Seek and Ye Shall Find: An Empirical Examination of the Effects of Seeking Real-Time Feedback on Employee Performance Evaluations

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Abstract
Many companies utilize real-time feedback applications to increase employee engagement with their performance evaluation programs and disseminate the results. Yet beyond giving and receiving employee feedback, important dynamics such as feedback-seeking behavior and feedback rating are not well addressed in the literature. In order to fill this gap, we examine employee behavior related to two dimensions of real-time feedback: (i) seeking performance feedback from supervisors, peers, and direct reports; and (ii) evaluating the helpfulness of received performance feedback. Specifically, we examine the effects of feedback-seeking and rate-the-feedback behaviors on in-kind evaluations. After analyzing nearly 11,000 feedback instances from employees at four major organizations that utilize real-time performance feedback applications, we find that seeking feedback enhances constructive communication among colleagues. We show that feedback receivers who sought feedback receive lower feedback scores, have a higher likelihood of receiving comments, and receive longer, more positive, and more subjective comments. Feedback givers who opt not to provide comments or opt to provide shorter comments to feedback seekers choose to provide feedback anonymously. We document that feedback seekers care less about the high feedback scores and prefer longer comments when they rate received feedback. Low feedback scores received motivate feedback seekers to continue to seek feedback in the future. To solve the endogeneity problem, we use identification approaches such as instrumental variable, matching, and Heckman-type analysis. Sought feedback may be more useable than unsolicited feedback because text-based feedback responses may provide sufficient insight for the recipient to act on. Hence, managers and organizations should promote a culture of constructive feedback through this feedback-seeking dynamic and orientation. When implementing feedback applications that allow for seeking and rating feedback, managers should be aware that feedback ratings can be informative, but feedback results might be particularly lower when feedback is sought. Thus, based on our results, we identify several managerial insights that could be used by firms to manage feedback mechanisms.

Keywords: real-time feedback, performance appraisals, seeking feedback, rating feedback, empirical study

1. Introduction
Employee performance feedback is a widely accepted management practice across industries, generally associated with improved retention, engagement, and performance (Harris, 2021; Girdauskiene et al., 2022). In the United States, 91% of employers provide feedback, and 80% also provide performance ratings (Smith, 2022). Managers may use feedback to enhance job-related activities that support employees at a personal level to improve the organizational climate to either directly or indirectly affect employee performance (Maruping & Magni, 2015). From a technological perspective, paying attention to certain aspects of one’s work-life can bring asymmetric visibility to particular areas of needed behavioral change (Tiefenbeck et al., 2018; Chan et al., 2021).
Yet traditional feedback processes—generally involving annual- or bi-annual reviews and formal meetings between supervisors and their employees—are cumbersome and ill-equipped for the modern agile workplace. Formal employee appraisal processes are often time-consuming and, because they are scheduled months in advance according to a recurrent system, often lack time-relevant, actionable insights into specific aspects of performance (Buckingham & Goodall, 2019). While employee reviews can contribute to decisions about promotions, terminations, and compensation, traditional feedback models do little to positively impact employee performance in the long term (Schrage et al., 2019). When feedback is only given periodically or lacks specific, actionable information, positive impact effects begin to decay within days (Setia et al., 2013).

Indeed, employers are not the only ones discontented with traditional feedback models: 95% of employees feel dissatisfied with their organization’s performance feedback processes and do not feel they have enough opportunities to receive feedback from managers and colleagues (PurelyHR, 2021). A recent study found that 98% of employees become less engaged when managers give little or no feedback (Officevibe, 2022). But although employees seem to want more and more frequent feedback, many do not actively seek it from their supervisors or colleagues for fear of receiving a constructive appraisal (Meneghello, 2020).

In the past few years, many businesses have turned to technology to improve feedback collection and dissemination. A wide range of innovative, tech-based options have been introduced with the goal of streamlining feedback processes and motivating employees, many of which are part of a larger shift toward digitized and automated human resource management. These options include one- or two-question “pulse surveys” texted or emailed to employees and are intended to create snapshots of employee mentality (Burnett & Lisk, 2019; Kumar & Qiu, 2021), gamification of performance with individual tasks worth various points and leaderboards and badges used to track progress (Girdauskiene et al., 2022), and even wearable devices meant to measure employee movement throughout the workday (Burnett & Lisk, 2019).

This paper focuses on one such technological advancement, the real-time performance feedback application. These generally cloud-based software packages allow organizational members to register for connected accounts in which they can then provide and receive performance feedback within their organization’s network. Real-time feedback processes differ in many ways from a traditional feedback system, but perhaps the most prominent difference is the real-time affordance of digital apps: feedback may be given while completing a task, during a ride on an elevator, between client meetings, or whenever a person chooses, and is then delivered instantaneously to the recipient. Performance feedback applications, which may be designed and implemented in-house or purchased as enterprise software, help to solve the industry problem of infrequent, delayed and/or irrelevant feedback, while simultaneously providing a means to measure and promote engagement. Unlike the short-lived effects of infrequent feedback, real-time feedback is associated with improved outcomes even months later (Jung et al., 2010; Pierce et al., 2015). The shift from annual reviews to a continuous feedback loop represents an industry-wide inflection point, with an estimated 70% of
multinational companies moving towards real-time feedback models (Cappelli & Tavis, 2016). Major players like Adobe, Deloitte, GE, IBM, and The Gap have made the switch to a real-time feedback model and enjoyed positive results (Bodell, 2019).

In addition to other benefits, some real-time feedback applications have built-in features to encourage engagement in the feedback process, such as an option for users to request feedback from specific individuals and the ability to rate received feedback so that providers receive insight on their own feedback’s perceived helpfulness. Because the application works in real time, employees can seek, receive, give, and rate feedback whenever they want, which empowers employees and employers to disseminate feedback as a target behavior occurs rather than waiting until a formal review. Theoretically, these features should enhance the feedback process, as the ability to actively seek feedback from supervisors, peers, and direct reports may help foster a virtuous cycle of seeking, giving, and rating feedback. Over time, helpfulness ratings may improve employees’ skills in providing helpful, actionable feedback (Shaoolian, 2018), thus improving the quality of feedback overall. However, while both seeking and rating feedback may have the potential to sustain a broader organizational culture of real-time feedback, these new dynamics are scantily addressed in the literature. This study attempts to fill this gap by examining the theoretical and practical dynamics of seeking and rating real-time feedback. Using a novel data set from firms that have implemented a real-time feedback application, we investigate the impact of seeking and rating feedback to contribute to the understanding of performance feedback best practices in the digital transformation of today’s workforce. As real-time feedback becomes more prevalent, understanding the dynamics of giving and seeking feedback can help individuals and organizations flourish and improve their performance.

A work culture that encourages constructive feedback seeking empowers colleagues to give feedback they may otherwise hesitate to offer—often the information most critical for performance improvement (Kim & Kim, 2020). Seekers can tailor feedback requests to receive specific feedback on targeted areas, reducing generalities and vagueness in the feedback they receive. Performance feedback mechanisms can increase the intrinsic motivation of high performers (Jiang & Wang, 2020; Chan et al., 2021), but to maximize intrinsic motivation in a team collaboration setting, measurements should be set idiosyncratic to each member of the team (Jung et al., 2010; Mithas et al., 2011). In addition, when employees have greater insight into specific skills and proficiencies they need to develop, they adapt more quickly to new roles, become more committed to their work, and report a higher sense of purpose in the workplace (Baumgartner, 2020). Seeking feedback from a variety of colleagues also helps combat bias inherent in traditional performance management processes like the annual review, where insights from upper-level supervisors gathered once or twice a year become the frame of reference for an employee’s performance over time (Jones et al., 2018). Furthermore, AI-enabled real-time feedback tools may promote effective collaboration within and across teams and sustainable growth in corporate settings and online education environments, allowing feedback providers and receivers to develop...
critical thinking and self-reflection skills (Porter & Grippa, 2020).

Providing and receiving feedback within real-time feedback applications takes only a few minutes, allowing managers to scale their capacity to provide coaching (Buckingham & Goodall, 2019). Having convenient access to a feedback application empowers managers to offer more personalized and customized guidance to every employee and provide more relevant and effective insights to help them grow (Borden et al., 2018). Feedback in the form of quantitative scores and qualitative comments can be exchanged continually within real-time feedback applications, helping employees stay informed about what skills they need to develop and how quickly they need to do so and inspire a culture of continuous learning (Jenkins, 2019).

Understanding the impact of feedback-seeking behavior on feedback outcomes could contribute to managerial strategies to reduce recency bias that can creep in when performance feedback is sporadic and help individuals obtain feedback as needed (Dunbar et al., 2014). By asking how seeking causes resulting scores and comments to be different from that of non-requested feedback, we may uncover score and comment biases resulting from employees’ ability to easily seek feedback, and this insight could provide managers with clarity regarding whether to encourage the practice of actively seeking performance evaluation. Moreover, it could help to identify the type of feedback a seeker expects when they make a request.

Maintaining employee feedback engagement is an ongoing concern for researchers and organizational leaders, and the ability to easily seek feedback from selected colleagues may provide a way forward. However, seeking feedback could damage constructive communication among colleagues (Chur-Hansen & McLean, 2006). Feedback givers may feel put on the spot by requests for feedback and give no comments or shorter comments to ensure that they close the feedback loop, save face, or avoid conflict rather than provide a thorough comment describing their perception of the seeker’s actual performance capacity. Therefore, our first research question aims to determine whether seeking feedback results in scores and comments that differ from those that are unsolicited:

**Research question 1. To what extent and how does seeking feedback impact real-time feedback scores and comment frequency and length?**

On the other hand, some research has found that seeking feedback could enhance constructive communication among colleagues (Ashford et al., 2003). Some feedback givers may view the action of seeking feedback as a signal of self-motivation, improving their appraisal of the feedback seeker; others may be complimented by the request, as it signals that the seeker values their input. Understanding what comments are delivered when feedback is solicited can help managers become more aware of the coaching their direct reports are receiving so they can adjust their managerial practices accordingly. When managers agree with the feedback given, they can reinforce behavior change with the receiver or fill in gaps when comprehensiveness might be lacking. In instances where they disagree, they can intervene and course correct with further guidance for recipients. Prior research does not consider the likelihood or length of comments in a one-to-one assessment
setting in which a feedback seeker has directly sought feedback from a reviewer. Therefore, our second research question asks:

**Research question 2.** What is the effect of feedback seeking on comment sentiment and subjectivity?

It is also important for managers to understand how anonymity impacts real-time feedback results in response to feedback-seeking behavior (Detert & Burris, 2016). Anonymity transfers repeated interactions between the feedback giver and receiver into a one-shot game, which leads to a less cooperative outcome since the feedback receiver cannot directly interact with the feedback giver. As a result, managers may not know how to interpret and respond to anonymous feedback, whether they are the feedback recipient or are reviewing feedback that has been given to another associate. The answer to this research question could help managers understand the impact of anonymous feedback so they can identify when to encourage or discourage this practice among their team members. Managers who understand this dynamic may be better positioned to interpret real-time feedback results with clarity and coach employees on how to give feedback most effectively. Therefore, our third research question asks:

**Research question 3.** How does anonymity in response to feedback seeking impact real-time feedback results?

Managers recognize that feedback can be used to positively reshape behavior when given properly but can be a detriment when given poorly (Chappelow & McCauley, 2019). Offering specific, helpful input on feedback may improve rating quality (London & Smither, 2002). However, employees may feel obligated to provide high ratings for positive feedback and may punish constructive or change-oriented feedback with lower scores (Itzchakov & Latham, 2020). If there is a tit-for-tat relationship between the helpfulness rating and subsequent feedback, understanding these dynamics may help management ensure that employees are not penalized for low scores if they are the result of a “revenge review” or, in the opposite case, rewarded for high scores earned as the result of a quid pro quo. When managers understand how real-time feedback results impact feedback helpfulness ratings, they can more accurately determine the kinds of ratings initial givers desire and will find most beneficial.

Research has identified a reciprocal “tit-for-tat” relationship between digital feedback givers and receivers (Rivera et al., 2021c). In other words, when reviewers’ identities are known, receivers tend to reciprocate positive or constructive feedback in kind. Feedback recipients are also more likely to act on feedback they feel is accurate (Kinicki et al., 2004; Liden & Mitchell, 2017). However, it is unclear whether the feedback received affects subsequent ratings by the recipient. This information can inform managerial strategies for implementing and optimizing rate-the-feedback processes and help feedback application users understand how to interpret the data received. We ask:

**Research question 4.** How does feedback seeking affect the relationship between feedback results and the ratings of feedback helpfulness?

To better understand users’ feedback-seeking goals, we investigate how feedback seeking and its
subsequent feedback results affect future feedback-seeking behavior, and particularly, whether sought or unsolicited feedback received is associated with an increased likelihood that an employee will seek future feedback. One might expect that a user who receives unsolicited feedback, especially if it contains a low feedback score, would be less likely to seek feedback in the future. On the other hand, one might expect that users who seek feedback for performance improvement would be more likely to seek feedback in the future, even if they received a constructive feedback result, since a constructive review may motivate the feedback seeker to enhance their work competency to improve future feedback. Therefore, we ask:

**Research question 5. How do feedback results affect the likelihood of future feedback-seeking?**

To address these questions, we draw on a unique dataset of feedback, communicated through a real-time application and including both fulfilled feedback requests and unsolicited feedback. Specifically, we examine whether people who ask their supervisors, peers, or direct reports for feedback on their performance receive a higher or lower feedback score compared with those who do not directly seek feedback. We also examine the effects of feedback rating scores on future feedback behaviors. In addition to quantitative scores, we explore the likelihood of receiving qualitative, text-based comments and the comments’ length when solicited.

The following section reviews relevant literature to situate our study in the field of performance feedback management. Section 3 subsequently develops our research hypotheses. Section 4 then provides an overview of industry trends pertaining to digital real-time feedback and describes the specific performance feedback application used in this study. In Section 5, we describe our methodological approach and data collection procedures. Section 6 provides detailed summary statistics and regression results, with robustness checks detailed in Section 7. Finally, we conclude with a discussion and managerial implications in Section 8.

### 2. Literature Review

In this section, we situate our work with past studies in four areas of study relevant to our research: (i) feedback-seeking behaviors, (ii) feedback source credibility and anonymity, (iii) feedback ratings and responses, and (iv) future feedback activity. Table A.1 in Online Appendix A compares this study with the selected literature. We then utilize the insight from these past studies to generate our hypotheses in the following section.

#### 2.1 Feedback-Seeking Behaviors

While employee feedback is often routinized and initiated by supervisors, employees may also seek feedback from peers or supervisors when they feel ambivalent or want reassurance about their performance. It has been shown that feedback-seeking frequency is at least in part a reflection of personal and team traits. These “feedback inquiries” (Diamantidis & Chatzoglou, 2018) are positively correlated with emotional competence, team reflexivity, and task interdependence (Sung et al., 2019; Mittal et al., 2020). Interpersonal dynamics inform how often employees seek and receive feedback from their supervisors. Employees who have strong, positive relationships with their leaders are more likely to seek constructive feedback frequently, particularly
when they feel empowered in their role and have an “open channel” style of communication with their leaders (Auh et al., 2019). Employees in these environments are more likely to clearly understand their job expectations and tend to feel supported in their role (Chen et al., 2007). Notwithstanding, poorly performing employees or employees concerned they may receive constructive supervisor feedback may utilize certain feedback-seeking strategies to secure supporting and affirmative feedback rather than accurate feedback to preserve their self-esteem. This may cause supervisors to provide more positive feedback to avoid distress and opposition (Larson, 1989).

Previous studies explore the relationship between personal factors and whether employees seek out and act on feedback. Research suggests that individuals conduct a cost-benefit analysis before seeking performance appraisal from their supervisors (Qian et al., 2018), and leaders influence whether employees think of feedback-seeking as a high-benefit, low-cost behavior. Employees are more likely to seek feedback from supervisors with whom they maintain mutual respect and trust (VandeWalle et al., 2000) and who model feedback-seeking themselves (Qian et al., 2018). Employees motivated by learning goals are more likely to consider feedback-seeking as a high-benefit, low-cost behavior, making them more likely to seek and act on feedback (VandeWalle et al., 2000; Tuckey et al., 2002; Ghose et al., 2014). Likewise, proactive and highly self-regulatory individuals are also more likely to do both (De Stobbeleir et al., 2011). In contrast, reduced feedback-seeking behaviors are associated with ego-protection (Tuckey et al., 2002).

Feedback seeking is proactive, suggesting that employees who seek feedback may be more likely to use constructive and voluntary processes to improve procedures, such as feedback inquiry, problem prevention, and environmental scanning (Letmathe et al., 2012; Eccles et al., 2014). We borrow from this literature in understanding how feedback-seeking might affect feedback results. Additionally, these employees provide a voice that may lead to innovative modifications that improve the structure of standard procedures (Parker & Collins, 2010). These markers are also associated with credibility, feedback monitoring, innovation, and responsibility. A growing body of research identifies many positive outcomes when people seek performance feedback from others. These include higher compensation, better performance ratings, faster promotions, and more trusting relationships, among other benefits (Stone & Heen, 2015). Previous studies highlight that employees prefer appropriately delivered corrective feedback to general or vague positive feedback (Carli, 1990; Sagrestano, 1992; Zenger & Folkman, 2014). Providing feedback in real-time helps to overcome salience bias by delivering timely information regarding needed change (Tiefenbeck et al., 2018). However, previous research does not specify whether this correlation extends to requested feedback. Moreover, the literature does not address whether the relationship to the feedback seeker affects the likelihood that a reviewer leaves qualitative feedback or its length. Similarly, prior studies have found that less than half of large survey respondents provide write-in comments in employee-employer surveys (Borg & Zuell, 2012). Again, however, this research does not consider the likelihood or length of comments in a one-to-one assessment setting in
which an employee has directly requested feedback.

While the existing literature highlights how employee status contributes to feedback seeking, gaps exist around how the specific composition of the request influences the feedback received. These feedback-seeking behaviors may also interact with employee voice, i.e., their initiative to “take charge” via voluntary and constructive efforts to improve organizational procedures (Grant & Ashford, 2008). In doing so, the “voice” of the employee may lead to innovative suggestions and feedback that may not otherwise be vocalized, even when others disagree (Parker & Collins, 2010). From a theoretical perspective, we contribute to the Information Systems (IS) literature on feedback dynamics and, within this broader discipline, the role of feedback applications in organizations. Our exploration of specific technological affordances of the applications, seeking and rating feedback, provides important nuance to the field’s understanding of performance feedback behaviors. It is not clear how feedback score, comments, and future activity would be affected by seeking and rating feedback. Studies show that performance feedback is a widely accepted management practice associated with improved employee retention, engagement, and performance (c.f., Harter & Adkins, 2015; Manning, 2016; Porath, 2016; Zhang, 2017). While companies have turned to real-time feedback applications to improve the feedback process across the organizational hierarchy (Yohn, 2019), recent studies have focused on the impact of role, gender, and favoritism/retribution in the context of giving feedback (Rivera et al., 2021c), and how network embeddedness affects real-time performance according to positional (the position of an individual in the emerging network of performance ratings) and structural (the extent to which a person is entrenched in a network) relationships (Petryk et al., 2022).

To the best of our knowledge, however, this is the first study to focus on understanding the theoretical and practical dynamics of seeking and rating real-time feedback. The present study aims to expand this stream of research by examining the feedback implications of seeking and rating behaviors across a series of organizations. First, we find seeking feedback engenders a more constructive quantitative assessment, but it also invites a more contextualized qualitative evaluation of performance. The literature mostly focuses on how personal factors contribute to whether employees seek and act on feedback (e.g., Chen et al., 2007; Auh et al., 2019; Sung et al., 2019; Mittal et al., 2020). We extend the literature by showing feedback givers view the action of seeking feedback as a signal of self-motivation and a proactive search for ways to improve performance. Furthermore, we provide insight into how seeking and rating can affect feedback results and future activity, respectively.

2.2 Feedback Source Anonymity

Studies exploring the impact of feedback relationships have limited and conflicting results. Some studies suggest that peer and self-evaluative feedback carry more weight than supervisor feedback (Bastos & Fletcher, 1995; Hong et al., 2016), perhaps because employees value feedback they can more or less control (Hackman & Lawler, 1971; Ilgen et al., 1979). Other studies find that supervisor feedback increases job performance
more than peer and self-feedback (Becker & Klimoski, 1989), presumably because its source conveys authority or carries potential consequences if it is disregarded. Despite this lack of consensus, the feedback source appears to strongly impact how employees react to feedback (Halperin et al., 1976; Bannister, 1986; Podsakoff & Farh, 1986; Podsakoff & Farh, 1989; Steelman & Rutkowski, 2004). However, these studies did not explore how source anonymity may also affect feedback structure and composition.

Some employees opt to provide feedback anonymously to protect their privacy (Atwater et al., 2007) or because they are concerned that fully disclosed constructive feedback could lead to retribution (Waldman et al., 1998). Others provide fully disclosed feedback without fear of negative repercussions and see the benefits in revealing their identity as part of the feedback exchange (Machin & Jeffries, 2017). Research suggests that anonymous feedback is often constructive, as it tends to be more thorough than feedback given by a named rater (Bapna et al., 2016); however, because the source is unknown, anonymous feedback also tends to be less trusted by the recipient (Ghose et al., 2009).

Data on the impact of feedback source also offers conflicting results in academic settings. A meta-analysis of feedback indicates that feedback has a moderate effect on student learning, but the significant heterogeneity in the data shows that feedback cannot be understood as a single consistent treatment. A moderator analysis revealed that the information conveyed substantially influences the impact on the receiver (Wisniewski et al., 2020). Other studies indicate that peer assessment is more effective than no assessment or teacher assessment but has a similar effect to self-assessment (Raaijmakers et al., 2019). Self-given feedback, or self-regulated learning, has been shown to be effective, but monitoring judgments and control decisions must be accurate (Bjork et al., 2013; Panadero et al., 2017). As such, training self-regulated learning skills has been found to be effective for improving learners’ monitoring and control accuracy (Azevedo & Cromley, 2004; Kostons et al., 2012; Rolim et al., 2014; Bol et al., 2016). In terms of performance, an underlying component of the ability to process real-time feedback is the factor of learning. Organizational efficacy cannot be achieved if employees do not use effective knowledge management processes to ensure that they show organizational commitment and work engagement (Garud & Kumaraswamy, 2005; Mitchell, 2006).

Anonymity may reduce both the likelihood of providing comments and comment length. For instance, if the feedback giver does not feel like providing comments or wants to give shorter comments when their feedback is requested, they may choose to provide feedback anonymously to save face, which further supports the notion that seeking feedback facilitates constructive communication among colleagues (Yohn, 2019). This mechanism is consistent with findings (Fox et al., 2015; Rivera et al., 2021c) that anonymity negatively impacts real-time feedback in an application-based environment. Additionally, providing an option for anonymous feedback can also lead to a sense that it is not safe for employees to speak up in their work environment, making employees more resistant to giving any sort of feedback, anonymous or not (Detert & Burris, 2016). In some cases, critical anonymous feedback can lead to a witch hunt, whereby managers spend time figuring
out who said what, especially in instances where feedback involves sensitive issues, such as harassment, racism, or sexism.

Unlike previous work in the area of source anonymity (e.g., Halperin et al., 1976; Bannister, 1986; Podsakoff & Farh, 1986; Podsakoff & Farh, 1989; Steelman & Rutkowski, 2004), our study relies on feedback data spanning the organizational chart, including ratings given across various roles and identity disclosure. By observing feedback activities in the context of feedback providers who fully disclose themselves and those who choose to keep their identity obscured, we offer a more holistic view of performance to accounts for potential source effects related to anonymity. Our findings show that, irrespective of whether feedback is anonymous, seeking feedback facilitates constructive communication between employees, encouraging the feedback giver to provide a lower score, and give longer, detailed comments.

2.3 Feedback Ratings and Responses

While it seems clear from the literature that performance feedback is generally helpful, less research has been conducted on how employees assess or “rate” the feedback they receive. Instead, most research in this area focuses on changes in behavior or attitude following feedback, rather than directly addressing how employees evaluate the feedback they receive.

Research suggests that positive employee feedback improves engagement, retention, and performance (Harter & Adkins, 2015; Porath, 2016; Zhang, 2017), but the extent to which this may be true in practice is less clear. Research suggests that positive (i.e., behavior-reinforcing) feedback does not improve routine task performance (Waldersee & Luthans, 1994), whereas constructive (i.e., behavior-challenging) feedback is correlated with improved performance and outcomes (Hazucha et al., 1993; Fang & Weisner, 2019; Guo et al., 2014), even among poorly rated employees (Smither et al., 1995). Overly constructive feedback can lead to frustration, disappointment, and anger (Belschak & Den Hartog, 2009), as well as defensiveness, denial, and dissatisfaction (Ilgen et al., 1979; Ilgen et al., 1981; Podsakoff & Farh, 1989; London, 1997). These emotional effects can hinder an employee’s opportunities for performance improvement (Ilgen & Davis, 2000; Ilies et al., 2007). Constructive feedback is also seen as less reliable than positive feedback and is, therefore, less likely to be accepted (Ilgen et al., 1979; Fedor et al., 1989). Employees may use “feedback monitoring,” in which employees ask supervisors directly about their level of performance. This feedback is used to actively monitor their work environment, including the behavior of their peers and supervisors (Grant & Ashford, 2008; Parker & Collins, 2010). Employees may use productivity factors such as feedback to creatively solve problems and improve performance when dealing with unusual and complicated circumstances, as well as unpredictable and uncertain work situations (Ardalan et al., 1994; Smart et al., 2015; Diamantidis & Chatzoglou, 2018; Shan et al., 2022).

Formal performance feedback can impact employee attitudes, which can, in turn, impact performance. Employees rated “satisfactory” but not “outstanding” often experience a drop in organizational commitment.
after formal appraisals, which could have negative consequences for their organizations (Pearce & Porter, 1986). Geddes and Baron (1997) find that aggression is a common response to constructive workplace feedback, though it is typically passive, verbal, or indirect. Other negative effects include relational and emotional consequences as well as performance-related fallout. The performance feedback model predicts that employees are more likely to act on feedback if they consider it accurate (Ilgen et al., 1979). Kinicki et al. (2004) find a positive relationship between a feedback-rich environment and an employee’s likelihood to consider feedback accurate. Additionally, they find that perceptions of feedback accuracy correspond to the likelihood of an employee acting on the feedback. Yet, when it comes to feedback accuracy, assessments are rarely consistent across evaluators.

Though it is important to understand how employees receive and react to performance feedback, there is a clear gap in the literature concerning how employees rate the feedback they receive. Real-time feedback applications encourage recipients to communicate to colleagues whether their feedback has helped them, where feedback could be clearer, and how feedback can be more effective in the future (Schrage et al., 2019). Our study considers rating feedback an integral aspect of feedback in organizations and provides insights on feedback rating outcomes. By utilizing effective feedback implementation strategies, including emphasizing the importance of seeking and rating feedback, companies and managers can create a sustainable feedback culture that encourages continuous improvement, skill development, and growth-focused goal setting (Bharadwaj et al., 2013; Krishnamurthy et al., 2014; Yohn, 2019). The more beneficial receivers consider the information to be, the more effectively real-time feedback applications may foster employee growth and thus contribute to overall company success (O’Donovan et al., 2019).

Managers recognize that appropriately given feedback can be used to positively reshape behavior, and poorly given feedback can hinder improvement (Chappelow & McCauley, 2019). Offering constructive input on feedback can improve quality (London & Smither, 2002). However, employees may feel obligated to provide high scores for positive feedback and may punish constructive feedback with low scores (Itzchakov & Latham, 2020). Understanding the dynamics between helpfulness rating and subsequent feedback may help management ensure that employees are not penalized for low scores resulting from a “revenge review” or rewarded for high scores earned as the result of a quid pro quo. When managers understand how real-time feedback results impact feedback helpfulness ratings, they can more accurately determine the kind of ratings initial givers desire and find most beneficial. Managers can use this information to provide targeted training to associates about the best strategies for delivering effective feedback to reduce biased responses.

2.4 Subsequent Feedback Activity

Recent literature has examined employees’ feeling of social responsibility to sustain the future organizational environment. Psychological ownership describes the extent to which employees feel a sense of control over and ownership of their organization (Pierce et al., 2001; Jiang et al., 2019). The theory of psychological
ownership posits that behaviors that benefit the organization can lead to better overall performance and directly benefit employees and customers (Maignan et al., 1999). Pierce et al. (2001; 2003) posit that individuals who feel they have a measure of control, knowledge, and investment in their organization contribute to future organizational sustainability. These traits are also associated with leadership behaviors (Jiang et al., 2019; Zhang et al., 2021) and are reflected in feedback-seeking in the future. Furthermore, employees who seek empowering psychological ownership experience a greater sense of control over their work conditions (Zhang & Bartol, 2010). Therefore, some argue that it is possible to predict empowering leadership behaviors based on the extent to which one feels psychological ownership (Zhang & Bartol, 2010). Since an increased need for knowledge about the organization is key to seeking psychological ownership, it can also be argued that those who seek knowledge are more likely to participate in behaviors that convey a greater sense of social responsibility, contributing to pro-environmental behaviors even in the face of critical feedback (Smith & O’Sullivan, 2012). Employees who feel a greater sense of psychological ownership are more likely to behave more responsibly, exhibiting increased organizational citizenship behavior toward the environment (OCBE), which is vital to workplace performance (Jiang et al., 2019).

3. Hypotheses Development

Here we present a series of hypotheses corresponding to our research questions. First, we address (RQ1), which asks, “To what extent and how does seeking feedback impact real-time feedback scores and comment frequency and length?” Feedback givers view the action of seeking feedback as a signal of self-motivation and a proactive search for ways to improve performance (Beenen et al., 2017; Gong et al., 2019). As such, feedback givers may provide lower numeric feedback scores to remind feedback receivers there is still room for improvement. In some cases, employees may seek feedback proactively because they recognize their recent performance as poor and want to avoid getting a constructive review later (Krasman, 2011). Overall, feedback seekers may have high-self efficacy and therefore be less likely to perceive constructive feedback as a threat than those with low self-efficacy who have more fragile egos (Sherf & Morrison, 2019). It might follow, then, that employees who seek feedback are more likely to receive constructive scores than high scores. In addition to quantitative scores, we investigate qualitative feedback in the form of comments that give the receiver context related to the area(s) of assessed performance. We explore the relationship between feedback seeking and the likelihood of receiving text-based comments and the length of those comments. We hypothesize:

**Hypothesis 1:** Feedback seeking decreases resulting quantitative scores but increases the likelihood of receiving comments and comment length.

Mitigating employee disengagement from feedback mechanisms is an ongoing concern for researchers and organizational leaders. It is possible that seeking feedback could enhance constructive communication among colleagues (Ashford et al., 2003). Some feedback givers may view the action of seeking feedback as a signal.
of self-motivation, which could improve their appraisal of the feedback seeker. Others may feel complimented by the request, as it signals that the would-be recipient values their input. Thus, feedback givers may be willing to put more thought and effort into delivering thorough and lengthy comments describing their perception of the seekers’ performance capacity to help their colleagues improve (Jawahar, 2006). To confirm the mechanism at work, we use natural language processing to explore (RQ2), which asks, “What is the effect of feedback seeking on comment sentiment and subjectivity?” If feedback givers view feedback seeking as a positive indicator of self-motivation, then they will aim to encourage colleagues to improve and achieve their best work performance. Feedback givers should want to let seekers know what they are doing well so they can continue those behaviors (Porter, 2019). By providing insight into what a feedback seeker does not need to improve, feedback givers help their colleagues identify the skills and situations where they need to put their attention and energy. Therefore, feedback-seeking should be associated with more positive, encouraging, and subjective comments. Furthermore, the act of seeking feedback demonstrates to the feedback giver that the recipient is likely to put their feedback into practice. Therefore, we hypothesize the following:

**Hypothesis 2:** Feedback seeking improves textual sentiment and subjectivity of comments received.

To assess (RQ3), “How does anonymity in response to feedback-seeking impact real-time feedback results?” we explore the dynamic between anonymous and attributed feedback. These distinctions may help managers interpret real-time feedback results more clearly and gain insight to coach employees regarding best feedback practices. Our third research hypothesis addresses the potential impact of anonymity on feedback-seeking and results:

**Hypothesis 3:** Anonymity leads to lower feedback scores and decreases the impact of feedback seeking on the likelihood of receiving comments, the length of comments, and the subjectivity of comments.

Our (RQ4), “How do real-time feedback results impact ratings of feedback helpfulness?” is concerned with understanding whether feedback ratings can be biased by results; one might expect that feedback receivers who did not seek feedback prefer a higher feedback score and would, therefore, reward positive feedback givers with a higher rating score (Itzchakov & Latham, 2020). On the other hand, one might expect that feedback receivers who sought feedback care less about the high feedback score received because they are seeking feedback specifically to improve their performance (London & Smither, 2002). This may be reflected in the rating score they provide to the feedback givers. Because feedback seekers intend to use feedback for self-improvement, they are less sensitive to the feedback score received and are more likely to rate feedback higher if it is helpful than if it has a positive sentiment. Therefore, we hypothesize:

**Hypothesis 4:** The positive relationship between feedback score and rating score is less pronounced when users seek feedback.

How employees adjust feedback-seeking behaviors after receiving low feedback ratings, explored in (RQ5: “How do feedback results affect the likelihood of future feedback-seeking?”), could reflect the extent to which
employees display leadership behaviors as defined within the psychological ownership model. Specifically, employees with greater psychological ownership are more interested in providing feedback that may assist in building future knowledge; this knowledge benefits the employee’s inherent interest in gaining knowledge about the target organization, as well as their motives to participate in behaviors that contribute to a sense of social responsibility in the future (Smith & O’Sullivan, 2012). Therefore, while employees who have higher psychological ownership may be more likely to seek feedback, employees with lower psychological ownership may not be motivated by attaining a sense of control and knowledge about the target organization (Jiang et al., 2019). Thus, it is argued that employees with low psychological ownership will not leverage environmental control to further welcome new knowledge, such as critical feedback. Additionally, those with low psychological ownership may not feel a sense of responsibility to invest in the organization’s future performance compared to those with high psychological ownership in the face of critical feedback; in other words, those who do not seek feedback and receive low scores are likely to be discouraged from seeking future feedback while those seek feedback and receive low scores will be motivated to improve performance and then seek further feedback to establish growth. We hypothesize:

**Hypothesis 5:** Low feedback scores are associated with reduced future feedback seeking among those who did not seek feedback and increased future feedback seeking among those who did.

4. Industry Practices and DevelapMe Overview

Our study explores real-time feedback dynamics using data obtained from DevelapMe, a real-time feedback application.¹ DevelapMe enables competency-based, real-time employee performance feedback for individual users and organizations. Developed by Petrucci et al. (2016) to assess student project teams (Santos, 2017), DevelapMe is now used predominantly in industry and is commercially available. To date, DevelapMe has been used by several small, midsize, and large organizations, including a number of Fortune 500 companies.

DevelapMe contracts with client organizations to set up customized implementations based on each organization’s feedback needs. Clients choose specific employee competencies to measure, such as accountability, listening skills, and trust. These competencies are included as evaluation items for all employees at that organization who provide feedback through the application. Evaluation items are measured on a sliding scale from one to five, with one being the lowest possible score for each item and five being the highest. Depending on the client’s needs, other items can be included, such as progress on goals and comment boxes for users to volunteer text-based comments. Most customizations allow for feedback on approximately 20 items, with two to three items comprising a competency area. The application tracks progress in these areas over time; each time a user sends or receives feedback, that information is compiled with previous ratings.

¹ See [https://www.develapme.com/](https://www.develapme.com/). An overview of the app, including an overview video, is available at [https://www.develapme.com/products](https://www.develapme.com/products).
Users can view real-time scores on each competency by accessing their in-application scorecard. The data is aggregated and tracked over time on an organizational chart available for review by senior management.

To introduce DevelapMe to an organization, administrators import employee lists into the application. Employees access the application on their laptops, smartphones, or other compatible devices and use it to provide, request, and receive real-time, competency-based feedback to and from supervisors, peers, and direct reports. An individual user opens the application on their device and taps the “Give Feedback” icon (see Online Appendix Figure A.1). The user selects a particular individual from the employee list and then selects whether they would like to provide feedback to or seek feedback from that person. When seeking feedback, the users seek general feedback on their work performance. To request feedback, a user could opt to either use a default message (“What do I do well and what can I do better?”) or a customized message. The feedback-seeking requests are general without specifying competency types. The feedback seeker needs to provide his or her user information such as name, work group, job position, and company. When giving feedback, the responders can observe all the above information provided by feedback seeker. However, when giving feedback, the responders have the option to either disclose his or her identifying information or provide the feedback anonymously. When providing feedback, the employee will rate the chosen individual on a one to five sliding scale for each work competency-related item. One feedback instance only evaluates a single competency of a user, e.g., accountability. The feedback giver needs to initiate another feedback instance to evaluate another competency, e.g., group facilitation, of the same feedback receiver. The feedback giver can also enter optional text-based comments for each item along with a numerical feedback score. Feedback seekers receive feedback from individuals who were either sought (solicited) or not sought (unsolicited) for feedback.

5. Methodology and Data Description

The data set analyzed in this study contains real-time feedback information from DevelapMe application users at four major organizations in the airline, healthcare, education, and financial industries. Participating organizations were recruited from current DevelapMe clients who indicated an interest in using real-time feedback to enhance employee communication exchanges regarding work competencies and performance.

The data used in this study were collected between April 10, 2018, and March 9, 2019, and include 10,981 unique feedback instances from 416 distinct employees. The unit of analysis in this study is a single instance of feedback; that is, the behavior that User X gives feedback to User Y at a specific point in time. Feedback is given person to person; individuals can provide feedback to or receive feedback from an individual several times, resulting in multiple distinct units for analysis. The feedback giver can simultaneously be a feedback receiver because the feedback can be bi-directional and is exchanged in real-time. Each employee received an

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2 Names of these organizations are not disclosed because of the confidentiality agreement.
average of 26.4 instances of feedback.

This study analyzed multiple aspects of the data, including feedback scores, feedback comments, feedback-seeking behavior, messages used to seek feedback, participants’ job positions, and the frequency of feedback-seeking and giving behaviors. Detailed definitions and variable descriptions for the data set are provided in Table 1. Summary statistics of variables for the full sample, including the total number of observations, mean, standard deviation, minimum value, and maximum value of each variable, are listed in the Online Appendix Table A.2.

**Table 1. Variable Definitions**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anonymous</td>
<td>A binary variable indicating whether feedback is given anonymously; 0 is no, 1 is yes</td>
</tr>
<tr>
<td>Average feedback score given</td>
<td>The average score of a batch of feedback given by a user as a feedback provider</td>
</tr>
<tr>
<td>Average feedback score received</td>
<td>The average score of a batch of feedback received by a user as a feedback receiver</td>
</tr>
<tr>
<td>Feedback comment character length</td>
<td>Number of characters in the comment</td>
</tr>
<tr>
<td>Feedback comment length</td>
<td>Logarithm of (number of comment characters + 1)</td>
</tr>
<tr>
<td>Feedback comment sentiment</td>
<td>A continuous variable ranging between -1 and 1; value closer to -1 indicates negative comment sentiment, and value closer to 1 indicates positive sentiment</td>
</tr>
<tr>
<td>Feedback comment subjectivity</td>
<td>A continuous variable ranging between 0 and 1; value closer to 0 indicates less subjective, and value closer to 1 indicates more subjective</td>
</tr>
<tr>
<td>Feedback giver job position</td>
<td>A discrete variable assigning different values to different job positions of feedback givers</td>
</tr>
<tr>
<td>Feedback giver people</td>
<td>Total number of distinct people who have sought feedback from this feedback giver</td>
</tr>
<tr>
<td>Feedback giver times</td>
<td>Total number of times that people have sought feedback from this feedback giver</td>
</tr>
<tr>
<td>Feedback receiver job position</td>
<td>A discrete variable assigning different values to different job positions of feedback receivers</td>
</tr>
<tr>
<td>Feedback receiver people</td>
<td>Total number of people from whom this feedback receiver has sought feedback</td>
</tr>
<tr>
<td>Feedback receiver times</td>
<td>Total number of times this feedback receiver has sought feedback</td>
</tr>
<tr>
<td>Feedback score</td>
<td>Score chosen by feedback giver for receiver in the first round, evaluating receiver on one specified competency; 5 is the best, 1 is the worst</td>
</tr>
<tr>
<td>Feedback with comment</td>
<td>A binary variable indicating whether feedback giver provides comments with score; 0 is no, 1 is yes</td>
</tr>
<tr>
<td>Having feedback loops</td>
<td>A binary variable indicating whether there exist multiple rounds of feedback instances between a pair of users; 0 is no, 1 is yes</td>
</tr>
<tr>
<td>Giving feedback</td>
<td>A binary variable indicating whether a user provides feedback after this user receives feedback; 0 is no, 1 is yes</td>
</tr>
<tr>
<td>Network</td>
<td>A continuous variable ranging between 0 and 1; value closer to 0 indicates a lower degree of user’s positional embeddedness calculated as the eigenvector centrality, and value closer to 1 indicates a higher degree of positional embeddedness</td>
</tr>
<tr>
<td>Number of feedback loops</td>
<td>Total number of rounds of feedback instances between a pair of users</td>
</tr>
<tr>
<td>Peer to peer</td>
<td>A binary variable indicating whether feedback is given between users who are at the same level of job positions; 0 is no, 1 is yes</td>
</tr>
<tr>
<td>Rating score</td>
<td>Feedback rating score given by feedback receiver (i.e., rating giver) for the second round; 5 is the best, 1 is the worst</td>
</tr>
<tr>
<td>Seeking feedback</td>
<td>A binary variable indicating whether the person requested the feedback; 0 is no, 1 is yes</td>
</tr>
<tr>
<td>Subordinate to supervisor</td>
<td>A binary variable indicating whether feedback is given from subordinate to supervisor based on job positions; 0 is no, 1 is yes</td>
</tr>
<tr>
<td>Supervisor to subordinate</td>
<td>A binary variable indicating whether feedback is given from supervisor to subordinate based on job positions; 0 is no, 1 is yes</td>
</tr>
<tr>
<td>Tailored specific</td>
<td>A binary variable indicating whether seeking is through a tailored message; 0 is no, 1 is yes</td>
</tr>
<tr>
<td>Training</td>
<td>A binary variable indicating whether the person received training on seeking feedback</td>
</tr>
<tr>
<td>Unwanted feedback</td>
<td>A binary variable indicating whether the feedback received is unwanted; 0 is no, 1 is yes</td>
</tr>
</tbody>
</table>

Individuals at each study site used the DevelapMe application to provide one-to-one performance-related feedback to fellow employees. This real-time feedback included required numerical performance scores and
optional comments related to various competencies, such as efficiency, accuracy, group facilitation, social and emotional intelligence, etc. Scores for each item ranged from the 1 (lowest score possible) to 5 (highest). As seen in Table A.2, the average feedback score was 4.275 out of 5.

We measure feedback comment dimensions using several variables, including whether or not comments were provided (as comments are optional), comment length, comment sentiment, and comment subjectivity. We use a binary variable indicating whether the feedback giver provided comments along with their feedback score. To measure comment length, we count the number of characters in the comment and utilize the logarithm of number of comment characters plus one. To analyze comments for textual sentiment and subjectivity, we conduct natural language processing utilizing TextBlob, a Python sentiment analysis package. We measure comment sentiment with a value ranging from -1 to 1; a value closer to -1 indicates negative sentiment, and a value closer to 1 indicates positive sentiment.

We also measure comment subjectivity using a value that ranges between 0 and 1, with a value closer to 0 to indicate a comment is less subjective and a value closer to 1 to indicate it is more. Table A.2 shows that the average likelihood of a user providing a comment in an instance of feedback is 0.602, meaning that 60.2% of 10,981 feedback instances included comments. Hence, the number of observations for comment sentiment and comment subjectivity is 6,608 (= 0.602 × 10,981). The mean comment length was approximately 125 characters, with a minimum value of 0 and a maximum value of 1,886. We discuss the potential outlier and censoring issues of comment variables and provide solutions in the robustness check section (Section 6).

In addition, we create several binary variables to measure feedback-seeking and giving behaviors. Among 10,981 feedback instances, 28.1% of feedback was given after a colleague sought it. To request feedback, a user could opt to either use a default message (“What do I do well and what can I do better?”) or a customized message. The feedback-seeking requests are general without specifying competency types. Firms that had provided training on encouraging employees to seek feedback accounted for 82.7% of feedback instances. We also observed that 4.4% of feedback was given anonymously.

To control for the sensitivity of feedback-seeking, we measure how frequently each feedback receiver sought feedback and how often each giver provided feedback. We create variables to represent the number of distinct people who sought feedback from a specific feedback giver and the number of times they sought it. We also create variables to measure the number of people from whom this feedback receiver has sought feedback and the number of times it was requested.

6. Empirical Analysis and Results

Our empirical studies investigate the research hypotheses proposed in Section 3: (H1) Feedback seeking decreases resulting quantitative scores but increases the likelihood of receiving comments and comment length; (H2) Feedback seeking improves textual sentiment and subjectivity of comments received; (H3) Anonymity
leads to lower feedback scores and decreases the impact of feedback seeking on the likelihood of receiving comments, the length of comments, and the subjectivity of comments; (H4) The positive relationship between feedback score and rating score is less pronounced when users seek feedback; (H5) Low feedback scores are associated with reduced future feedback seeking among those who did not seek feedback and increased future feedback seeking among those who did.

6.1 The Effect of Seeking on Feedback Results

To empirically analyze the impact of feedback-seeking on feedback results, we conduct baseline regressions as shown in equation 1 for the full sample. Each unit of observation in this study is a single instance of feedback in which a feedback giver evaluates a feedback receiver on a certain competency, such as professionalism, collaboration, leadership, etc. The subscript $i$ of the regression variables indexes the feedback giver, $j$ indexes the feedback receiver, $k$ indexes the competency about which the feedback is evaluating, and $t$ indexes the time period when the feedback instance happens.

(1) FeedbackResults_{ijkt} = \beta_0 + \beta_1 \text{SeekingFeedback}_{ijkt} + \beta_2 \text{TailoredSpecific}_{ijkt} + \beta_3 \text{FeedbackGiverJobPosition}_{ijkt} \\
+ \beta_4 \text{FeedbackReceiverJobPosition}_{ijkt} + \beta_5 \text{FeedbackGiverPeople}_{ijkt} + \beta_6 \text{FeedbackGiverTimes}_{ijkt} \\
+ \beta_7 \text{FeedbackReceiverPeople}_{ijkt} + \beta_8 \text{FeedbackReceiverTimes}_{ijkt} + \theta_i + \delta_j + \gamma_k + \mu_t + \epsilon_{ijkt}

Dependent variables include various measures of feedback results, such as numeric feedback scores, whether a feedback giver provided comments, and a logarithm of the number of comment characters. Due to the binary nature of whether a feedback giver provided comments, we apply a probit regression to model dichotomous dependent variables. Regressions with other dependent variables are conducted via an ordinary least squares approach. We include control variables, such as the specific job positions of the feedback giver and feedback receiver, and the sensitivity of the feedback giver measured by how frequently an individual seeks their feedback. These variables are time-variant. For example, feedback giver and receiver’s job positions could change for different feedback instances during the sample period of the study.

To make our tests more rigorous, we add individual fixed effects, where $\theta_i$ represents the individual feedback giver fixed effects, and $\delta_j$ represents the individual feedback receiver fixed effects. The individual fixed effects allow us to examine the effects of seeking feedback results among each feedback giver and each feedback receiver. We also include the competency fixed effect, represented by $\gamma_k$, to study the effects of seeking feedback within each type of competency. In addition, users may have different feedback behaviors when close to the year-end assessment. We create time dummy variables to represent whether the feedback instance happens during the year-end assessment period of each firm and add the assessment period fixed effects in the regressions represented by $\mu_t$.

We cluster the standard errors at the work group level to deal with heteroscedasticity, considering that the
workplace culture within a work group could influence the feedback behaviors and the feedback outcome within each work group may not be independent. Alternatively, we also cluster the standard errors at the firm level as a robustness check and find similar results.

Table 2 displays the effects of seeking feedback on various measures of real-time feedback results for the full sample. The p-values in parentheses are corrected for heteroscedasticity by clustering at the work group level. Regression results in columns (1) – (3) in Table 2 show that seeking feedback decreases the feedback score, increases the likelihood of receiving comments, and increases the length of comments received, which is measured by the logarithm of the number of comment characters. The regression coefficients are all significant at the 1% level, with p-values less than 0.01.

**Table 2. Impact of Seeking on Feedback Results**

<table>
<thead>
<tr>
<th></th>
<th>Feedback score</th>
<th>Feedback with comment</th>
<th>Feedback comment length</th>
<th>Feedback comment sentiment</th>
<th>Feedback comment subjectivity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OLS</td>
<td>Probit</td>
<td>OLS</td>
<td>OLS</td>
<td>OLS</td>
</tr>
<tr>
<td>Seeking feedback</td>
<td>-0.143***</td>
<td>0.956***</td>
<td>0.789***</td>
<td>0.028***</td>
<td>0.140***</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.001)</td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.008)</td>
</tr>
<tr>
<td>Tailored specific</td>
<td>-0.226**</td>
<td>-0.706**</td>
<td>-0.437**</td>
<td>-0.049</td>
<td>-0.092</td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.040)</td>
<td>(0.012)</td>
<td>(0.355)</td>
<td>(0.122)</td>
</tr>
<tr>
<td>Feedback giver job position</td>
<td>-0.012</td>
<td>-0.101***</td>
<td>-0.075***</td>
<td>0.003</td>
<td>0.013**</td>
</tr>
<tr>
<td></td>
<td>(0.157)</td>
<td>(0.003)</td>
<td>(0.000)</td>
<td>(0.225)</td>
<td>(0.024)</td>
</tr>
<tr>
<td>Feedback receiver job position</td>
<td>0.001</td>
<td>0.016</td>
<td>0.004</td>
<td>0.002</td>
<td>-0.005</td>
</tr>
<tr>
<td></td>
<td>(0.791)</td>
<td>(0.189)</td>
<td>(0.733)</td>
<td>(0.653)</td>
<td>(0.272)</td>
</tr>
<tr>
<td>Feedback giver people</td>
<td>0.256*</td>
<td>-1.726*</td>
<td>2.352***</td>
<td>0.282</td>
<td>1.000***</td>
</tr>
<tr>
<td></td>
<td>(0.095)</td>
<td>(0.079)</td>
<td>(0.005)</td>
<td>(0.106)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Feedback giver times</td>
<td>-0.024</td>
<td>1.260**</td>
<td>-1.943***</td>
<td>-0.225</td>
<td>-0.840***</td>
</tr>
<tr>
<td></td>
<td>(0.852)</td>
<td>(0.019)</td>
<td>(0.003)</td>
<td>(0.111)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Feedback receiver people</td>
<td>-0.024</td>
<td>0.196***</td>
<td>0.006</td>
<td>0.066***</td>
<td>0.149***</td>
</tr>
<tr>
<td></td>
<td>(0.142)</td>
<td>(0.009)</td>
<td>(0.916)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Feedback receiver times</td>
<td>0.027**</td>
<td>-0.196***</td>
<td>-0.040</td>
<td>-0.038***</td>
<td>-0.086***</td>
</tr>
<tr>
<td></td>
<td>(0.020)</td>
<td>(0.002)</td>
<td>(0.342)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Constant</td>
<td>3.523***</td>
<td>1.128</td>
<td>11.537***</td>
<td>0.687</td>
<td>2.772***</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.381)</td>
<td>(0.000)</td>
<td>(0.145)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Feedback giver fixed effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Feedback receiver fixed effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Competency fixed effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Assessment period fixed effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Observations</td>
<td>10,981</td>
<td>10,981</td>
<td>10,981</td>
<td>6,608</td>
<td>6,608</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.426</td>
<td>0.357</td>
<td>0.495</td>
<td>0.186</td>
<td>0.183</td>
</tr>
</tbody>
</table>

Note: *10% significance, ** 5% significance, and *** 1% significance. The p-values are listed in parentheses and the standard errors are corrected by clustering at the work group level.

We also notice that one of the dependent variables, feedback comment length, which counts the number of characters in the comments, has potential outlier and left-censoring issues. To rule out the possibility of
statistical bias caused by these issues, we conduct several robustness checks in Section 6, such as applying the tobit model and winsorizing data, to empirically confirm our findings.

Regarding hypotheses (H1), these findings illustrate that feedback seeking decreases the score received, increases the likelihood of receiving comments, and increases the length of comments received. One possible mechanism behind these results could be that feedback givers view the action of seeking feedback as a proactive search for ways to improve performance, thereby signaling self-motivation (Beenen et al., 2017; Gong et al., 2019). Feedback givers provide lower numeric feedback scores to remind feedback receivers there is still room for improvement. When a colleague proactively seeks feedback from them, feedback givers are more willing to spend time writing longer comments to help their colleague improve.

We evaluate and confirm the above-mentioned mechanism for (H2) using natural language processing and textual analysis to numerically measure feedback comments’ sentiment and subjectivity. The results of regressions (4) and (5) in Table 2 show that seeking feedback is associated with significantly increased comment sentiment (meaning more positive and encouraging comments) and comment subjectivity (meaning more subjective and personal comments). The mechanism that seeking feedback enhances constructive communication among colleagues is supported by our findings on the effect of seeking feedback on comment sentiment and subjectivity. The empirical results show that feedback-seeking is associated with more positive comments and more subjective comments, indicating that feedback givers use more encouraging and personal language in feedback comments to motivate colleagues to improve and achieve success at work.

The results for (H1) and (H2) support the mechanism that feedback givers view the action of seeking feedback as signaling self-motivation and a proactive search for ways to improve performance, showing that seeking feedback enhances constructive communication among colleagues. Our findings provide evidence for managers that seeking feedback engenders a more constructive quantitative assessment but also invite a more contextualized qualitative evaluation of performance. Thus, because these findings alleviate the concern for falsely positive assessments and replace it with confidence that others can play a role in identifying areas of improvement. Managers should foster more seeking activity across feedback providers.

6.2 Robustness Check for Endogeneity

With feedback giver fixed effects, feedback receiver fixed effects, competency fixed effects and assessment-period fixed effects, Table 2 shows that the act of seeking feedback decreases the score received but increases the likelihood, length, sentiment, and subjectivity of comments. However, endogeneity problems caused by omitted variables and reverse causality could still exist and statistically bias the results. For example, it is possible that the omitted variables related to the unobservable characteristics of feedback givers and feedback receivers could simultaneously affect the decision of seeking feedback and the feedback results, leading to a self-selection bias (Rivera et al., 2021a; Rivera et al., 2021b; Rivera et al., 2021c). It is also likely that
employees who complete a complex task with outstanding work performance tend to seek feedback to ensure their performance is noticed by supervisors, resulting in reverse causality and hence endogeneity problems (Katou, 2012). Therefore, we apply three approaches to reduce the statistical bias caused by the potential endogeneity problem, namely the instrumental variable approach, the exact value matching approach, and the Heckman-type approach.

6.2.1 Instrumental Variable Approach

To alleviate the endogeneity concerns, we first apply the instrumental variable and two-stage least squares approach, following the literature (e.g., Roberts & Whited, 2013; Bollmann et al., 2019; Jiang et al., 2021). According to Roberts and Whited (2013), the variation in the endogenous regressor can be divided into two parts: the part that is uncorrelated with the error term (“good” variation) and the part that is correlated with the error term (“bad” variation, which causes the endogeneity problem). The instrumental variable and the two-stage least squares regression should extract the “good” variation and disregard the “bad” variation.

The instrumental variable used in our study is Training, a binary variable indicating whether the feedback receiver participated in a training provided by the DevelapMe team that focuses on encouraging feedback-seeking behavior. Users do not choose to receive training of their own volition; instead, the DevelapMe team selected one firm at random from its participating clients to which they would provide the training. Figure A.2. in Online Appendix A highlights sample training materials.

The training introduces the functions of the DevelapMe app and encourages users to seek feedback. The relevance condition of instrumental variable is statistically tested in the first stage of two-stage least squares regressions. The results of regression (1) in the Online Appendix Table A.3 show that the instrumental variable, Training, and the endogenous variable of interest, Seeking feedback, have a significantly positive relationship. We would like to note that in our dataset, 14.9% of non-trained users seek feedback, while 30.8% of trained users seek feedback. Therefore, the training is effective in motivating users to proactively seek feedback, so the relevance condition of our instrumental variable is satisfied. On the other hand, the training does not affect feedback results directly. As a point of specific emphasis, the training does not instruct users whether they should give higher scores or provide longer comments. Even if the exclusion condition for the instrumental variable is not statistically testable because of the unobservable factors in the residual, we argue that our instrumental variable, Training, helps to reduce the endogeneity concerns to a certain degree.

The results of the second stage of two-stage least squares regressions are listed in columns (2) – (6) in Table A.3. In the second stage, we run the regression of the dependent variables of feedback results on the instrumented key variable of interest, Seeking feedback (Instrumented), which is the fitted value of the dependent variable from the first stage. The second stage of the two-stage least squares regressions show similar results as the baseline regressions, confirming that seeking feedback is associated with a decrease in feedback score, an increase in the likelihood of receiving comments, an increase in the length of comments,
and an increase in the textual sentiment and subjectivity of comments. The regression coefficients of the second stage of the two-stage least squares regressions are all significant at the 1% level, with very low p-values close to zero.

We also conduct the weak instrument test and find that the Cragg-Donald Wald F-statistic is 73.139, which is greater than the critical value of 16.38, provided by Stock and Yogo (2005). Thus, it is statistically confirmed that our instrument, Training, is not a weak instrument.

6.2.2 One-to-One Exact Value Matching Approach

In addition to the instrumental variable approach, we add the one-to-one exact value matching approach as an additional method to reduce endogeneity concerns for our baseline regressions: the effect of seeking feedback on feedback results. Exact value matching is a nonparametric matching method that allows for balance between the treatment group and the control group by the exact values of background variables and thereby control the error in treatment effect estimates (Blackwell et al., 2009).

We match the treatment group (i.e., feedback instances with the request of feedback) and the control group (i.e., feedback instances without the request of feedback) based on the exact values of seven background variables: namely Company, Feedback giver job position, Feedback receiver job position, Feedback giver people (i.e., total number of distinct people who have sought feedback from this feedback giver), Feedback giver times (i.e., total number of times that people have sought feedback from this feedback giver), Feedback receiver people (i.e., total number of people from whom this feedback receiver has sought feedback) and Feedback receiver times (i.e., total number of times this feedback receiver has sought feedback). It is a one-to-one exact matching without replacement of observations.

To ensure that the exact matching between the treatment group and the control group is successful, we check the data balance before and after matching by using t-tests on the continuous variables, namely Feedback giver people, Feedback giver times, Feedback receiver people, and Feedback receiver times. The null hypothesis of the t-tests is that the means of background variables in the treatment group and the control group are the same, and the alternative hypothesis is that the means are different. The results of the t-tests in the Online Appendix Table A.4 show that the mean values of these continuous background variables in the treatment group are significantly different from the mean values of those variables in the control group. After the one-to-one exact value matching, the means of these continuous background variables are the same between the treatment group and the control group, and the differences are all reduced to zero, indicating that the one-to-one exact value matching is successful.

With the rigorous matching approach, the matched sample is much smaller than the full sample, which is reduced from 10,981 to 512. However, the regression results of the matched sample (see the Online Appendix Table A.5) are similar to those of the full sample, confirming that seeking feedback decreases the feedback score, increases the likelihood, the length, the sentiment, and the subjectivity of comments received.
6.2.3 Heckman-Type Approach

As discussed earlier, the selection issue of seeking feedback may bias our estimation. To make our main findings more robust, we follow Brown and Mergoupis (2010) and Rivera et al. (2021c) to consider a Heckman-type approach to alleviate the endogeneity problem by modeling the feedback-seeking selection mechanism. We estimate the selection process using the probit model with variables that have prediction power for users to seek feedback, such as Training, and generate the Inverse Mills Ratio (IMR).

We then re-estimate our baseline regression (i.e., the outcome equation) by including the inverse Mills ratio. The inclusion of the inverse Mills ratio in the outcome equation yields a consistent estimate of the variable of interest (Puhani, 2000), which is Seeking feedback in our study. With the inverse Mills ratio included in our baseline regression, we find that our main findings continue to hold (see the Online Appendix Table A.6). We confirm that the action of feedback seeking is associated with a lower feedback score, a higher likelihood of receiving comments, longer comments, more positive and more subjective comments.

6.3 The Effect of Anonymity Interaction on Feedback Results

To assess (H3) on the effect of anonymity on feedback results, we add a binary variable Anonymous and its interaction with seeking feedback into the regressions. The binary variable Anonymous indicates whether feedback is given anonymously. A value of 0 indicates “no,” and a value of 1 indicates “yes.”

(2) FeedbackResults\textsubscript{ijkt} = β_0 + β_1SeekingFeedback\textsubscript{ijkt} + β_2TailoredSpecific\textsubscript{ijkt} + β_3Anonymous\textsubscript{ijkt}
+ β_4SeekingFeedback\textsubscript{ijkt} × Anonymous\textsubscript{ijkt} + β_5FeedbackGiverJobPosition\textsubscript{ijkt}
+ β_6FeedbackReceiverJobPosition\textsubscript{ijkt} + β_7FeedbackGiverPeople\textsubscript{ijkt} + β_8FeedbackGiverTimes\textsubscript{ijkt}
+ β_9FeedbackReceiverPeople\textsubscript{ijkt} + β_{10}FeedbackReceiverTimes\textsubscript{ijkt} + \theta_i + \delta_j + \gamma_k + \mu_t + e_{ijkt}

For the full sample results shown in Table 3, we find that when a feedback giver discloses their identity, feedback-seeking is associated with a lower feedback score, a higher likelihood of receiving comments, and comments with longer length, more positive sentiment, and higher subjectivity (with regression coefficients of -0.140, 1.088, 0.826, 0.029, and 0.148, respectively), which are similar to the results of our baseline regressions shown in Table 2. When a feedback giver provides feedback anonymously, the regression coefficients for the regressions in columns (1), (2), (3), and (5) of Table 3 are changed into -0.375 (= -0.140 – 0.235), -0.020 (= 1.088 – 1.108), 0.001 (= 0.826 – 0.825) and -0.237 (= 0.148 – 0.385), respectively.

For (H3), we find that when a feedback giver provides feedback anonymously, seeking feedback is associated with a lower score, a lower chance of receiving comments and comments with shorter length and lower subjectivity, compared to situations when a feedback giver provides feedback with their identity disclosed. This indicates the mechanism that seeking feedback facilitates constructive communication among colleagues because it encourages the feedback giver to give comments and give longer and more subjective
If the feedback giver provides shorter comments or does not provide any comments to the feedback seeker, they will likely provide the feedback anonymously to save face. Feedback givers prefer to hide their identity and provide feedback anonymously to avoid reprisal when giving lower scores. This mechanism is consistent with the literature (Rivera et al., 2021c; Fox et al., 2015), which largely finds that anonymity negatively impacts real-time feedback in an application-based environment. Anonymity transfers repeated interactions between feedback giver and receiver into a one-shot game, resulting in a less “cooperative” outcome. However, it is important for managers to understand that the full impact of feedback is diminished due to providing less context. As a result, managers can actively coach associates to provide fully disclosed feedback as often as possible when appropriate. Therefore, we find the supporting evidence for the mechanism that seeking
feedback facilitates constructive communication between employees, as it encourages the feedback givers to give comments and give longer comments. If the feedback givers do not feel like delivering comments or writing long comments when they are sought out for feedback, they will provide the feedback anonymously.

### 6.4 Impact of Feedback Results on Rating Results

One advantage of a real-time, application-based feedback environment is that it enables repeated interactions (Rivera et al., 2021c). In the second round, feedback receivers have the option to rate the received feedback for its helpfulness; these ratings are denoted as “rating” results in our paper to be distinguished from the feedback results in the first round. We investigate how feedback scores and comments received in the first round affect these second-round rate-the-feedback results. The rating results can help reveal the mentality of feedback receivers and understand their incentives for seeking feedback.

The dependent variable is the rating score provided by feedback receivers. We add two interaction terms between the feedback results and seeking feedback to analyze the rating behaviors of feedback seekers. The regression results in Table 4 show that feedback receivers who did not seek feedback prefer receiving a higher score and rate the feedback 0.179 points higher when the feedback score received is increased by 1 point. However, the feedback receivers who sought feedback care less about high feedback score and rate the feedback only 0.097 points higher when the score is increased by 1 point (with regression coefficients changed into 0.097, and 0.097 = 0.179 – 0.082). In addition, feedback receivers who did not seek feedback prefer receiving feedback with longer comments and rate the feedback instance 0.015 points higher with the comment that is one character longer. However, feedback receivers who sought feedback have a stronger preference for longer comments and rate the feedback instance 0.045 points higher with the comment that is one character longer (with regression coefficients changed into 0.045, and 0.045 = 0.015 + 0.030).

Therefore, regarding (H4), the results show that the positive relationship between feedback score and rating score is less pronounced for feedback seekers than those who did not seek feedback. Feedback seekers reward longer comments more than those who did not seek feedback. The results indicate that feedback seekers care less about the feedback score and have a stronger preference on receiving feedback with longer comments, which is reflected in the rating scores they provide to the feedback givers. Based on the above evidence, we find support for the mechanism that feedback seekers seek feedback to improve themselves. Therefore, they
are less sensitive to the feedback scores and want to hear lengthier comments. Managers can use this insight while training employees on how best to respond to seeking requests. Employees should be empowered to answer seekers and provide constructive feedback. Seekers, in turn, find constructive feedback that identifies areas of improvement as beneficial, as reflected by the rating scores received. Likewise, when feedback is not sought, employees may be encouraged to frame feedback in a less constructive manner because of the reduced receptivity.

<table>
<thead>
<tr>
<th>Table 4. Impact of Feedback Results on Rating Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating score</td>
</tr>
<tr>
<td>(1)</td>
</tr>
<tr>
<td>OLS</td>
</tr>
<tr>
<td>Feedback score</td>
</tr>
<tr>
<td>0.179***</td>
</tr>
<tr>
<td>(0.000)</td>
</tr>
<tr>
<td>Feedback comment length</td>
</tr>
<tr>
<td>0.015*</td>
</tr>
<tr>
<td>(0.054)</td>
</tr>
<tr>
<td>Feedback score × Seeking feedback</td>
</tr>
<tr>
<td>-0.082***</td>
</tr>
<tr>
<td>(0.000)</td>
</tr>
<tr>
<td>Feedback comment length × Seeking feedback</td>
</tr>
<tr>
<td>0.030***</td>
</tr>
<tr>
<td>(0.001)</td>
</tr>
<tr>
<td>Feedback giver job position</td>
</tr>
<tr>
<td>-0.033***</td>
</tr>
<tr>
<td>(0.003)</td>
</tr>
<tr>
<td>Feedback receiver job position</td>
</tr>
<tr>
<td>-0.034*</td>
</tr>
<tr>
<td>(0.056)</td>
</tr>
<tr>
<td>Feedback giver people</td>
</tr>
<tr>
<td>1.623***</td>
</tr>
<tr>
<td>(0.000)</td>
</tr>
<tr>
<td>Feedback giver times</td>
</tr>
<tr>
<td>-1.261***</td>
</tr>
<tr>
<td>(0.000)</td>
</tr>
<tr>
<td>Feedback receiver people</td>
</tr>
<tr>
<td>-0.031</td>
</tr>
<tr>
<td>(0.273)</td>
</tr>
<tr>
<td>Feedback receiver times</td>
</tr>
<tr>
<td>0.073***</td>
</tr>
<tr>
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</tr>
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<td>6.221***</td>
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<tr>
<td>Feedback giver fixed effects</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Feedback receiver fixed effects</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Competency fixed effects</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Assessment period fixed effects</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Observations</td>
</tr>
<tr>
<td>2,841</td>
</tr>
<tr>
<td>R-squared</td>
</tr>
<tr>
<td>0.603</td>
</tr>
</tbody>
</table>

Note: *10% significance, ** 5% significance, and *** 1% significance. The p-values are listed in parentheses and the standard errors are corrected by clustering at the work group level.

6.5 Impact of Feedback Results on Future Feedback-Seeking

To better understand the goal of users’ feedback seeking, we investigate (H5) to understand to what extent and how the action of seeking feedback and subsequent feedback results affect future feedback-seeking behavior. This allows us to examine whether the feedback results affect the likelihood of future feedback seeking differently across users dependent upon seeking behavior.

We create a binary variable, Future seeking feedback, to measure the actions of seeking feedback between every pair of feedback giver and feedback receiver after the first-time feedback instance between them. We
create two subgroups, one group for users who did not seek feedback and the other group for users who sought feedback. Equation (4) depicts the regression that studies how the feedback score received affect the likelihood of seeking feedback in the future. The regression is repeated for both subgroups.

\[
\text{FutureSeekingFeedback}_{ijkt} = \beta_0 + \beta_1 \text{FeedbackScore}_{ijkt} + \beta_2 \text{FeedbackGiverJobPosition}_{ijkt} + \beta_3 \text{FeedbackReceiverJobPosition}_{ijkt} \\
+ \beta_4 \text{FeedbackGiverPeople}_{ijkt} + \beta_5 \text{FeedbackGiverTimes}_{ijkt} + \beta_6 \text{FeedbackReceiverPeople}_{ijkt} \\
+ \beta_7 \text{FeedbackReceiverTimes}_{ijkt} + \gamma_k + \mu_t + \epsilon_{ijkt}
\]

We find that the impact of the feedback score on the likelihood of future feedback-seeking differs between users who sought feedback and users who did not seek feedback. As shown in column (1) of Table A.7 in the Online Appendix, for users who did not seek feedback, the feedback score received has a positive relationship with the likelihood of feedback-seeking in the future. The results for this subgroup indicate that, if users who did not seek feedback received a lower feedback score, they are less likely to seek feedback in the future. However, the results in column (2) of Table A.7 show that, for users who sought feedback, the feedback score received subsequently has a negative relationship with the likelihood of future feedback-seeking. Thus, if the feedback seeker received feedback with a lower score, they have a higher likelihood of seeking feedback in the future.

Therefore, for (H5), we find that lower feedback scores discourage users who did not seek feedback from seeking feedback in the future, whereas lower feedback scores, in fact, motivate users who sought feedback to continue to seek feedback in the future. This further supports the mechanism that users who seek feedback aim to improve themselves. In other words, a review with a low score motivates feedback seekers to improve their work competency to achieve better recognition reflected as higher feedback score in future feedback instances.

7. Additional Robustness Checks

In this section, we conduct a rich battery of robustness checks to address possible empirical issues. We find that our findings continue to hold after we consider alternative estimation method, subsamples, control variables, etc.

7.1 Alternative Estimation Method and Winsorized-Sample for Feedback Comment Length

To make our findings more robust, in this section, we discuss and address potential problems with our methods. As shown in the summary statistics in Table A.2, the dependent variable of feedback comment length, which counts the number of characters in the comments, has a mean value of around 125, a minimum value of zero, and a maximum value of 1,886. In about 40% of instances, the feedback provider does not give comments, leading to a zero value for the comment length. Therefore, the dependent variable of feedback comment length has a potential left-censoring issue. In these cases, censoring from below takes place at the minimum value of zero. In order to eliminate the possibility of bias caused by censoring, we follow the literature (Carson & Sun, 2007; Hafner & Preminger, 2015) to apply Tobit regressions by setting the lower limit of feedback comment length.
length to zero. The Tobit model, also called a censored regression model, is designed (a) to estimate linear relationships between variables in cases where there is either left- or right-censoring in the dependent variable, and (b) to solve the problem of heteroscedasticity caused by censoring (Arabmazar & Schmidt, 1981).

The robustness check for the results of (H1) and (H3) are shown in the first two columns of Table A.8 in the Online Appendix, respectively. The regression results in column (1) in Table A.8 are consistent with those of column (3) in Table 2, and the regression results of column (2) in Table A.8 are consistent with those of column (3) in Table 3. This further supports the findings that seeking feedback increases the length of feedback comments and that feedback givers choose to provide shorter feedback comments anonymously if they are sought out for feedback.

The dependent variable of Feedback comment length also suffers from a potential outlier issue. The maximum value of comment length (1,886) is much higher than the mean value of 125. To eliminate the possibility of bias brought by outliers, we winsorize extreme observations below 1st percentile and above 99th percentile by replacing the outlier observations by the observations at 1st percentile and 99th percentile (Thomas & Ward, 2006; Jiang et al., 2021). Then, we conduct ordinary least square regressions for the winsorized sample. The results of these regressions are shown in the last two columns of Table A.8 in the Online Appendix. These results are consistent with the results of corresponding original regression (3) of Table 2 for (H1) and regression (3) in Table 3 for (H3).

The robustness checks confirm that our empirical results regarding comment length are robust, i.e., seeking feedback increases feedback comment length and feedback givers who are sought for feedback and want to provide shorter feedback comments will provide feedback anonymously.

7.2 Subsample Analysis for Feedback with Comment
As previously discussed, in about 40% of instances, the feedback giver does not provide any comments, leading to a zero value for the comment length. To confirm that our results on (H1) and (H2) continue to hold without the disturbance of feedback instances that do not have comments, we drop the feedback instances without comments and repeat the baseline regressions using the reduced subsample. Our main findings remain consistent when we focus only on the feedback instances that have comments. As shown in Table A.9 in the Online Appendix, the action of seeking feedback decreases the feedback score received, increases the length of comments, and is associated with more positive comments and more subjective comments.

7.3 The Effect of Network on the Feedback Results
We conduct robustness checks on (H1) and (H2) with alternative control variables to evaluate whether the user’s network among employees impact the feedback results. We follow the prior literature (Bonacich 1987; Mizruchi & Galaskiewicz 1993; Petryk et al., 2022) to create a variable, Network, to capture a user’s positional
embeddedness by using the eigenvector centrality. A higher value of Network indicates a higher degree of positional embeddedness.

Additionally, we categorize all job role relationships in feedback instances into Peer to peer (i.e., feedback giver and feedback receiver are at the same rank level), Subordinate to supervisor (i.e., feedback giver is the subordinate and feedback receiver is the supervisor), and Supervisor to subordinate (i.e., feedback giver is the supervisor and feedback receiver is the subordinate). We replace the control variables of detailed job positions of feedback givers and feedback receivers by the job role relationships Peer to peer and Supervisor to subordinate. The category of Subordinate to supervisor is omitted to avoid the problem of multicollinearity and is treated as base group.

As shown in Table A.10 in the Online Appendix, our findings continue to hold after we consider the users’ network and job role relationship. We continue to find that the action of seeking feedback is associated with a lower feedback score, a higher chance of receiving comments, longer comments, more positive comments, and more subjective comments. The results also show that the embeddedness of an individual’s network position has a similar effect on feedback results as the action of seeking feedback. This indicates that positionally embedded individuals have good reputation and trust, and they invite constructive feedback that has lower score and longer comments.

7.4 The Effect of Rating Results on Future Feedback Results
We have conducted robustness checks on the results regarding (H4). As shown in Section 5.4, feedback receivers have the option to rate the received feedback for its helpfulness. It is possible that a feedback giver’s anticipation of the receiver’s response via feedback rating score affects the contents of their own initial feedback, which raises the concern of reverse causality.

To empirically rule out the existence of reverse causality, we conduct a temporal-based analysis. We study the effect of a rating score on the future feedback score between every pair of feedback givers and feedback receivers. Table A.11 in the Online Appendix shows that the regression coefficients on Rating score are insignificant, indicating that the rating score provided by the feedback receiver does not affect the feedback score given by the feedback giver in the future, and reverse causality concern is alleviated.

7.5 The Effect of Seeking Feedback on Feedback Loops
One advantage of our real-time feedback system is that it allows continuously feedback exchange among users, and this study centers on the effect of seeking feedback on feedback outcomes. In this section, we investigate how the action of seeking feedback affects the users to initiate multiple feedback loops between a pair of users and the number of feedback loops between a pair of users. As shown in column (1) of Table A.12 in the Online Appendix, it is documented that the action of seeking feedback increases the likelihood of having multiple feedback loops between a pair of users (measured by a binary variable Having loops). We also find that the
action of seeking feedback increases the total number of feedback loops between a pair of users (measured by a continuous variable *Rounds of loops*), with the results depicted in column (2) of Table A.12.

The above results are consistent with our findings for hypotheses (H1) and (H2). Feedback givers view the action of seeking feedback as a signal of self-motivation and a proactive search for ways to improve performance. Feedback givers may also feel complimented by the request of feedback, as it signals that the would-be recipient values their input. Thus, feedback givers are willing to put more effort into delivering more rounds of feedback to help their colleagues improve. The findings of feedback loops confirm that the action of seeking feedback could enhance communication among colleagues.

7.6 Additional Analysis on Being Both Feedback Receiver and Feedback Giver

The real-time feedback system allows a user to be both feedback receiver and feedback giver in different feedback instances. In this section, we investigate several questions regarding the phenomena that a user switches between the roles of feedback receiver and feedback provider.

First, we examine whether the previous feedback a user received would affect the likelihood of the same user providing feedback later, and how the previous feedback a user received would impact the feedback results if this feedback receiver provides feedback later. Considering that a user typically receives a batch of feedback, then gives a batch, and then repeat, we calculate the average feedback score received for each batch of a user (measured by the variable *Average feedback score received*) and the average feedback score given for each batch of a user (measured by the variable *Average feedback score given*). We also create an indicator variable, *Giving feedback*, to measure if a feedback receiver also gives feedback later. As shown in column (1) of Table A.13 in the Online Appendix, we find that the average feedback score received by a user as a feedback receiver does not affect the likelihood of the same user providing feedback later. We also document in column (2) of Table A.13 that the average feedback score received by a user as a feedback receiver does not affect the average feedback score given by the same user when he or she is a feedback provider.

Second, we study if providing feedback to others upon requests would influence a user’s behavior of seeking feedback, as a user can switch between the roles of feedback giver and feedback. When a user is a feedback giver, some of feedback provided by the user are based upon the feedback-seeking requests, and the remaining feedback are initiated by the feedback giver without any request. To measure how intensively a feedback giver receives feedback-seeking requests for each batch, we create the variable *Percentage request received*, which is calculated as the percentage of feedback provided upon requests out of all the feedback provided for each batch of a user when they are a feedback giver. To measure if the user sends feedback-seeking requests for each batch when he or she is a feedback receiver, we create an indicator variable, *Sending request*. To measure how intensively the user sends feedback-seeking requests when he or she is a feedback receiver, we compute a continuous variable, *Percentage request sent*, to show the percentage of feedback
received upon requests sent out of all the feedback received for each batch of a feedback receiver. The results depicted in Table A.14 of Online Appendix document that a higher percentage of feedback provided upon requests when the user is a feedback giver is associated with a higher likelihood and a higher intensity for the user sends feedback-seeking request when he or she is a feedback receiver. The results show that receiving feedback- seek requests encourages the users to send feedback- seek requests, which are supportive to our main findings that the action of seeking feedback facilitates the communication among colleagues.

Third, we examine how receiving unwanted feedback affects the behavior of seeking feedback in the future for a feedback receiver. We create a binary variable, Unwanted feedback, to indicate whether the feedback received is unwanted. The results in Table A.15 of Online Appendix show that receiving unwanted feedback is associated with less feedback seeking in the future.

8. Discussion and Conclusions
Leaders influence whether employees consider feedback seeking a high-benefit, low-cost behavior: Employees are more likely to seek feedback from supervisors who maintain mutual respect and trust (VandeWalle et al., 2000). Seeking feedback also impacts the nature of feedback given and received. Because feedback quality is often more important than quantity, managers must ensure their team members receive frequent feedback that is not simply positive but also contains useful constructive content. In this study, we analyze these dynamics to present important managerial implications regarding the management of feedback-seeking behavior in a real-time feedback context.

8.1 Managerial Contributions and Implications
The results of our investigation into (H1) and (H2) provide insight into the extent to which seeking feedback impacts real-time feedback scores, comments, and mechanisms. Regarding (H1), our results show that employees who seek feedback tend to receive lower feedback scores, indicating that seeking feedback could enhance constructive communication among colleagues. Feedback givers provide lower numerical feedback scores to remind feedback seekers that room for improvement still exists (Larson, 1989). We also find that seeking feedback increases the likelihood of receiving comments and the length of comments. Regarding (H2), we find that feedback givers are more willing to spend time providing comments at length with useful suggestions to help their colleagues improve. In this way, sought feedback may be more useable than unsolicited feedback because text-based feedback responses may provide sufficient insight for the recipient to act on (Schrage et al., 2019). Hence, managers and organizations should promote a culture of constructive feedback through this feedback-seeking dynamic and orientation.

Managers should bear in mind that anonymous feedback may be superficially negative, since the requestee might feel no constraints when providing feedback in this way (Buckingham & Goodall, 2019; Ghorpade, 2000). We find in studying hypothesis (H3) that regardless of whether a feedback giver discloses their identity
or stays anonymous, feedback seeking is always associated with a lower feedback score, a higher likelihood of receiving comments, and more detailed comments. However, anonymity reduces the likelihood of providing comments as well as the length of comments. This suggests that if the feedback giver does not feel like providing comments or wants to give shorter comments when they are sought for feedback, they will provide feedback anonymously. When considering employee performance, feedback seeking is known to interact with several proactiveness and adaptability markers, such as willingness to take charge, communicating one’s “voice,” innovation, preventing problems, environmental scanning, and solving problems associated with uncertainty (Hansen et al., 2011). Employers can adopt a feedback system with a continuous mechanism to generate nontrivial participation by engaging the employee’s cognition. The use of continuous feedback may be appropriate based on managerial goals. For example, if the goal is to maximize revenue, then feedback on outcomes is preferred (Adomavicius et al., 2013; Gardner, 2020). In addition, engaging in feedback-seeking behaviors may reflect an employee’s increased organizational commitment and work engagement (Nevo et al., 2021). These nuances provide a better understanding of when and how feedback-seeking and rating dynamics should be integrated into the design and application of feedback systems.

Attentional bias also plays a significant role in real-time feedback. As such, increasing employees’ attentional resources may improve their ability to provide feedback and make decisions. It has been shown that the relationship between learning and real-time decision making is interdependent; it is difficult to support real-time decision making through cognitive support when there is not a high rate of learning (Lerch & Harter, 2001). As such, a real-time feedback system requires a thorough understanding of the benefits and costs associated with the system as it affects the outcomes of decision-making strategies (Tiefenbeck et al., 2018). Our findings should reassure managers that seeking feedback facilitates constructive communication between employees whether the identity of the reviewer is disclosed or anonymous (Yohn, 2019). However, encouraging full disclosure is likely to result in employees receiving more contextualized feedback.

When a user receives feedback, they have the option to “rate” the feedback they received in terms of its helpfulness. Our (H4) speaks to an essential aspect for managers regarding whether employees value the feedback that they receive. We find that feedback receivers who did not seek feedback prefer higher feedback scores and will rate the feedback higher when the feedback score is increased. Feedback receivers who did not seek feedback do not like long feedback comments and will rate the feedback lower for longer feedback comment length (Roebuck, 1996). However, feedback seekers care less about the high feedback scores and instead prefer longer comments. We conclude that feedback seekers do so to improve themselves and therefore desire constructive and detailed suggestions through comments. Therefore, managers should encourage employees to see requests for feedback as opportunities to provide constructive feedback.

Employees who feel a sense of control about their roles in an organization display behaviors that seek to further their knowledge about the organization, including feedback about themselves. We find in (H5) that
among users who sought feedback, there was a negative relationship between feedback score and the likelihood of future feedback seeking. We further find that feedback receivers given low scores were more motivated to enhance their work competency and achieve better recognition that would be reflected in future feedback. Seeking and rating feedback dynamics support the psychological ownership model and supplement existing models such as the self-determination theory (Graves et al., 2013) and the social exchange theory (Priyankara, 2018). Our findings imply that within the psychological ownership model, individuals who sought feedback were motivated to achieve a greater sense of control, acquire more knowledge, and invest in their development. As such, a constructive review will motivate feedback seekers to improve themselves, making them more likely to seek feedback again in the future to reflect their enhanced competency. Managers should pay attention to employees who display fewer feedback-seeking behaviors while providing opportunities for them to welcome a sense of autonomy within the organization, which may lead to a better sense of control, knowledge, and investment. In doing so, managers should emphasize future environmental sustainability by attending to employees’ participation in feedback-seeking behaviors (Jiang et al., 2019).

When implementing feedback applications that allow for seeking and rating feedback, managers should be aware that feedback ratings can be informative, but feedback results might be particularly lower when feedback is sought. Therefore, to improve helpfulness and accuracy, managers should encourage both feedback-seeking and feedback-giving, at least in part through organization-wide training in feedback best practices, such as the importance of contextualized comments. Managers may also consider incentivizing workers who actively seek feedback as well as those who provide quality feedback (Hoffmann & Thommes, 2020).

8.2 Future Research Directions
While this study begins to answer questions regarding seeking and rating employee performance feedback, many areas remain to be explored. Future studies might build on this work and focus on establishing best practices at the outset to increase and improve seeking and rating behaviors, including optimal times. These may start by considering who is more likely to seek feedback or provide ratings for feedback, e.g., whether demographic factors such as gender, race, or seniority contribute to an individual’s tendency to seek feedback or provide ratings on that feedback; or whether specific circumstances, such as the necessity for feedback, at work tend to lead to more seeking and rating behavior.

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