 1, 2, 3, and 4-grams, from the reviews that our method deemed relevant for each construct. Since a review may pertain to multiple constructs, we divided the reviews into sentences. Next, we calculated the TF-IDF scores for the identified n-grams, with each document consisting of all shortlisted sentences for a specific construct. Finally, we ranked the keywords based on their TF-IDF scores, providing insights into the importance of certain terms for each construct as determined by our embedding-based method. This process was performed separately on the pro reviews paired with OP/PS and on the con reviews paired with LOP/LPS (as detailed in Section 4.1).

As previous literature suggests a positive correlation between both OP and PS and employee satisfaction [11, 13, 15, 17, 31, 49], we investigated the relationship between OP/PS scores and the company ratings through a linear regression analysis, while controlling for the number of reviews.

As we found that the distribution of OP and PS scores varies across different industry sectors (Figure 4), we examined whether these two constructs relate differently to industry sectors. To determine whether the differences in the two scores across sectors are statistically significant, we conducted ANOVA followed by post-hoc analyses using Tukey's (honestly significant difference) HSD tests [68]. Note that we only analysed sectors with more than 10 companies to ensure the analysis possesses sufficient statistical power. A larger sample size within each sector allows for more reliable and generalisable findings, reduces the impact of outliers, and enables more nuanced subgroup analyses. We also conducted a qualitative analysis using the publicly available reviews. To identify reviews that encapsulate the predominant themes within each sector, we followed two steps that are commonly adopted in thematic analysis [69]. We first applied open coding to identify key concepts that emerged across multiple reviews; specifically, two of the authors read all the reviews that scored in the top 5% from OP/PS, and marked them with keywords that reflected the key concepts expressed in the text. They then used axial coding to identify relationships between the most frequent keywords, and select representative reviews. We summarise our qualitative analysis with respect to OP and PS. Any excerpts utilised to support the analysis were paraphrased to ensure anonymity and avoid the identification of specific reviews.

5 Results

We applied the framework (§4) on 430K employee reviews from 2008 to 2020 in 318 major U.S. companies, and showed that these two constructs are associated differently with organisational culture. Table 4 (Appendix) shows the summary statistics of all variables used in our analysis, and Table 7 (Appendix) shows the outcomes of our manual evaluation and the comparative analysis of our method versus the keyword- and LLM-based baselines. This table highlights the high accuracy of our approach and its clear advantage over the baseline method. Moreover, our method also outperformed or matched the LLM baseline, highlighting its state-of-the art performance for this task. In this section, we present our findings about the two constructs examined across companies and industries.

OP applies to a company as a whole, and it is high in utility and energy sectors and low in consumers and communications. When analysing the positive and negative construct items, which represent the pros and cons of review sections, we observed a consistent language pattern. Initially, we discovered that all items associated with both OP and PS shared common keywords such as *work*, *people*, and *employee* (Figure 2). This outcome was expected since both aspects revolve around the employee experience in the workplace. However, OP-related items tended to focus more on the overall "company" aspect, indicated by words like *company*, *job*, and *benefit*. This finding aligns with the definitions of these concepts in organisational research, where it primarily encompasses employee experiences related to the organisation as a

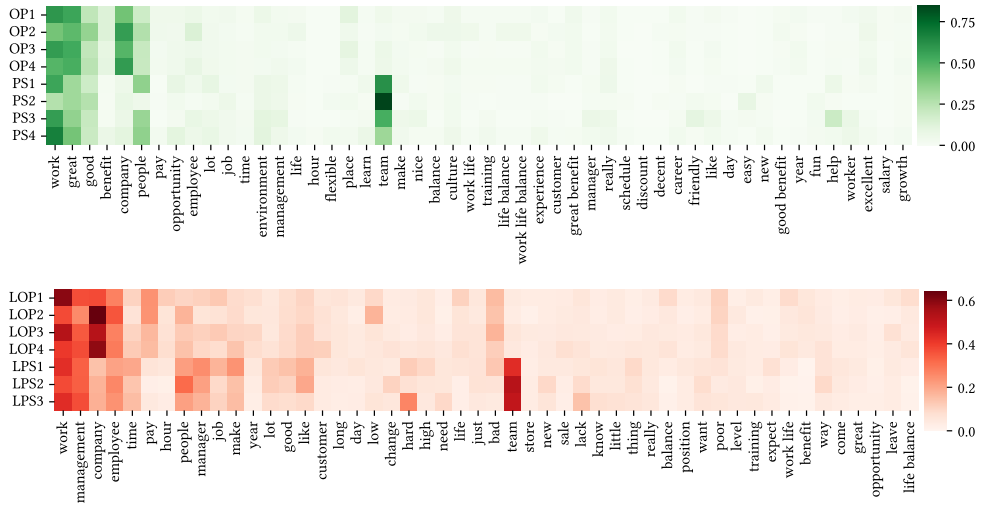

Fig. 2: **Top 50 n-grams in sentences expressing OP & PS.** Darker colours (higher normalised TF-IDF score) indicate greater relative relevance to a particular construct. The distinctive keywords for OP and PS are "company" and "team", respectively. The n-grams are sorted by their frequency in all the documents.

whole [15]. By exploring more specific keywords without the six most frequent keywords (*company, good, great, people, team,* and *work*) as shown in Figure 3, we found that OP was now associated with *(good/great) benefits*, *culture*, *employees*, and *(good/great) place)*. These findings are consistent with previous research indicating a positive relationship between OP and work-life balance [17], as well as the benefits of internal CSR practices for employees [70]. This suggests that our OP measure applies to a company as a whole. Examples of reviews with high and low OP/PS scores can be found in Table 2.

Table 2: **Example reviews for high and low OP/PS scores.**

#	High OP
1	Company that you are proud to work for.
2	This company has some of the best and brightest talent and I am happy to work alongside of them.
3	The company has an excellent reputation and I am proud to work here.
4	I love working for a company with such brand recognition.

#	Low OP
1	One of the most unethical and corrupt companies I have ever worked for.
2	Felt disjointed from the firm.
3	Constant lawsuits and bad press make one not want to admit to working there.
4	One of the worst companies I have ever experienced.

#	High PS
1	Excellent benefits, team members that are willing to assist with issues and questions.
2	Bunch of smart people working on difficult problems.
3	Great team facing challenging environment. Strong commitment by all coworkers.
4	Terrific people, strong team emphasis.

#	Low PS
1	If you make an error, they hold it against you.
2	There's much confusion and miscommunication among teams.
3	Lot of politics. If you end up being with a wrong team, your experience will be really bad.
4	It is a team environment. Some team members are not as good as others.

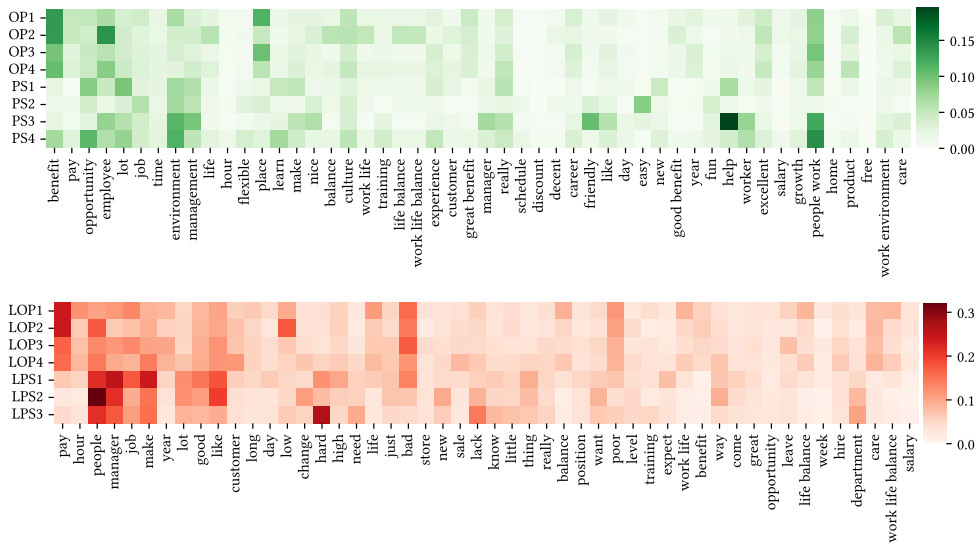

Fig. 3: **Top 50 n-grams in sentences expressing OP & PS.** Darker colours (higher normalised TF-IDF score) indicate greater relative relevance to a particular construct. We removed top shared keywords (*company, good, great, people, team, work* for pro reviews and *work, management, company, employee, time, team* for con reviews) and to let more construct-specific keywords emerge. The n-grams are sorted by their frequency in all the documents.

OP across industry sectors. ANOVA indicated statistically significant differences in OP scores across sectors ($F = 4.11, p < 0.001$). Post-hoc analysis with Tukey's HSD identified significant mean differences ($p < 0.05$) between consumer discretionary and four other sectors: energy, health care, information technology, and utilities.

Our analysis showed above-average scores in the *utilities* and *energy* sectors (Figure 4). The high OP in these sectors may be attributed to employees engaged in renewable energy sources, as they take pride in contributing to clean energy solutions and addressing pressing environmental issues. Example reviews: *'Leading the way to a greener future. Leading the renewable and energy storage world transformation. Keeping the lights on means 24x7 dedication to customers'* and *'I can sense an exciting future that will reshape the company completely. The people here are great.'* and *'There is no slack anywhere in company X, which is a good thing for shareholders but means it can at times be quite exhausting working at company X.'*

The *consumer staples* sector, which includes companies producing and selling essential consumer goods, exhibited substantial variability in OP scores. This can be attributed to the diverse nature of companies within this category. For example, companies offering food, beverages, or personal care products (e.g., Costco, Coca-Cola Company, and Procter & Gamble Co.) may experience different levels of pride (e.g., *'The CEO and CFO and in company X support their workers, and they believe in compensating and growing the people from within. They really care about their employees.'*)

compared to those involved in the production and sale of alcohol or tobacco products (e.g., Philip Morris International Inc.). The latter group, particularly tobacco companies, faces growing external critique and societal pressures due to the prioritisation of healthier lifestyles, which can influence employee sentiments towards the organisations. Example reviews: *'New purpose to deliver smoke-free products jumpstarted a need to address the culture and explore new ways of working. [...] Cost pressure due to lower sales volumes results in budget cuts.'* and *'[...] they did not mention that the role involved standing in a retail shop the entire day, approaching smokers and enrolling them to try smoke-free products. The management did not mention that the job involved "educating retailers" which in reality means bribing them to sell some-free in exchange for money vouchers, ipads and airpads.'*

Lastly, both the *consumer discretionary* and *communication services* sectors demonstrated significantly lower levels of OP. The *consumer discretionary* sector comprises companies that produce non-essential or discretionary goods and services, including industries with high turnover rates such as retail and e-commerce platforms. Example reviews: *'Very repetitive after a while!'* and *'Like most retail businesses the pay is substandard. Many employees have second jobs to make ends meet even if they are working full-time here.'* and *'Very stressful, lots of rude and antsy customers especially contractors.'* and *'Staff keeps getting reduced, therefore not enough time to serve everyone well. Then "they" wonder why sales are down.'* and *'Some poor policies that leave you dealing with some angry customers.'* Moreover, ethical concerns surrounding sustainability, animal welfare, and labour practices, particularly within industries such as apparel and luxury goods, contribute to diminished feelings of pride among employees. Example reviews *'Minimal pay, rude customers, long holiday hours.', and 'Management seems clueless outside of their department.'* and *'Retail is boring and monotonous'* and *'long hours over Christmas - have to work weekends'* and *'People no longer matter. Values and principles the company once was built on are no longer there.'* and *'Hours are not as organised as they could be, targets sometimes unrealistic - management need to understand many customers will shop online as websites offer better discounts.'*

In the *communication services* sector, especially social media and telecommunication companies, negative public sentiment related to issues like data privacy, misinformation, or service problems can impact employees' pride in their organisation. This sector often grapples with ethical issues such as data privacy, content regulation, and the digital divide. If employees feel that their company is not effectively addressing these issues, it can reduce their sense of pride in the organisation. Example reviews: *'Low pay and questionable privacy practices.'* and *'You face angry customers, [...] The trainers were not helpful and you feel like you've been left to handle things on your own.'* Additionally, in large communication service companies, employees may perceive themselves as small contributors in a large system, leading to a diminished sense of pride in their work's impact on the company and its customers. Example reviews: *'Whilst trying to keep the best person in each position, the company creates too much turnover.'*, *'We faced frequent layoffs when projects would complete [...]'*.

PS applies to the team as a unit, and it is high in IT and low in communications and healthcare. PS-related items were centred around the "team" aspect,

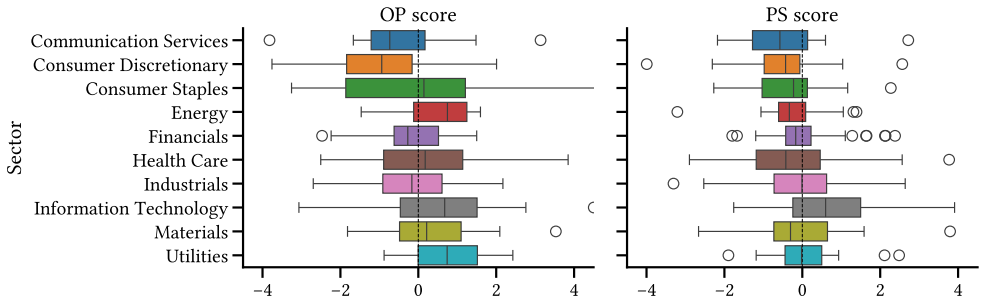

Fig. 4: **OP and PS scores across industry sector**. Box plots showing the distribution of OP and PS scores across different industry sectors.

Table 3: **Predicting company ratings using OP and PS scores.** Standard errors are shown below the coefficients.

	Career	Balance	Culture	Management	Overall
Intercept	2.650***	3.127***	2.731***	2.543***	2.914***
	(0.058)	(0.090)	(0.065)	(0.056)	(0.047)
OP_{score}	0.201***	0.156***	0.228***	0.204***	0.227***
	(0.010)	(0.016)	(0.011)	(0.010)	(0.008)
PS_{score}	0.025**	0.052***	0.058***	0.056***	0.022**
	(0.011)	(0.018)	(0.013)	(0.011)	(0.009)
$OP_{score} \times PS_{score}$	0.010***	-0.010*	-0.002	0.013***	0.001
	(0.004)	(0.006)	(0.004)	(0.004)	(0.003)
$\log(n_{reviews})$	0.085***	0.028**	0.089***	0.059***	0.069***
	(0.009)	(0.014)	(0.010)	(0.009)	(0.007)
R^2	0.749	0.470	0.773	0.797	0.842
Adjusted R^2	0.745	0.463	0.770	0.794	0.840
AIC	-167.621	112.588	-95.732	-185.739	-301.657
BIC	-148.811	131.398	-76.922	-166.929	-282.847
Residual Std. Error	0.184	0.287	0.207	0.179	0.149
F Statistic	233.107***	69.263***	266.298***	306.434***	416.059***
Note:					*p<0.1; **p<0.05; ***p<0.01

evident from words like *team*, *people*, *help*, and *friendly*, as depicted in Figure 2. This finding aligns with previous literature, suggesting that PS mainly pertains to employee experiences within their teams [49]. By exploring more specific words associated with PS (Figure 3), we found that it exhibited stronger associations with keywords such as *environment*, *friendly*, *help*, *training*, and *management*. These findings align with previous studies that highlight the interaction between PS and leadership qualities and team characteristics [49, 50]. Overall, this shows that our PS measure applies to the team as a unit.

PS across industry sectors. ANOVA also confirmed statistically significant differences in PS scores across sectors ($F = 2.75, p < 0.01$). Post-hoc analysis with Tukey's HSD identified significant mean differences ($p < 0.05$) between information technology and three other sectors: consumer discretionary, consumer staples, and health care.

We found high levels of PS in the *information technology* sector (Figure 4). This can be attributed to the career growth opportunities provided and the supportive work

environment within the *information technology* sector companies. Example reviews: *'[...] it was all about what you could bring to the table and they have an environment that made you want to bring all that you had.'* and *'Great career growth opportunities, excellent horizontal industry mobility, and chance to truly own your career trajectory.'* and *'Amazing benefits, lots of time spent on your training and development.'* and *'Diversity among teams. [...]'*

On the other hand, the *utilities* sector exhibits lower levels of PS. As discussed above, the *utilities* sector is often undergoing transformations due to advances in renewable and green technologies, regulatory changes, and shifting energy policies. This environment of change and uncertainty may impact job security, thereby affecting psychological safety among employees. Example reviews: *'Difficult to change things for the better. [...] They rather conform everyone to the same standard rather than embracing new and better ideas.'* and *'Constant pressure. Micro managed in ways that have never been seen before.'* and *'Current efforts to downsize are disturbing.'* and *'Lack of communication between coworkers.'*

In the *communication services* sector, which includes telecommunications, broadcasting, media and entertainment, and internet service companies, lower levels of both PS and OP may result from the fast-paced and dynamic focus on innovation, adaptability, and customer demands. This constant change can create uncertainty and stress, which in turn impacts psychological safety. Mergers, acquisitions, and layoffs are common in this sector due to its dynamic nature, further contributing to a sense of job insecurity that negatively impacts psychological safety. Example reviews: *'So many redundancies, too often.'* and *'You need to work hard.'* and *'Terrifying with anxiety 24/7. [...] Your job is always on the line, you can be let go at any point.'*

OP and PS are related organizational culture aspects, but each independently predicts employee satisfaction. Although OP and PS scores are correlated (Appendix, Table 5), the interaction term in the joint regression is not significant for most satisfaction ratings, including overall satisfaction (Table 3), indicating that neither aspect amplifies nor diminishes the other's effect. The exceptions are career and management ratings, where small but significant positive interaction terms show that higher OP or PS amplify each other's effects. The joint regression results also show that OP effects are significantly stronger than PS effects in predicting ratings, sometimes by an order of magnitude (e.g., 0.227 for OP *vs.* 0.022 for PS when predicting overall satisfaction). Accordingly, we do not pursue a combined OP$\times$PS analysis; instead, for an interested reader, we present an exploratory, construct-by-construct comparison of company standings across the two constructs in Appendix §9.

6 Discussion

Organisational pride and psychological safety provide a holistic understanding of employee experiences and attitudes throughout the organisational hierarchy. To assess these constructs automatically, we developed and validated an automated language-based framework, which we applied to hundreds of U.S. S&P 500 companies. By employing this framework, we identified significant variations in these constructs across industry sectors and categorised companies based on their respective levels

of organisational pride and psychological safety. Next, we discuss the theoretical and practical implications of our work, while also acknowledging its limitations and outlining potential future directions.

6.1 Theoretical Implications

From a theoretical perspective, our work contributes to developing automated ways of modelling workplace-related psychological constructs such as organisational culture. Our work builds upon previous research [8, 56] that aimed to automatically quantify organisational culture on a large scale, particularly by utilising Glassdoor data. We have made technical improvements to enhance the construct validity of this approach. In our study, we proposed a framework that captures organisational constructs from free-form employee reviews about the company by leveraging validated psychometric measures. While we demonstrated the framework's effectiveness in capturing OP and PS, it is important to note that the framework can be applied to any validated organisational construct as long as the corresponding psychometric measure exists. For constructs that have both positive and negative items in their psychometric measures (as was the case for PS in this study), our framework can directly incorporate them. However, for constructs with only affirmative items (such as OP in this study), the creation of negative items, as detailed in Section 4.1.2, can be beneficial.

Our study contributes to the theoretical understanding of organisational culture by examining two psychological constructs of OP and PS. To the best of our knowledge, this is the first study to report the varying degrees of OP and PS across different industry sectors, addressing the call for organisational behavioural research to disentangle context-specific theories rather than relying solely on context-general ones [71]. The consistent relationships between OP, PS, and ratings across the five Glassdoor categories suggest the general importance of these constructs in fostering employee satisfaction. As we demonstrated in Table 3, OP is a strong and robust predictor of all employee satisfaction ratings, with coefficients consistently larger than those for PS. Interestingly, for overall satisfaction, the effect of OP is an order of magnitude greater than that of PS (0.227 vs. 0.022). This likely reflects the fact that OP is measured at the company level and thus aligns closely with overall company satisfaction, while PS primarily captures team-level dynamics. This pattern holds across specific domains such as career, work-life balance, culture, and management. Although PS also significantly predicts satisfaction outcomes, its independent contribution is smaller. The interaction term between OP and PS is generally not significant, with the exception of career and management satisfaction, where the small but significant positive coefficients suggest a modest amplifying effect when both pride and safety are high. However, these interaction effects are limited in magnitude, and the primary drivers of employee satisfaction appear to be the main effects of OP and, to a lesser extent, PS. These findings indicate that initiatives aiming to increase organizational pride may have a particularly strong impact on employee satisfaction, though fostering psychological safety can provide additional benefits, especially in areas related to career advancement and management quality.

6.2 Practical Implications

From a practical standpoint, our work offers immediate benefits to organisations by integrating automated psychological assessment into their workflows, conducting sector-specific analyses, and cultivating a positive and productive work environment.

Automated Psychological Assessment. Our automated framework for assessing organisational constructs, including organisational pride, overcomes several limitations associated with conventional self-report assessments. Traditional internal corporate surveys often suffer from method bias and inconsistent implementation across companies. Our framework mitigates biases related to self-report data by using anonymous employee-provided information. This approach ensures more reliable and consistent measurements of organisational pride across diverse industry sectors, allowing organisations to obtain accurate insights into their employees' experiences and attitudes. A practical way to use our framework would be the integration with interactive dashboards where HR and managers can observe OP and PS scores over time, at both team and company levels, identifying trends and pinpointing areas for improvement. These dashboards, coupled with actionable insights and recommendations, can guide strategies to cultivate a positive company culture. For example, if a company scores low on psychological safety, HR could implement specific programs aimed at building trust, such as anonymous feedback tools or conflict resolution workshops. On the contrary, a company with low organisational pride might need to enhance internal communication regarding successes and milestones to boost pride, ensuring that the company's purpose is clearly communicated and that employees understand how their daily tasks fit into the bigger picture. The creation of educational tools and training materials focused on practices that foster organisational pride and psychological safety can educate both employees and leaders alike, and keep everyone engaged and informed about the best practices to enhance the company's cultural health.

Sector-Specific Analyses. By using our framework, any organisation, whether it be a small company or a large corporation, can identify the level of its workforce's organisational pride and psychological safety within its industry sector, and compare it across other sectors. This is important because organisations within specific sectors may face unique challenges and can leverage their strengths to address them effectively. By understanding the sector-specific dynamics related to organisational pride and psychological safety, organisations can tailor their strategies and interventions to create an environment that aligns with their industry's requirements and capitalise on their strengths [72].

Positive and Productive Work Environment. Organisations that prioritise creating a positive work environment can reap numerous benefits. Research has consistently shown that a positive work environment contributes to higher levels of employee well-being and performance [2, 3]. Strategies that foster emotional attachment, commitment, and psychological safety among employees not only can significantly enhance well-being and performance but also productivity. When employees feel valued, supported, and psychologically safe to take interpersonal risks and express their ideas, they are more likely to engage in proactive behaviours and contribute to the organisation's success [1].

Our framework's practical implications extend beyond organisational stakeholders to prospective employees and internal stakeholders. Job seekers can utilise our framework to compare organisational culture across companies and make more informed employment decisions (e.g., through visualisation tools; similar tools have been developed to allow prospective employees to compare their values with their prospective employers [57]). This can benefit both job seekers and current employees in reflecting on their assumptions and expectations regarding the work environment [73, 74].

6.3 Limitations and Future Work

Our work is subject to five main limitations, primarily related to the dataset used and how we measured the two psychological constructs studied.

The first three limitations pertain to the dataset itself. Firstly, our analysis focused on a subset of S&P 500 companies for which data were available, comprising 318 companies. This focus may limit the applicability of our findings to smaller firms with fewer online reviews. For instance, the observed distinctions between OP and PS in relation to employee satisfaction might be less evident in smaller companies, which typically have fewer and less diverse teams compared to larger corporations. To broaden the applicability of our findings, future research could use stratified sampling to gather reviews from a more varied range of businesses, considering both economic status and cultural context. Secondly, it is important to acknowledge the ethno-cultural bias inherent in our dataset, as we exclusively considered U.S.-based companies and English-language reviews. This restricts the cross-cultural generalisability of our findings, and it is not clear if and which of our findings would be impacted. To enhance the cultural and linguistic breadth of future studies, researchers could use large language models to process and analyse organisational reviews in multiple languages from different platforms, thus offering a more nuanced understanding of organisational behaviour across diverse cultural backdrops. Lastly, although our dataset includes timestamps, we did not extensively analyse the temporal dynamics of OP or PS, partly because of the insufficient number of reviews over time for smaller companies, which would not allow for a comprehensive assessment. Future research, leveraging our methodology and larger temporal datasets, could incorporate longitudinal analysis to uncover time-sensitive effects, providing a more dynamic understanding of organisational culture over time. Examining these temporal aspects could reveal how perceptions and attitudes toward organisations change in response to macroeconomic fluctuations or significant internal changes.

The second two limitations pertains to the psychological constructs themselves. Firstly, our assessment of OP and PS focused on the organisation level, based on employee reviews about their overall company experience. While this approach provides a broad overview of psychological safety within an organisation, our findings suggest that PS may not be fully captured at this level because it often operates more meaningfully within smaller teams. PS is inherently relational and context-dependent, deeply influenced by immediate interpersonal dynamics, the support structures of team members, and leadership styles within teams [1]. This suggests that PS may be most accurately assessed within the context of these smaller, functionally cohesive units rather than solely at the organizational level. Our results reinforce this perspective by

revealing that organizational-level PS may overlook significant variations across teams, which play a critical role in shaping employees' daily experiences. Treating PS solely as an organisation-wide construct may mask these intra-organisational nuances, as employees within certain departments or project teams could experience significantly different levels of psychological safety. For example, employees working in high-stress or high-risk areas, such as customer-facing roles, may feel varying degrees of PS compared to those in internal roles, depending on the unique culture and support systems within their teams. To address this limitation, future studies could adapt the framework we experimented with to assess PS at the team level by analysing reviews from employees grouped by team, department, or project if such data is available. Secondly, our measure of employee satisfaction was limited to the online company ratings data currently accessible to our research team. Future research could incorporate additional indices of success, such as those measured by industry standards organisations, annual revenue, or social media sentiment, to provide a more comprehensive understanding of employee satisfaction.

6.4 Ethical Considerations

In this study, we used public and anonymised data obtained from a reputable company review website. The qualitative analysis was conducted using data from publicly accessible sources, and any excerpts utilised to support the analysis were paraphrased to ensure anonymity and avoid the identification of specific reviews. The statistics presented at the company level were derived from publicly available information.

7 Conclusion

This work highlights the importance of understanding employee experiences and attitudes through the lens of organisational pride and psychological safety to cultivate a positive work environment and drive organisational success. By utilising a deep-learning framework and analysing a vast dataset of employee reviews from 318 major U.S. companies, our findings emphasise the crucial role of organisational pride and psychological safety in shaping employee engagement, satisfaction, productivity, and innovation. By prioritising organisational pride and psychological safety, organisations can create a work environment that fosters employee well-being and drives long-term success.

List of Abbreviations

1. OP: Organisational Pride
2. PS: Psychological Safety
3. OC: Organisational Culture
4. NLP: Natural Language Processing
5. CSR: Corporate Social Responsibility
6. ISE: Internal Sustainability Efforts
7. OCB: Organisational Citizenship Behavior
8. S&P 500: Standard and Poor's 500

9. SBERT: Sentence-level BERT
10. SNLI: Stanford Natural Language Inference
11. LOP: Lack of Organisational Pride
12. LPS: Lack of Psychological Safety
13. TF-IDF: Frequency–inverse Document Frequency
14. CEO: Chief Executive Officer
15. CFO: Chief Financial Officer
16. IT: Information Technology
17. GICS: Global Industry Classification Standard
18. U.S.: United States
19. HR: Human Resources
20. LLM: Large Language Model

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Availability of data and material

Data and code are available at: https://github.com/aliakbars/org-pride.

Competing interests

The authors declare that they have no competing interests.

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Author's contributions

AS collected the data and conducted the analysis. AS, SS, MC, and DQ conceived the experiments and wrote the manuscript.

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Appendix

Organisational Pride (OP) & Psychological Safety (PS) Psychometrics Measures Considered

OP items by Jones [41]:

1. "I am proud to work for [this company]."
2. "People respect what [this company] does."
3. "I am proud to be associated with [this company]."
4. "I am proud of what [this company] accomplishes."

OP items by Turban et al. [12]:

1. "I would be proud to be an employee at this firm"
2. "I would receive respect from others if I worked for this firm."
3. "My family would feel proud of me if I worked for this firm."

OP items by Cable and Turban [32]; adapted from [12]:

1. "I would feel proud to be an employee of this firm."
2. "I would be proud to tell others that I work for this firm."
3. "I would be proud to identify myself personally with this firm."

PS items by Edmondson [1]:

1. "If you make a mistake on this team, it is often held against you."
2. "Members of this team are able to bring up problems and tough issues."
3. "People on this team sometimes reject others for being different."
4. "It is safe to take a risk on this team."
5. "It is difficult to ask other members of this team for help."
6. "No one on this team would deliberately act in a way that undermines my efforts."
7. "Working with members of this team, my unique skills and talents are valued and utilised."

Summary statistics of the variables used in this study

Table 4: Summary statistics of analyzed variables.

	Mean	Std. dev	Min	Median	Max	Histogram
OP_{score}	0.00	1.46	-4.78	-0.05	4.97	
PS_{score}	0.00	1.29	-3.99	-0.14	4.82	
# reviews	1354.68	2013.33	102.00	452.00	12707.00	
Balance rating	3.30	0.39	2.16	3.33	4.51	
Career rating	3.21	0.37	2.16	3.19	4.47	
Culture rating	3.30	0.43	2.17	3.31	4.64	
Management rating	2.94	0.39	2.00	2.93	4.35	
Overall rating	3.36	0.37	2.25	3.36	4.60	

Correlations between OP, PS, and overall ratings

Table 5: Correlation matrix among OP and PS scores, and the overall company rating.

	OP score	**PS score**	**overall rating**
OP score	1.00		
PS score	0.69	1.00	
overall rating	0.89	0.67	1.00

Multicollinearity between OP, PS, and overall ratings

Table 6: Variance Inflation Factor (VIF) Results.

Variable	VIF
OP score	1.904
PS score	1.896
overall rating	1.009

Results of Manual Assessment and Baseline Comparison

We validated our methods on a set of manually annotated reviews against two baselines: a phrase-based Rapid Automatic Keyword Extraction (RAKE), and a large language model (LLM)-based GPT-4o-mini.

First, we selected 400 reviews using stratified random sampling: 200 from pros, such that 50 were labeled with our method as OP, 50 as PS, and 100 that were labeled as not pertaining to either of the two constructs; and equivalently, 200 from cons such that 50 were labeled with our method as LOP, 50 as LPS, and 100 that were labeled as not pertaining to either of the two constructs. Then, three authors independently annotated the 400 reviews for the presence of each construct, as defined in the literature, keeping the construct items in mind. Specifically, they did so in the following way. For the reviews sampled from *cons*, they assigned one of four labels—LOP, LPS, LOP&LPS, or NA (inapplicable)—to match the automatic framework; likewise, reviews sampled from *pros* were labeled OP, PS, OP&PS, or NA. For example a cons review *"HR department is protective of the company, not the employees. Hard to move up the food chain for some positions. Company is so big that individuals are sometimes unvalued."* would be labeled as LOP&LPS since it indicates both a lack of OP (individuals are unvalued) and PS (HR is protective of the company, not employees),

whereas a pros review *"Conservative and rarely have layoffs."* would be labeled with NA because it mentions job security but does not clearly express high OP or PS.

All three annotators initially agreed on 44.5% of the pros and 49.0% of the cons, while two out of the three annotators agreed on 80.3% of the pros and 80.8% of the cons. To ensure label quality, the annotators subsequently met to discuss and resolve disagreements. These primarily involved clarifying interpretations of the two constructs and assessing the level of implied information within brief reviews. For instance, some reviews mentioning low job safety were initially labeled as LOP by one annotator, but the group collectively agreed this did not equate to LPS. Similarly, reviews highlighting high wages or a good work-life balance were occasionally labeled as OP by an individual annotator, but upon discussion, it was concluded that these alone were insufficient to imply pride in the company. The final consensus labels were used for evaluating our method and the baselines.

Table 7 shows that our method outperforms the RAKE baseline implemented using `rake-nltk` Python library on the set of 400 manually annotated reviews. Moreover, our method also outperforms GPT-4o-mini in predicting three out of four constructs from the reviews (OP, LOP, LPS), and is at par for the last construct (PS).

Table 7: Comparison of our method and a keyword-based and an LLM (GPT-4o-mini) baselines.

Method	F1 OP	F1 PS	F1 LOP	F1 LPS
GPT-4o-mini	39.75%	**61.64%**	28.32%	49.61%
Keyword-based	28.57%	40.91%	8.57%	43.75%
Our method	**42.50%**	57.80%	**34.78%**	**52.46%**

IT Sector Analysis

Upon excluding more generic keywords like 'benefits', 'company', 'good', 'great', 'people', and 'work', we found that IT companies with low public sentiment scores frequently had positive reviews mentioning "work-life balance" (Figure 5). This contrasted with companies with Company and Teams Leadership (high OP, high PS), which did not emphasise work-life balance to the same degree, according to reviews. Moreover, "opportunities" and "environment" were frequently cited as advantages across reviews.

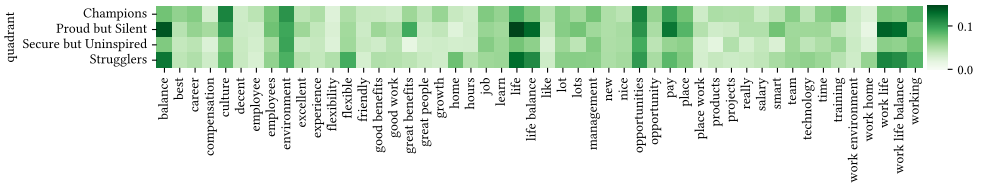

Fig. 5: Keywords associated with each quadrant for IT companies.

Although "work-life balance" was brought up in reviews for all analysed companies across different sectors, this theme did not emerge as strongly outside the IT industry (Figure 6). Interestingly, when PS was low, employees tended to only mention "pay" as a positive factor rather than citing deeper advantages like work-life balance or opportunities for growth. This suggests that a lack of psychological safety may limit employees' ability to find meaning and fulfilment in their work beyond monetary compensation. In contrast, the prevalence of "work-life balance" comments for IT companies indicates that employees feel safe voicing appreciation for experiences beyond just pay when psychological safety is higher.

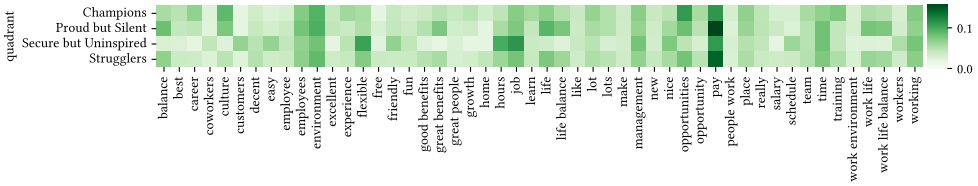

Fig. 6: Keywords associated with each quadrant for all analyzed companies across different sectors.

Sensitivity Analysis

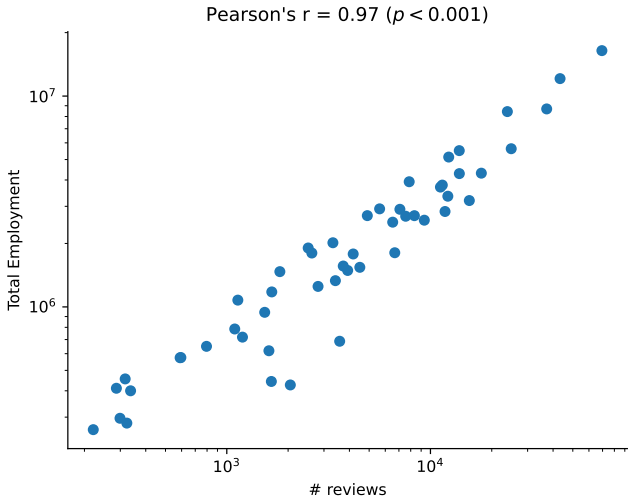

Fig. 7: Correlation between the number of reviews per state and the total number of employment positions per state using Occupational Employment and Wage Statistics from U.S. Bureau of Labor Statistics in 2022.

8 Analysing OP and PS in Combination

To visualise the interplay between OP and PS, we projected the companies onto a Cartesian plane with two dimensions (Figure 8). This method allowed us to succinctly and clearly represent each company's positioning in relation to these two constructs.

To understand what characterises these four quadrants, we identified the most frequent keywords, including 1, 2, 3, and 4-grams, from the pro and con reviews. Next, we removed stopwords before calculating the TF-IDF scores for the identified n-grams. We only kept the top 100 keywords to identify the discriminative ones. Finally, we fit a multinomial logistic regression model using the top 100 keywords as the input to predict the quadrant of the companies from which the reviews are coming. Finally, we identified the most prominent keywords by looking at the model's coefficients for each quadrant.

9 Studying OP and PS in Combination

As both OP and PS show significant correlations with overall company ratings (Appendix Table 5), with Pearson coefficients of $r = 0.89$ and $r = 0.67$, respectively, it is unsurprising that these constructs both emerged as significant *positive* predictors of the ratings individually (Table 3). However, given that OP and PS are also moderately correlated ($r = 0.69$), we sought to explore how the interplay between these two constructs relates to the company scores. Since the variance inflation factor (VIF) analysis found that the multicollinearity among our variables was low-to-moderate and, it did not require corrective measures (see Appendix Table 6), we began by examining a model that predicts employee ratings using OP and PS scores together, while controlling for the number of reviews. The results in Table 3 show that the model coefficients for OP are positive when predicting various ratings (ranging from 0.156 for balance to 0.228 for company culture), while the coefficients for PS are also positive but with a weaker effect (ranging from 0.022 for overall to 0.058 for culture). We also estimated a regression model incorporating an interaction term between OP and PS (see Appendix Table 3). The results remained consistent: OP and PS continued to show a positive association with the rating after controlling for the number of reviews, while the coefficient for their interaction term was not statistically significant.

We named the four quadrants shown in Figure 8 as *No Designated Leadership (low OP & low PS)*, *Teams Leadership (low OP & high PS)*, *Company Leadership (high OP & low PS)*, and *Company and Teams Leadership (high OP & high PS)* for ease of reference.

We conducted an ANOVA on the mean company ratings across the four groups and found statistically significant differences ($F = 105.36, p < 0.001$). The post-hoc analysis presented in Table 8 further demonstrates that the differences are significant for most pairwise comparisons between the quadrants.

We next provide a definition for each quadrant, its characteristics derived from the most prominent keywords (Figure 9), and the sectors that are related to it (Figure 10).

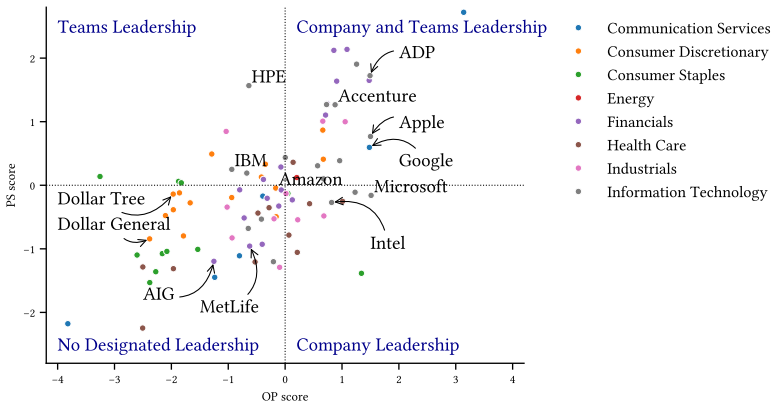

Fig. 8: **Scatter plot of the Organisational Pride (OP) *vs.* Psychological Safety (PS) scores for the top 100 companies based on the number of reviews.** Consumer discretionary companies like Dollar Tree and Dollar General displayed lower scores in OP and PS. On the other hand, tech companies like Google and Microsoft scored higher in OP but not as high in PS. It is important to note that Google is classified as Communication Services, according to the Global Industry Classification Standard (GICS) Sector definition.

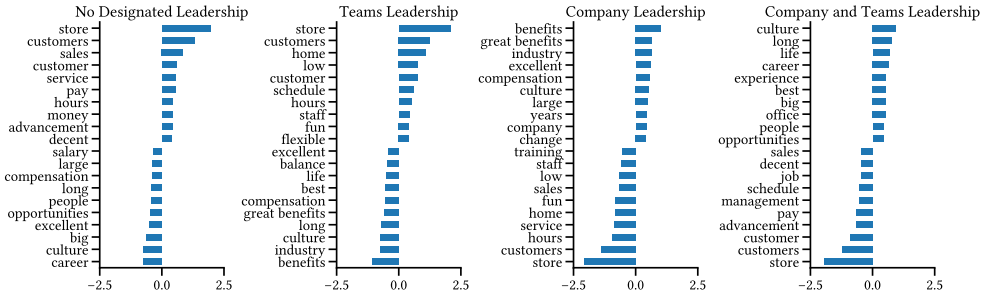

Fig. 9: **Top 20 n-grams in sentences expressing OP & PS across the companies in the four quadrants.** The bar length signifies the mean coefficients from a 10-fold cross validation of the multinomial logistic regression based on the normalised TF-IDF score. Positive scores imply greater relative relevance of keywords for companies in that quadrant. Negative scores suggest that the mentioned keyword is less prevalent in the companies in that quadrant, compared to others. The notable keywords for *No Designated Leadership* companies include "store", "customers", "sales," and "pay". For *Team Leadership* quadrant companies, distinctive keywords are "store", "schedule", "fun", and "flexible". Conversely, in the *Company Leadership* quadrant, distinctive keywords are "large", "benefits", "culture," and "compensation". Lastly, for companies in the *Company and Teams Leadership* quadrant, distinctive keywords are "opportunities", "culture", "career", and "experience".

Table 8: Tukey HSD Test Results for Multiple Comparison of Means (FWER = 0.05)

Group 1	Group 2	Mean Difference	p-adj	Reject
Company Leadership	Company & Teams Lead	0.1449	0.008	T
Company Leadership	No Designated Leadership	-0.4393	0.000	T
Company Leadership	Teams Leadership	-0.3889	0.000	T
Company & Teams Leadership	No Designated Leadership	-0.5843	0.000	T
Company & Teams Leadership	Teams Leadership	-0.5338	0.000	T
No Designated Leadership	Teams Leadership	0.0504	0.781	F

No Designated Leadership. These companies exhibit a persistent challenge in cultivating a workplace culture that fosters pride and belonging (low OP) while also struggling to establish a psychologically supportive and safe environment (low PS). This is evident as employees predominantly focus on retirement (*401K* in Figure 9) and significantly mention the following words less frequently compared to employees in the three other company types: *culture* (indicating low pride), and *friendly*, *work-life balance*, and *care* (indicating low safety). Notable companies in this category include MetLife, Nielsen, AIG, Dollar Tree, and Comcast, primarily representing sectors such as *financials*, *consumer discretionary*, and *communication services*.

Teams Leadership. These companies might face challenges in organisational leadership and fostering a strong sense of belonging (low OP), yet they excel in strong team leadership by creating a supportive and inclusive environment that prioritises employee well-being and open collaboration (high PS). This is apparent as employees frequently discuss *managers*, *coworkers*, and *flexible* work environments (signifying high safety). Conversely, there is less emphasis on discussions about *great benefits*, *career*, *projects*, and *culture* (indicating low pride). Companies such as Kmart and Staples in consumer staples ensure employee safety through a less demanding environment or more tightly knit teams, but this approach might inadvertently impact the pride associated with working in these organisations.

Company Leadership. These companies are distinguished by their robust organisational leadership, fostering strong pride and loyalty among employees towards the organisation (high OP). However, they encounter difficulties in establishing a psychologically safe workplace that promotes openness, vulnerability, and collaborative risk-taking (low PS). This is reflected in employee discussions about *culture*, *great benefits*, and *compensation*, (signifying high pride), while conversations about *coworkers*, *people work*, and *flexibility* are less frequent (indicating low safety). Companies such as BlackRock and JPMorgan in financials, Intel and Microsoft in information technology, and Pfizer and Merck in health care are examples, known for their challenging and dynamic environments, potentially affecting their employees' psychological safety. As we have seen from the results on predicting ratings from both OP and PS, in companies with high OP, it is lower PS that contributes to a higher rating. Hence, many of the companies in this quadrant are highly rated by their employees.

Company and Teams Leadership. These companies are lauded for their outstanding leadership, both organizationally (high OP) and in team dynamics, fostering a supportive, inclusive, and empowering work culture (high PS). Employees in such environments are generally more motivated and experience greater job satisfaction,

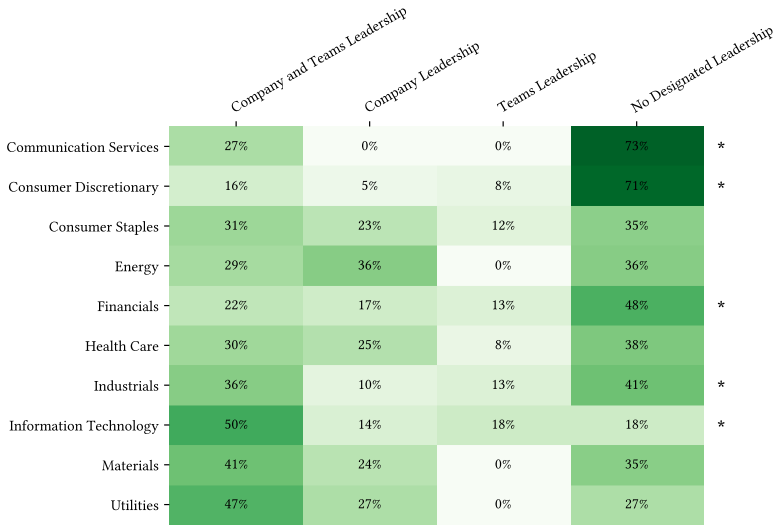

Fig. 10: **Distribution of companies per industry sector across the four quadrants**. After dividing the companies into quadrants based on OP & PS scores, we can see that Communication Service and Consumer Discretionary companies are more likely to score low in OP & PS (No Designated Leadership) whereas Information Technology companies have high scores in OP & PS (Company and Teams Leadership). The $*$ symbol indicates a statistically significant result using a Chi-squared test at $p < 0.05$.

contributing to higher productivity. This is reflected in employee discussions about *projects*, *career*, *learning*, and *work-life balance*, contrasting with lesser focus on *hours* and *balance*, and seldom mentioning attributes like *easy* and *free*. As Šćepanović et al. [59] suggest, fulfilling workplaces often involve challenges and positive stress, rather than ease. These companies span diverse sectors, including notable ones like Apple and Nvidia in information technology, Halliburton in energy, Eastman Chemical Company in materials, and General Electric Company and FedEx in industrials.

Figure Legends

1. Fig 1: **Our framework for measuring an organisational construct score (e.g., OP or PS score) from company reviews.** Starting from the validated psychometric measures for the construct of interest, we subset negative from positive items, or, if no negative items are present, we create them as opposites to the positive items. We then embed each item and measure its similarity to the embedding of the company reviews. For each company, the proportion of reviews found similar to the positive statements, gives company positive score, and the proportion of reviews found similar to the negative statements, gives company negative score. The final company score for the given construct is calculated as the difference between positive and negative scores.
2. Fig 2: **Top 50 n-grams in sentences expressing OP & PS.** Darker colours (higher normalised TF-IDF score) indicate greater relative relevance to a particular construct. The distinctive keywords for OP and PS are "company" and "team", respectively.
3. Fig 3: **Top 50 n-grams in sentences expressing OP & PS.** Darker colours (higher normalised TF-IDF score) indicate greater relative relevance to a particular construct. We removed top shared keywords (*company, good, great, people, team,* and *work*) to let more construct-specific keywords emerge.
4. Fig 4: **OP and PS scores across industry sector**. Box plots showing the distribution of OP and PS scores across different industry sectors.
5. Fig 5: textbfScatter plot of the Organisational Pride (OP) *vs.* Psychological Safety (PS) scores for the top 100 companies based on the number of reviews. Consumer staples companies like Walgreens, KMart, and Staples displayed lower scores in OP but higher scores in PS. On the other hand, tech companies like Amazon, Google, and Microsoft scored higher in OP but not as high in PS. It is important to note that Amazon is classified as Consumer Discretionary, and Google is classified as Communication Services according to the Global Industry Classification Standard (GICS) Sector definition.
6. Fig 6: **Top 20 n-grams in sentences expressing OP & PS across the companies in the four quadrants.** The bar length signifies the coefficients of the multinomial logistic regression based on the normalised TF-IDF score. Positive scores imply greater relative relevance of keywords for companies in that quadrant. Negative scores suggest that the mentioned keyword is less prevalent in the companies in that quadrant, compared to others. The notable keywords for *No Designated Leadership* companies include "home", "technology", "sales," and "401K". For *Team Leadership* quadrant companies, distinctive keywords are "store", "customers", "easy", and "coworkers". Conversely, in the *Company Leadership* quadrant, distinctive keywords are "smart", "benefits", "work-life", and "culture". Lastly, for companies in the *Company and Teams Leadership* quadrant, distinctive keywords are "projects", "culture", "career", "learning", and "work-life balance".
7. Fig 7: **Distribution of companies per industry sector across the four quadrants**. After dividing the companies into quadrants based on OP & PS scores, we can see that Communication Service companies are more likely to

score low in OP & PS (No Designated Leadership) whereas Material companies have high scores in OP & PS (Company and Teams Leadership). The $*$ symbol indicates a statistically significant result using a Chi-squared test at $p < 0.05$.

8. Fig 8: Keywords associated with each quadrant for IT companies.
9. Fig 9: Keywords associated with each quadrant for all analyzed companies across different sectors.

Table Legends

1. Table 1: Final selected or adapted items from psychometric measures for measuring OP and PS.
2. Table 2: **Predicting company ratings from the standardised OP score.** We added the number of company reviews as a control variable. The numbers in parentheses show the standard errors of the coefficients.
3. Table 3: **Predicting company ratings from the standardised PS score.** We added the number of company reviews as a control variable. The numbers in parentheses show the standard errors of the coefficients.
4. Table 4: **Predicting company ratings using both OP and PS scores.** Both scores are statistically significant to predict overall ratings even after adding the number of reviews as a control variable. The numbers in parentheses show the standard errors of the coefficients.
5. Table 5: Comparison of our method and keyword-based baseline.