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HOW DID YOU DO THAT? EXPLORING THE MOTIVATION TO LEARN FROM OTHERS' EXCEPTIONAL SUCCESS

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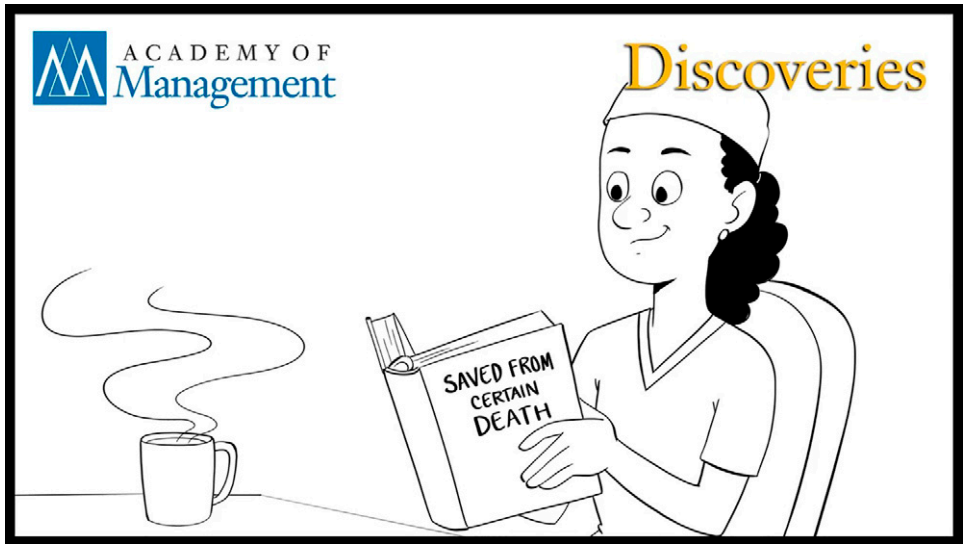

In this article, we explore how perceptions of other people's exceptional success influence individuals' motivation to learn—a relationship that has been surprisingly unexplored within the broad literature on learning in organizations. Our research reveals, across two distinct samples and methodologies, that an individual's motivation to learn is higher when they perceive performance by another person to be more exceptionally successful, as compared to perceiving the other's performance as a more "normal" success. We also observe, in line with prior research, marginal support for the notion that motivation to learn is higher when individuals perceive others' performance as more of a failure; thereby suggesting a curvilinear relationship between perceived performance and motivation to learn. Our second study demonstrates that the relationship between others' performance and the motivation to learn is mediated by interest and moderated by surprise. We discuss the implications of these results for provoking new theorizing, measurement, and practical implementation of learning in organizations.

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Author's voice:
What motivated you to undertake this research? (Part 1)

Organizational life is rife with opportunities for individuals to learn (e.g., Cohen & Bacdayan, 1994; Weick & Ashford, 2001), but learning is unlikely to happen, or is unlikely to be effective, if individuals are not motivated to learn (Argyris & Schön, 1996; Noe, 1986). One factor that may have a significant impact on motivation to learn is encountering exceptionally successful performance, as evident in the countless books, articles, speeches, blog entries, and other media that present exceptional successes as models from which to learn (e.g., Collins, 2001; Willink & Babin, 2017). The market for such media implies a motivation to learn from exceptional success, but researchers have both criticized (e.g., Denrell, Fang, & Zhao, 2013; Denrell & Liu, 2012) and seen value (e.g., Lilien, Morrison, Searls, Sonnack, & von Hippel, 2002; Starbuck, 1993) in learning from exceptional success. Their assessments of such learning have focused primarily on the content of what is learned, rather than on whether and how this exceptional success motivates learning. To our knowledge, no one has explored the question of whether, when, and why an individual's motivation to learn from exceptional success differs from motivation to learn from "normal" levels of success or failure. Given the many factors that demotivate learning from others in the workplace (e.g., Argyris & Schön, 1996; Darley & Fazio, 1980), understanding a phenomenon that, in popular media at least, appears to have implications for motivation to learn would be of value to organizational scholars and practitioners.

People may be motivated to learn from others' exceptional successes, but learning from media accounts is not the same as learning from coworkers' exceptional performance in similar work tasks. For example, negative or positive interpersonal relationships may complicate the desire to learn from coworkers. Moreover, there may be cases in which a coworker's exceptional success demotivates learning in an individual because they are intimidated by that coworker's success, or because they see the coworker's success as irrelevant. Coworkers learn about each others' performance in similar work tasks through the conversations that ensue when managers post employee performance (Nordstrom, Lorenzi, & Hall, 1991), through internal or external websites dedicated to sharing stories about work (e.g., Facebook's "Workplace" software; workplace.com), or through the stories that spontaneously emerge when people work together on challenging projects (Orr, 1996). Yet we know of no theory or empirical research on how others' exceptional success affects individuals' motivation to learn at work, leaving the presence and nature of this relationship open for empirical exploration.

Author's voice:
What motivated you to undertake this research? (Part 2)

Because motivation to learn is just one type of motivation, we can derive some intuitions about how exceptional success affects motivation to learn from general theories of motivation; however, these theories actually suggest conflicting intuitions. For example, if people lose their motivation to perform when they believe that an outcome is impossible for them to achieve (Locke & Latham, 1990), they may lose their motivation to learn when others succeed exceptionally at an activity that they believe they could never learn to perform that well. In contrast, if another person's exceptional success acts as an existence proof (Weick, 2007) that extraordinary performance is possible (when an individual previously believed it to be impossible [see Vroom, 1964]), the possibility of learning to perform at that level may have a significant positive impact on an individual's motivation to learn.

We conducted research to first compare how other people's exceptional success influences individuals' motivation to learn, relative to other levels of performance that people achieve (specifically, normal levels of success and failure), and then to explore potential mediators and moderators of this relationship between other people's performance and one's own motivation to learn. This analysis offers some "first suggestions" (Bamberger, 2018) for understanding individual motivation to learn when encountering others' exceptionally successful performance as compared to normal success or failure. We perform this analysis using data from a field study with multiple emergency departments and from an online scenario-based study. We find that perceptions of others' performance—ranging from failure, through normal success, to exceptional success—display a curvilinear relationship with individuals' motivation to learn in both studies. We also find that this relationship is mediated by individuals' feelings of interest in, and moderated by the level of surprise they feel about, others' performance. Based on these findings, we theorize about others' performance and the motivation to learn in several important ways, most notably providing coalescing evidence for a nonlinear influence of others' performance (as it ranges from failure, through normal success, to exceptional success) on individuals' motivation to learn in work organizations that

highlights the motivating value of encountering others' exceptional success.

THE MOTIVATION TO LEARN FROM OTHERS' EXCEPTIONALLY SUCCESSFUL PERFORMANCE AT WORK

Recent theorizing on vicarious learning has argued that individuals' motivation to learn is an important component of learning from others' experiences because motivation to learn influences the extent to which they spend time and energy making sense of, and drawing lessons from, others' experience (Myers, 2018). This motivation to learn reflects the effort and persistence invested into acquiring knowledge and skills (Noe, 1986), and is necessary because learning can be difficult, embarrassing, complicated, or inconvenient (e.g., Staw, Barsade, & Koput, 1997; Westen, Pavel, Harenski, Kilts, & Hamann, 2006). Given these obstacles, learning from others' performance is less likely to occur if people are not sufficiently motivated.

In the present research project, we explore whether, when, and why encountering others' exceptional success can impact motivation to learn, relative to encountering other levels of performance (i.e., a more typical success or a failure). Others' performance can vary widely, including not only the frequently studied distinction between failed and successful performance but also ranging beyond this traditional threshold to more exceptionally positive performance. Indeed, successful performance at work can manifest to varying degrees, ranging from acceptable or typical performance ("normal success") to unusually positive performance that exceeds typical performance ("exceptional success"). Yet the distinction between success and exceptional success tends to be more ambiguous than the distinction between failure and success. The distinction between success and failure depends on whether performance exceeds or falls below a reference point (Lewin, Dembo, Festinger, & Sears, 1944), which may be a preset goal, a previous level of performance achieved, or one's own performance relative to the performance of others. Reference points such as these tend to be relatively explicit, and known or easily discoverable by others. The distinction between success and exceptional success also depends on exceeding a threshold. However, in this case, the threshold is the individual's perception of what is typical relative to what is exceptional, and, unlike the distinction between success and failure, this threshold is seldom prespecified, but is instead implicit and intuited from experience. Nor is this threshold as likely to be publicly accepted or shared within a given social group. Because it is intuited from experience, it is likely to be idiosyncratic to the individual perceiving the performance.

If individuals distinguish normal performance from exceptional performance, the relationship between perceptions of others' performance and an individual's motivation to learn may not be linear across the performance spectrum (i.e., ranging from failure, through normal success, to exceptional success). For example, if others' exceptional success serves as an existence proof (Weick, 2007), showing that exceptional success can be achieved, and therefore challenging an individual's expectations about what is possible, then perceiving that exceptional success would indicate a significant change in how the individual thinks. This change should, in turn, have a correspondingly strong impact on how motivated the individual is to learn from another's success, because motivation is influenced by the likelihood of success, especially if improved performance also implies improved rewards (Vroom, 1964). Thus, the relationship between perceptions of performance and motivation to learn may be increasingly positive as others' performance exceeds the bounds of "typical" success, and could be considered more exceptional, because it generates an increase in the interest people have in the other person's performance. In this sense, exceptional performance is likely to interest people because it is often novel or complex while still being comprehensible (Silvia, 2008).

In contrast, perceiving others' performance as surpassing the limit of what previously seemed possible may also have a nonlinear effect on motivation to learn, because a person may believe that learning to achieve such performance would be exceptionally difficult. Exceptionally difficult activities can reduce people's motivation if the effort necessary to learn and achieve seems impossible *to them*, or unreasonable to pursue (Locke & Latham, 1990): For example, people may think, "Just because someone else was able to achieve that performance does not mean that *I* can or should learn how to do it." They may also be averse to failure in these contexts and disengage from even wanting to learn how to perform difficult tasks. If this logic prevails, it would imply a curvilinear relationship between perceptions of others' performance and individuals' motivation to learn, with the individual being more motivated by seeing others achieve normal amounts of success, relative to seeing failure (e.g., Wood & Bandura, 1989), but in turn being less motivated by seeing someone's more exceptional success (relative to the normal success).

These potential nonlinear effects of perceptions of others' performance on one's own motivation to learn suggest that it may be valuable to compare the

effects of perceived exceptional success with perceived normal success and perceived failure on motivation to learn. Is an individual's motivation to learn uniquely affected when others' performance is perceived as not only acceptable (i.e., as a success rather than a failure) but actually exceptional? Or does this motivation to learn continue to grow (or diminish) linearly through these performance levels (i.e., failure, success, and exceptional success) in spite of the violated expectations, new possibilities, or desirable capabilities and outcomes latent in exceptional success? Taken together, our review of extant research suggests that the overall relationship between perceptions of others' performance and an individual's motivation to learn—especially when that performance is exceptional—is poorly understood and would benefit from exploratory research (Bamberger, 2018). We explored this across two task settings. First, we considered the effect of perceptions of others' failure, success, and exceptional success on individuals' motivation to learn in a sample of emergency department clinicians. Second, we used a more controlled task setting to replicate the effect found in the first study and explore interest and surprise as potential mediators and moderators.

STUDY 1: FIELD STUDY

Our first study was a field-based, multi-week exploration of motivation to learn among doctors, physician assistants (PAs), and nurse practitioners who work in emergency departments. Utilizing stories of failure, success, and exceptional success, and measuring learning motivation among individuals as they were actively engaged in their day-to-day work (in this case, treating patients), both enabled us to explore perceptions of others' failure, success, and exceptional success in a natural setting and provided external validity for the relationship between others' performance and individuals' motivation to learn.

Participants and Procedures

The participants in our first study were clinicians from the Emergency Physicians Medical Group (EPMG), a company that staffs emergency departments. The study proceeded in two stages. The preliminary stage involved creating a means for ensuring a wide range of perceptions of others' performance by generating and collecting stories of real failures, successes, and exceptional successes experienced in the emergency department setting. In the primary stage of the study we examined clinicians' perceptions of others' performance in these stories, and their motivation to learn, over a six-week period.

Author's voice:
If you were able to do this study again, what if anything would you do differently?

Preliminary stage: Creating a means for ensuring a breadth of perceptions. To ensure that there would be variance in our participants' perceptions, we based our study on what O'Keefe (2003) called a Class I research claim regarding the effect of messages on psychological states. A Class I research claim asserts that psychological states (such as the perception of someone else's performance) have specific effects on variables of interest (such as the motivation to learn), and even though these states may be caused by specific messages (such as an experimental manipulation), the messages are only important inasmuch as they create variance in the psychological state. It may be interesting to know whether the manipulation had the intended effect, but the purpose of the manipulations was only to create variance in perceptions of performance in order to examine how these perceptions were related to the motivation to learn. Therefore, the study we conducted is not an experiment, even though we used manipulations of the messages presented to participants in the primary stage: we used these manipulations to create the variance we were interested in studying with the independent variables.

The messages we constructed were stories from medical directors and clinician leaders at EPMG who had emergency medicine experience. We could have created scenarios ourselves, but we believed that actual reports would be more authentic, and that stories from colleagues in the same organization would be more meaningful to our participants. We asked these leaders (who were not included as participants in the primary study) to write up the story of an experience in the emergency department setting, and specifically to describe the context, characters, plot, outcome, and "moral of the story," or lesson of the experience they reported. We asked some leaders to write about failed experiences, some to write about successful experiences, and some to write about exceptional successes. We collected 11 exceptional success stories, 10 success stories, and 10 failure stories. Many of the stories used jargon or uncommon acronyms, were told in a way that assumed readers would know things they might not necessarily know, or simply did not flow well. Therefore, an emergency medicine physician on our research team edited the stories for readability, without altering their content.

We ran pilot tests with the stories to confirm they generated variance in perceived performance. We

asked two emergency medicine clinicians, not employed by EPMG, to rate the performance in the stories using a sliding scale from 0 to 120 with anchors of "A complete failure" covering the range from 0 to 12, "A failure" from 13 to 30, "Less success than desired" from 31 to 50, "An acceptable outcome" from 51 to 70, "A success" from 71 to 89, "A very successful outcome" from 90 to 108, and "An outcome that exceeds all expectations" from 109 to 120. Scholars often use 100-point scales to draw on the intuitive experience of people who have attended schools where grades are based on percentages to judge success (e.g., Pajares, Hartley, & Valiante, 2001). We used this same intuition to suggest that a 100-percentage point scale indicates a range of failure and success, but that as performance approaches and exceeds 100, that performance would be considered exceptional. This broad scale also allowed for more variance in perceptions of performance compared to a traditional 5- or 7-point scale, even when those perceptions fall within the same general category of performance. We also asked the raters to include feedback on the clarity of the stories.

We checked the interrater reliability of the scores because reliable ratings at different levels implied that we would generate the variance we needed in our actual study. Interrater reliability fell short of the standard 0.70 cutoff, and feedback from our raters suggested that the stories were not as clear as they needed to be. Therefore, we used their feedback to edit the stories further. This editing included replacing less-common acronyms with the words for which they stood, improving grammar, and replacing even more of the medical jargon. Our raters indicated that simpler language was needed, even though the writers and readers of the stories were all medical professionals. We then had two new emergency medicine clinicians rate the stories using the same scale. These raters achieved an interrater reliability of 0.88.

Our raters agreed on their ratings of performance in the stories; however, there were a few stories the raters assessed as demonstrating a failure, success, or exceptional success but that the EPMG leaders who wrote the initial stories had categorized differently (we treated stories with a rating between 0 and 40 as failure, stories with a rating between 41 and 90 as success, and stories with a rating between 91 and 120 as exceptional success, based on the anchors on our scale). To tighten the manipulation and minimize confusion we dropped these stories in which our raters did not align with the authors about the level of performance. This was not because of the content of the stories but because our goal was to produce stories that maximize the likelihood of participants having failure, success, and exceptional success perceptions, while still allowing for plenty of variance in those perceptions. Eight stories of exceptional success, six stories of success, and seven stories of failure met these criteria. Because participants would read one story of one type each week, we needed to have the same number of stories in each category. Therefore, we included the six success stories, along with six failure stories and six exceptional success stories, to use as stimuli in our study.

The six stories within each performance category (success, failure, and exceptional success) generated in this preliminary stage of research varied in terms of features such as characteristics of the protagonists (e.g., gender) and the patient (child versus adult), and the length of the story. This variation provided an overarching set of stimuli that would reflect the category and ensure that findings would not be an artifact of a particular element of the story.

Primary stage: Six-week story study. We contacted clinicians employed by EPMG in emergency departments throughout the Midwest United States to request participation. Fifty-five clinicians from 21 different emergency departments participated in at least the initial survey (from the set of surveys described below). Twenty-four, or 44%, of the clinicians who participated were female. We confirmed with EPMG managers that this is the same proportion of female clinicians employed by EPMG overall. The leaders of EPMG offered points toward clinicians' bonus pool for participating, which, depending on end-of-year calculations, could be worth $600. The 55 participating clinicians were randomly assigned to read stories from one of the three performance categories generated in the preliminary stage of this study. These stories, and the opportunity to learn from them, were embedded in clinicians' normal weekly routine through a six-week series of online surveys.

Participation in the study required clinicians to fill out an initial survey before the six weeks began and an additional six surveys in the subsequent six weeks, one in each week. The initial survey assessed baseline measures of learning tendencies, including motivation to learn and learning behaviors, as well as demographic data. The measures of perceptions of performance and motivation to learn were collected in the six weekly surveys. Each week, a clinician would be sent an online survey containing one new story, always from the same category (failure, success, or exceptional success). In each weekly survey, participants were given open space to reflect in writing on that week's story, including what they felt the story was about, whether and how they could relate to the story, and what they would have done in the situation depicted. After reflecting, they were asked to rate their perception of the performance in the story (using the 120-point rating scale described in the preliminary stage of this study), and responded to 7-point Likert-scale questions that measured other main study variables.

Measures

Focal measures. The focal variables in this study were perceptions of performance and motivation to learn. We measured *perceptions of performance* by asking participants to rate how well they thought the clinician in the story performed on the same 120-point sliding scale used by our raters in pretesting. Ratings were then rescaled to facilitate the analysis by dividing by 100, and thus ranged from 0 to 1.2. We measured *motivation to learn* using three items adapted from Noe and Schmitt (1986) and Colquitt and Simmering (1998). Reliability for this measure was $\alpha = .91$. All perceptual scales in our research can be found in Appendix A.

Control variables. We collected additional measures in the initial survey (administered before any of the participants were exposed to the story conditions) in order to both rule out alternative explanations for our findings and control for appropriate individual characteristics. Specifically, we captured participants' *baseline motivation to learn* using the same scale as on weekly surveys, other than beginning the first item with "I exert" instead of with "This week, I intend to exert" ($\alpha = .74$). We included this variable to examine how motivation to learn deviates from one's typical motivation to learn after each weekly exposure to a story. We measured participants' *learning behaviors* ($\alpha = .94$) to account for changed motivation relative to effort that clinicians were already putting into learning (Edmondson, 1999).

For each weekly story, we also measured *empathy* for the story protagonist in order to account for differences in participants' resonance with, or perceived similarity to, particular story protagonists. The reliability for this scale was 0.52, which failed to reach the traditional 0.70 threshold, even though this scale has been found reliable in prior research (Parker & Axtell, 2001). In spite of this problem, we decided to use this scale as constructed because it is an established scale and reliabilities as low as 0.50 can be considered acceptable if the construct's conceptualization is valid (John & Benet-Martínez, 2000; Pedhazur & Schmelkin, 1991). Additionally, confirmatory factor analysis (using MPlus [Muthén & Muthén, 2005]) showed adequate support for the factor structure of this measure alongside our measure of motivation to learn (the only other multi-scale measure in the study), with the two-factor model demonstrating good fit (RMSEA = .02, SRMR = .03, CFI = .999, TLI = .998).[1]

[1] We used a different measure of empathy in our second study that was more reliable, mitigating the risk of unreliable conclusions based on this specific measure.

As additional controls, we created a binary variable for clinicians who were physicians (Medical Doctor [MD] or Doctor of Osteopathy [DO] degree) versus nonphysician clinicians (PAs or nurse practitioners) to control for the possibility that different positions may have different expectations for learning. We also controlled for those who were assigned to read exceptional success, success, or failure stories (using dummy variables), because even though the purpose of the descriptions of performance was to ensure that there was variance in perceptions of performance, it was possible that the stories may have influenced motivation to learn through mechanisms other than perceptions of performance. For example, the positive language in exceptional success stories, or the negative language in failure stories, may have led people to subconsciously frame the stories as more or less interesting, irrespective of the extent of success or failure the participants perceived the protagonists in the story to have experienced. Thus, including these control variables (dummy variables for the exceptional success and failure stories, with success as the omitted category) accounted for the possibility that these descriptions would affect motivation to learn through alternative mechanisms.

Analysis

Procedure. We explored possible linear and curvilinear relationships between perceptions of performance and motivation to learn at the weekly response level (individual week, which is a within-person unit of analysis), with a primary sample of 289 clinician-week observations from 53 unique clinicians (who completed at least one weekly survey, out of the 55 who completed the presurvey). We analyzed our data with mixed-effects models, utilizing the MIXED command in SPSS 24 (specifying repeated observations for participants' responses over the six weeks and a compound symmetric covariance structure). Using this approach, rather than a repeated-measures analysis of variance (ANOVA), allowed us to include the effects of time-varying predictors (e.g., weekly measures of perceived story performance and empathy) and to avoid excluding participants who were missing one or more weekly responses (both key limitations of a repeated-measures ANOVA) while still accounting for the nonindependence between participants' responses over time (Bagiella, Sloan, & Heitjan, 2000). Specifically, we constructed marginal (i.e., population-average) models, rather than full random-effects models, as our interest was in the global effect of our variables (vs. subject-specific effects [Gardiner, Luo, & Roman, 2009]). In all analyses, fixed effects for the week (for each of the six weeks of

the study), the randomly assigned story condition (failure, success, or exceptional success story), and the binary variable controlling for physician (vs. nonphysician) clinicians were included as categorical factors; fixed effects were estimated for all remaining variables as continuous covariates.

Common method bias could have been a concern in our model if we found main effects and no curvilinear relationship because, as Siemsen, Roth, and Oliveira (2010) have shown, common method variance does not create artificial quadratic effects and interaction effects. In fact, if we were to find a quadratic relationship and there was common method variance, then the results of our analysis would provide "strong" evidence for the existence of such a relationship, because the relationship would be subject to significant deflation in the presence of common method variance (Siemsen et al., 2010: 468). However, to minimize potential problems with common method bias, we ensured anonymity, kept participants blind to the purpose of the study, and used psychologically separate measures (e.g., motivation to learn is self-focused while the other two measures are other-focused).

Data quality. The means, standard deviations, correlations, and reliabilities (where appropriate) for Study 1 variables are presented in Table 1. We calculated correlations between the individual variables and the individual-week variables by putting each individual's values in each individual-week row for the respective individuals, and then counterweighted these observations by the number of weekly responses we received from each of these individuals (see Cullen, Parboteeah, & Hoegl, 2004; Quinn & Bunderson, 2016). The significant correlations between the binary variable for physicians and the dummy variables for the failure and exceptional success conditions (–0.21 for exceptional success and 0.20 for failure) are artifacts of the random distribution of participants. Our random distribution led to one PA being in the failure condition, three PAs in the success condition, and one nurse practitioner and five PAs in the exceptional success condition. These were small differences overall, but in a sample of 53 participants these numbers were sufficiently different from each other to affect the correlations. Higher correlations also occurred for similar reasons between the baseline measures (learning behaviors and motivation to learn) and the failure (0.20 and 0.26), success (0.16 and 0.10), and exceptional success conditions (–0.36 and –0.35). While these correlations are entirely plausible in a random sample of 53 individuals, they provide additional impetus for using these variables as controls in our models to account for any anomalies.

Although it was not necessary in a Class I study of how psychological states influence variables of interest (O'Keefe, 2003), we nevertheless conducted regression analyses to examine whether the stories of failure, success, and exceptional success affected perceptions of performance. Using the controls described above, we found that failure stories had a negative impact ($B = -0.52$, $p < .001$), and exceptional success stories had a positive impact ($B = 0.14$, $p < .001$), on perceptions of performance (stories of success served as the omitted base condition). We also examined histograms of residuals from our full model

TABLE 1
Study 1 Descriptive Statistics

Variables	Mean	*SD*	1	2	3	4	5	6	7	8	9
Control Variables											
1. Exceptional success stories[a,c]	0.34	0.47	–								
2. Success stories[a,c]	0.34	0.47	−0.51***		–						
3. Failure stories[a,c]	0.32	0.47	−0.49***	−0.49***	–						
4. Physician[a,c]	0.83	0.38	−0.21***	0.01	0.20**	–					
5. Baseline motivation to learn	6.22	0.67	−0.36***	0.16**	0.20**	−0.25***	(0.74)				
6. Learning behaviors[a]	5.48	0.88	−0.35***	0.10†	0.26***	−0.22***	0.58***	(0.94)			
7. Empathy[b]	5.62	0.96	0.19**	−0.03	−0.16**	−0.11†	0.12*	−0.06	(0.52)		
Independent Variable											
8. Perceptions of performance[b]	0.76	0.36	0.59***	0.24***	−0.83***	−0.32***	−0.18**	−0.25***	0.24***	–	
Dependent Variable											
9. Weekly motivation to learn[b]	6.02	0.86	−0.13*	0.04	0.09	−0.15**	0.47***	0.31***	0.40***	−0.04	(0.91)

Note: $n = 289$.

[a] Individual-level data ($n = 53$ individuals).

[b] Week-level data ($n = 289$ individual-weeks).

[c] Dummy variable.

†$p \leq 0.10$

*$p \leq 0.05$

**$p \leq 0.01$

***$p \leq 0.001$

TABLE 2
Study 1: Fixed-Effect Estimates Predicting Motivation to Learn

	MODEL 1			MODEL 2			MODEL 3		
Parameters	**Estimate**	***SE***	***T***	**Estimate**	***SE***	***T***	**Estimate**	***SE***	***T***
Controls									
Intercept	1.64	1.00	1.63	1.74	1.01	1.71†	2.16	1.00	2.16*
Week 1[a]	−0.05	0.08	−0.57	−0.06	0.09	−0.74	−0.09	0.09	−1.07
Week 2[a]	−0.05	0.08	−0.59	−0.05	0.08	−0.60	−0.05	0.08	−0.55
Week 3[a]	−0.06	0.09	−0.69	−0.07	0.09	−0.77	−0.03	0.09	−0.29
Week 4[a]	0.02	0.09	0.28	0.02	0.09	0.25	0.03	0.09	0.32
Week 5[a]	0.00	0.09	0.05	0.00	0.09	0.01	0.05	0.09	0.57
Week 6[a]	0.00b	0.00	.	0.00[b]	0.00	.	0.00b	0.00	.
Exceptional success stories[a]	0.06	0.24	0.27	0.08	0.24	0.34	0.02	0.23	0.08
Failure stories[a]	0.04	0.22	0.17	−0.02	0.24	−0.09	−0.12	0.23	−0.52
Success stories[a]	0.00[b]	0.00	.	0.00[b]	0.00	.	0.00b	0.00	.
Nonphysician[a]	0.02	0.26	0.06	0.03	0.26	0.11	0.00	0.26	−0.01
Physician[a]	0.00[b]	0.00	.	0.00[b]	0.00	.	0.00b	0.00	.
Baseline motivation to learn	0.55	0.17	3.23**	0.55	0.17	3.22**	0.53	0.17	3.17**
Learning behaviors	0.08	0.13	0.61	0.08	0.13	0.60	0.08	0.13	0.65
Empathy	0.10	0.03	2.74**	0.10	0.03	2.77**	0.11	0.03	3.24***
Main Effect Term									
Perceptions of performance				−0.11	0.16	−0.72	−1.47	0.45	−3.26***
Quadratic Term									
Perceptions of performance squared							0.95	0.30	3.21**

Note: $n = 289$.
[a] Entered as a categorical variable.
[b] This parameter is set to 0 because it is redundant.
†$p \leq 0.10$
*$p \leq 0.05$
**$p \leq 0.01$
***$p \leq 0.001$

predicting motivation to learn, which revealed one outlying observation. Upon further examination, this outlier appeared to reflect a genuine reaction by one participant to one of the stories, and as there was no theoretical reason to remove it, we retained this observation in all of the analyses reported below.

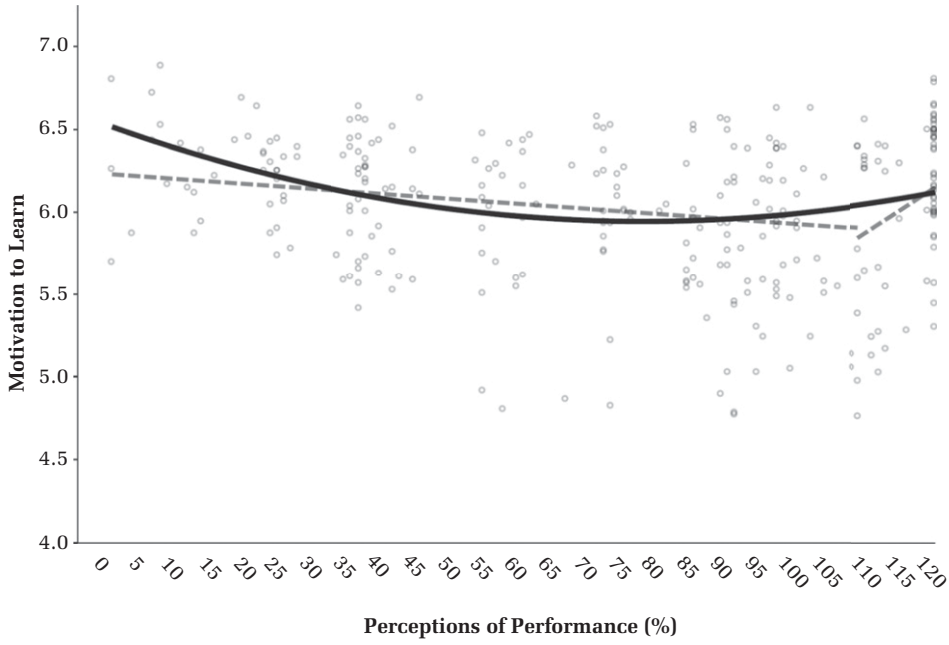
Results

Our purpose for having emergency medicine clinicians read stories of failure, success, and exceptional success was to explore how perceptions of performance influence motivation to learn, and specifically to test for the presence of a nonlinear relationship. We examined this relationship by constructing the three models presented in Table 2. In Model 1, we regressed motivation to learn from weekly stories on the controls described above, as well as on each week (with week 6 as the base condition) and the story conditions (failure and exceptional success, with success as the omitted base condition). In Model 2, we included the main effect for perceptions of performance, which revealed no significant linear effect of performance perceptions on motivation to learn ($B = –0.11$, $p = .47$). In Model 3, we added the squared term for perceptions of performance, to test the presence of a curvilinear relationship between perceptions of performance and motivation to learn, which revealed a significant main effect ($B = -1.47$, $p = .001$) and a significant quadratic effect ($B = 0.95$, $p = .002$) of perceptions of performance on motivation to learn. To check for the presence of a more complex nonlinear relationship, we also constructed separate models with cubic and quartic terms for perceptions of others' performance, which were both nonsignificant as the highest-order term in their respective models ($B_{Cubic} = –.57, p = .51$; $B_{Quartic} = 3.63, p = .20$), suggesting that the curvilinear (squared) effect more accurately reflected the nonlinear shape of the relationship.

Because the coefficient for the quadratic term in Model 3 is positive, it suggests that the relationship between perceptions of others' performance and individual's motivation to learn is *U*-shaped. We plotted this effect in Figure 1, revealing a curve where motivation to learn is higher for stories that are perceived as failures, then lower as perceptions of performance increase to the level of normal success, but rises again as perceptions of performance increase to exceptionally successful levels.

To be maximally conservative in our test of this relationship, we also subjected our data to Simonsohn's (2018) two-lines test of quadratic curves. This involves identifying a breakpoint in the curve, and

FIGURE 1
Study 1: Effect of Perceptions of Performance on Motivation to Learn



Notes: Plot depicts predicted values (gray circled points) and quadratic effect (solid black line) from the final mixed-effects model (Model 3 in Table 2) tested in Study 1. Dashed gray lines depict the linear effects generated for Simonsohn's (2018) two-lines test. Quadratic and linear effects are depicted with all continuous control variables set to their sample means and all categorical control variables set to 0.

then estimating a linear effect from the low values of the independent variable up to the break point and a second linear effect from the break point to the higher values of the independent variable, and testing these relationships for significant slopes in the expected direction. Importantly, this breakpoint is *not* the specific point at which the curve switches sign (i.e., the low point of the *U*-shape), but rather is set algorithmically with the goal of increasing power for detecting the two linear effects (Simonsohn, 2018). To calculate this breakpoint, we were not able to use Simonsohn's online calculator, which uses his more precise "Robin Hood" algorithm to calculate the breakpoint for the two lines (delivering higher power in detecting *U*-shaped relationships), because of our mixed-effects modeling approach. Instead, we calculated the breakpoint of our curve by constructing a model with all of our controls and the main, squared, cubic, and quartic terms for perceived performance and then identifying the value of perceived performance that generated the most extreme (in this case lowest) predicted value of motivation to learn from that model.[2] This generated a breakpoint of 1.09. Following the procedures for the two-lines test (i.e., constructing two interrupted regressions, one including the breakpoint in the first segment and the other including it in the second, then reporting the coefficients for each segment from the regression where it included the breakpoint [Simonsohn, 2018]) revealed a marginally significant negative slope on the lower end of the perceived performance spectrum (i.e., from 0 to 1.09; $B = -.30$, $p = .10$) and a significant positive slope on at the highest end of the spectrum (i.e., from 1.09 to 1.20; $B = 2.79$, $p = .04$; see dashed lines in Figure 1). Taken together with the analysis above, we interpret these results as suggesting that perceiving others to have achieved more highly exceptional success is associated with greater motivation to learn, compared to perceiving more normal successes. Perceived failure may also be associated with greater motivation to learn among emergency department clinicians, relative to normal success, but this finding was not as strong in the more conservative two-lines test.

Discussion

The results of this study suggest that motivation to learn was lowest when employees perceived others to be successful, and highest when they perceived that others had failed or achieved exceptional success. This finding is intriguing, given the many different forms we might

[2] This approach was detailed in an earlier version of Simonsohn's (2018) article, and was confirmed as a valid approach with Simonsohn through personal communication.

have assumed that this relationship would take, but is nonetheless a solitary finding from a study that had inherent limitations. For example, the between-person sample size was only 53 participants (though we obtained 289 week-level observations) and our measure of empathy had uncharacteristically low reliability compared to previous research using the same measure (Parker & Axtell, 2001). We therefore designed and conducted a second study with the goal of replicating this *U*-shaped effect, while also exploring potential mediators and moderators.

STUDY 2: ONLINE SCENARIO-BASED STUDY

To build on the observed results of our initial field study, we conducted a scenario study with an online sample. Our goals in Study 2 were to constructively replicate the curvilinear relationship between others' performance and motivation to learn demonstrated in Study 1, and to explore potential mediators and moderators. We focused in particular on the role of interest and surprise because both are emotions that people may experience in response to exceptional performance, that may alter how people perceive performance, and that may influence motivation to learn.

Emotions are subjective experiences characterized by relatively short periods of physiological activation and bodily expressions that occur as people appraise specific stimuli from their circumstances and that tend to alter their cognition, motivation, and action tendencies (Barrett, 2006; Izard, 2007; Thoits, 1989). The emotion of *interest* is a subjective experience in which people feel "engaged, caught-up, fascinated, curious" (Izard, 1977: 216), because they appraise stimuli to be novel or complex, but also comprehensible (Silvia, 2005). When interested, individuals exhibit behavioral or physiological changes such as speaking faster and with more range in vocal frequency, and adjusting the muscles near their eyes and forehead to focus attention and concentrate better, and motivate exploration (Silvia, 2008). *Surprise*, in contrast, is an initially mildly unpleasant emotion because it disrupts people's desires for structure and predictability, but it can turn positive if the source of the surprise is appraised to be positive after the initial disruption (Noordewier & Breugelmans, 2013). Surprise is distinct from being startled, which is a reflexive reaction to intense, sudden stimuli (Ekman, Friesen, & Simons, 1985), with surprise occurring when people actually appraise stimuli to be unexpected and to interfere with ongoing mental activity, rather than just react reflexively to it (Reisenzein, 2000). Surprise tends to initiate analysis of one's circumstances in a way that is more conscious and deliberate, and to updating of one's beliefs if necessary (Meyer, Reisenzein, & Schützwohl, 1997).

Surprise and interest could both potentially mediate the curvilinear relationship between perceptions of others' performance and motivation to learn, or potentially moderate the relationship. Surprise would mediate the relationship if people appraise others' more failed or more exceptionally successful performance to be unexpected and disruptive, because these are the appraisal criteria that lead to surprise (Reisenzein, 2000); in addition, because surprise readies people to update beliefs, it also motivates analysis (Meyer et al., 1997), which is a motivated learning effort. However, it may be that not all failures or exceptional successes are surprising. For example, if one person knows that another person regularly performs better than other employees, was working on a new and improved way to do the work, or happened to experience all of the right conditions for exceptional performance they may not be as surprised by the performance. Likewise, if the person knows that the task at hand is extremely difficult or irregular, they may be less surprised by seeing others' failure at the task, or could even find others' achievement of normal success to be surprising. If so, then the relationship between perceiving these different levels of others' performance and individuals' motivation to learn may be moderated by the extent to which the performance is more or less surprising.

Similarly, interest could mediate the relationship between perceptions of others' performance and motivation to learn if someone else's failure or exceptional success in the same or a similar task leads them to appraise that task as more novel or complex, but also more comprehensible, as these appraisals motivate exploration, which is also a motivated learning effort (Silvia, 2005, 2008). Alternatively, it may be that others' different levels of performance matter less to people when they are already interested in an activity or task. In other words, an individual's greater or lesser interest in the task could moderate the effect of perceptions of others' performance on the individual's motivation to learn. To explore these possibilities, we subjected the relationship between perceptions of performance and motivation to learn to a set of mediation and moderation analyses focusing on interest and surprise.

Participants and Procedures

We recruited participants for this scenario-based study using Qualtrics Panels. This service recruits participants from a large pool of potential participants who sign up to receive cash or reward points.

Researchers identify criteria for data quality in advance, and the service removes any responses that do not meet these criteria. We included only participants who were able to pass a colorblindness test (because the task required participants to differentiate colors), who did not use a mobile device to complete the study (again to enable greater visibility on the task), who completed the entire study, and who had not completed a study utilizing the same task previously. We further excluded participants who wrote nonsensical answers to the open-ended questions (20 people), who spent less than 5 minutes or more than 45 minutes on the study (14 additional people), who spent less than 10 seconds attempting the practice round (or did not click at least one part of the image as described below; three additional people), or who correctly guessed the goal of the study (four additional people). This left us with 296 participants in our final sample (out of 337 responses). Participants averaged 55 years of age ($SD = 14.7$) and 79% were female.

Study task and manipulation. Our study task involved identifying Howell–Jolly bodies (HJBs)—an indicator of damaged spleen function that can imply increased risk of infection and illness—from a blood smear image (a professionally prepared slide image of a blood sample), similar to the tumor cell–labeling task used by Chandler and Kapelner (2013). Participants were told that the purpose of the task was to examine whether laypeople (rather than medical professionals) could be trained to identify HJBs sufficiently well to perform this work, allowing medical professionals to perform other life-saving work. They were shown a sample smear and then engaged in a "practice round" of HJB identification. Next, they were presented with a story about a previous participant who completed the task, which we used to create variance in perceptions of performance. We did this by randomly assigning participants to read a story of a prior participant who failed, succeeded, or achieved exceptional success in the task.

Specifically, participants were told that a program of utilizing laypeople to identify HJBs would only be effective if they could identify at least 60% of the HJBs in a smear correctly. Then, participants were told how well a previous participant (referred to as FP) had done, with participants randomly assigned to read one of three versions of the story, reflecting failure, success, or exceptional success, respectively, as indicated by the words in brackets:

> For your reference, FP was [not / fairly / exceptionally] successful [at all (for the failure condition only)] at this task, identifying [far less than 60% / a little more than 60% / 100%] of the Howell–Jolly bodies correctly, [and taking much longer than average / taking an average amount of time / and was the only person out of thousands to do this, in what was nearly the shortest time] to complete the task.

Finally, participants were given a quote from FP (with language adapted for each condition):

> When I accepted this task, I thought it was fairly challenging, but interesting. I really liked that doing a good job on this task would help medical professionals—it seemed like a worthwhile task. I tried very hard to do a good job and identify the Howell–Jolly bodies correctly. I think the reason I [didn't do well / did pretty well / did really well] was because I [was not / was / was] very diligent about how I searched through the image for the HJBs. I learned it is important to develop a very clear search strategy for this task, like moving top to bottom or left to right, and doing it consistently. It's very easy to get distracted or not be systematic about it.

Next, participants answered perceptual questions, including questions about the empathy they felt for the previous participant, their perceptions of how successful the previous participant has been, and their own motivation to learn. Participants then saw the slide of HJBs from the practice round again, but this time with feedback on the cells that should have been labeled as containing HJBs (provided by two medical students), and were asked to reflect on what worked well or poorly, and what they might do differently in the "actual" test. After sharing their reflections, participants performed the "actual" test of identifying HJBs in another blood smear image. Then they were asked demographic and perceptual questions. On the final page of the survey, after submitting all of their responses, they were debriefed on the purpose of the study.

Measures

Focal measures. We assessed *motivation to learn* ($\alpha = .95$) and *perceptions of performance* using the same items as in Study 1, adapted to fit the study context (for instance, we changed the third and seventh anchors in our scale of perceptions of performance from "Less success than expected" and "An outcome that exceeds all expectations" to "Less success than desired" and "An exceptional outcome"; see Appendix A).

Surprise and interest measures. As noted earlier, one of the goals of Study 2 was to explore potential mediating and moderating roles of surprise and interest in explaining the relationship between perceptions of others' performance and individual motivation to learn. *surprise* (Kotsch, Gerbing, & Schwartz, 1982) and *interest* (Mitchell, 1993) were both measured after assessing participants' perceptions of FP's performance in the provided story, but before assessing their motivation to learn. The Cronbach's α for these variables are 0.83 and 0.91, respectively, and we captured participant responses for both variables with a 7-point Likert scale ranging from "strongly disagree" to "strongly agree."

Controls. Consistent with Study 1, we controlled for *empathy*, which could influence motivation to learn because people who feel others' emotions and perspectives tend to be more receptive to using their views as a new way of understanding (Brown & Starkey, 2000). Given the low reliability of the empathy measure used in Study 1 (adapted from Parker & Axtell, 2001), in this study we adapted Escalas and Stern's (2003) five-item measure (on a 7-point Likert scale ranging from "strongly disagree" to "strongly agree") of empathizing with advertisements (because it focuses on empathizing with a story protagonist), and found that it demonstrated greater internal consistency (α = .96) in our research context. A confirmatory factor analysis (using MPlus [Muthén & Muthén, 2005]) of all items in our included scale measures (motivation to learn, empathy, surprise, and interest) revealed acceptable model fit (RMSEA = .10, SRMR = .06, CFI = .93, TLI = .91).

Similar to Study 1, we included dummy variables for the exceptional success and failure story conditions to account for any additional effects from the stories that may have occurred above and beyond their effects on perceptions of performance. We included a binary variable for whether a person was a *health professional* (0 = no, 1 = yes), coded based on their self-reported occupational category (assessed at the end of the study), to account for any effects that previous knowledge about the medical field may have on the desire to learn an activity from that same field. Finally, we controlled for *age* because it has been shown to affect motivation to learn and related variables (Colquitt, LePine, & Noe, 2000) as well as performance in similar tasks (Chandler & Kapelner, 2013).

Analysis

Procedure and data quality. We conducted our analysis at the individual level using ordinary least squares (OLS) regression, as well as Hayes' (2013) MEDCURVE macro in SPSS 24. Means, standard deviations, and correlations are presented in Table 3. Again, though not a necessary part of our analysis (O'Keefe, 2003), we examined whether the stories of failure, success, and exceptional success affected perceptions of performance (using success stories as the omitted base condition). Including the controls, we found that failure stories had a negative impact (B = –0.22, $p < .001$), and exceptional success had a positive impact (B = 0.26, $p < .001$), on perceptions of performance. Histograms of residuals from analyses suggested the presence of several potential outliers (three exceptional residuals in the model predicting motivation to learn). We reviewed these responses and determined that they were within reasonable bounds (e.g., there were no obvious signs of error or mis-entry), and we had no theoretically grounded reason for removing them. All of our analyses therefore include these observations.

Results

We were interested in the possibility that participants' perceptions of FP's performance in the story they read would demonstrate a *U*-shaped effect on participants' motivation to learn from the story based on whether it reflected failure, success, or exceptional success. We constructed the first three models in Table 4 to examine this idea. Model 1 displays the effect of the controls on motivation to learn and Model 2 displays the effect of the controls and the main effect of perceptions of FP's performance. Model 3 includes all variables, including the squared term for perceptions of FP's performance. As in Study 1, the coefficient for the main effect in Model 2 was not significant (B = 0.33, p = .29), but in Model 3 the coefficients for the main effect (B = –2.36, p = .03) and the squared term (B = 1.79, p = .01) for perceptions of performance were both significant. The sign of the coefficient for the squared term suggests that the curve takes a *U* shape, as shown in the plotted results in Figure 2.

We performed Simonsohn's (2018) two-lines test so as to be maximally conservative in our interpretation of the relationship between perceptions of others' performance and individuals' motivation to learn. We used Simonsohn's online calculator (which uses the Robin Hood estimation procedure to generate a breakpoint in the curve and subsequently calculates the necessary linear effects, with heteroskedastic robust standard errors, to test the slopes of each linear effect; available at http://webstimate.org/twolines/) to perform the test in Study 2. This generated a breakpoint for the data at 0.61, and yielded an average slope for the linear relationship on the low end of the perceived performance spectrum (i.e., from 0 to 0.61)

TABLE 3
Study 2: Descriptive Statistics

	Mean	*SD*	1	2	3	4	5	6	7	8	9	10
Control Variables												
1. Age	54.76	14.72	–									
2. Health professional[a]	0.09	0.29	−0.09	–								
3. Exceptional success story[a]	0.34	0.48	−0	0.02	–							
4. Success story[a]	0.31	0.46	−0.09	0.02	−0.5***	–						
5. Failure story[a]	0.34	0.48	0.10†	−0.03	−0.5***	−0.5***	–					
6. Empathy	4.21	1.51	0.00	0.09	0.22***	0.15**	−0.36***	(0.96)				
Independent Variables												
7. Perceptions of performance	0.73	0.29	−0.02	0.04	0.67***	−0.01	−0.66***	0.41***	–			
8. Surprise	3.95	1.45	0.07	0.01	0.37***	−0.21***	−0.16**	0.24***	0.34***	(0.83)		
9. Interest	5.14	1.21	0.14*	0.06	0.10 †	0.03	−0.13*	0.43***	0.22***	0.20***	(0.91)	
Dependent Variable												
10. Motivation to learn	5.85	1.02	0.12*	0.00	0.00	0.05	−0.04	0.36***	0.12*	0.15**	0.67***	(0.95)

Note: $n = 296$.

[a] Dummy variable.

†$p \leq 0.10$

*$p \leq 0.05$

**$p \leq 0.01$

***$p \leq 0.001$

TABLE 4
Study 2: Regression Models Predicting Motivation to Learn

	MODEL 1			MODEL 2			MODEL 3		
Parameters	**Estimate**	***SE***	***t***	**Estimate**	***SE***	***t***	**Estimate**	***SE***	***T***
Controls									
Constant	4.32	0.28	15.27***	4.14	0.33	12.59***	5.08	0.49	10.29***
Age	0.01	0.00	1.95*	0.01	0.00	1.91†	0.01	0.00	1.86†
Health professional[a]	−0.07	0.19	−0.37	−0.08	0.19	−0.39	−0.07	0.19	−0.36
Exceptional success story[a]	−0.11	0.14	−0.83	−0.20	0.16	−1.26	−0.31	0.16	−1.89†
Failure story[a]	0.13	0.15	0.91	0.20	0.16	1.28	0.06	0.17	0.34
Empathy	0.27	0.04	6.74***	0.26	0.04	6.25***	0.26	0.04	6.43***
Main Effect Term									
Perceptions of performance				0.33	0.31	1.06	−2.36	1.11	−2.14*
Quadratic Term									
Perceptions of performance squared							1.79	0.71	2.54**
R^2	0.15***			0.15***			0.17***		
ΔR^2				0.00			0.02**		

Note: $n = 296$.
[a] Dummy variable.
†$p \leq 0.10$
*$p \leq 0.05$
**$p \leq 0.01$
***$p \leq 0.001$

that was negative but not statistically significant ($B = –0.60$, $p = .49$), while the slope of the line for higher values of perceived performance (from 0.61 to 1.20) was positive and significant ($B = 0.96$, $p = .05$; see dotted lines in Figure 2). These results (similar to those of Study 1) are consistent with the idea that perceiving others' more exceptional success is associated with greater motivation to learn, relative to more normal success. However, they also suggest that, at least in this sample, there is no statistically significant increase in motivation to learn as individuals perceive others' performance as demonstrating greater failure (vs. more normal success).

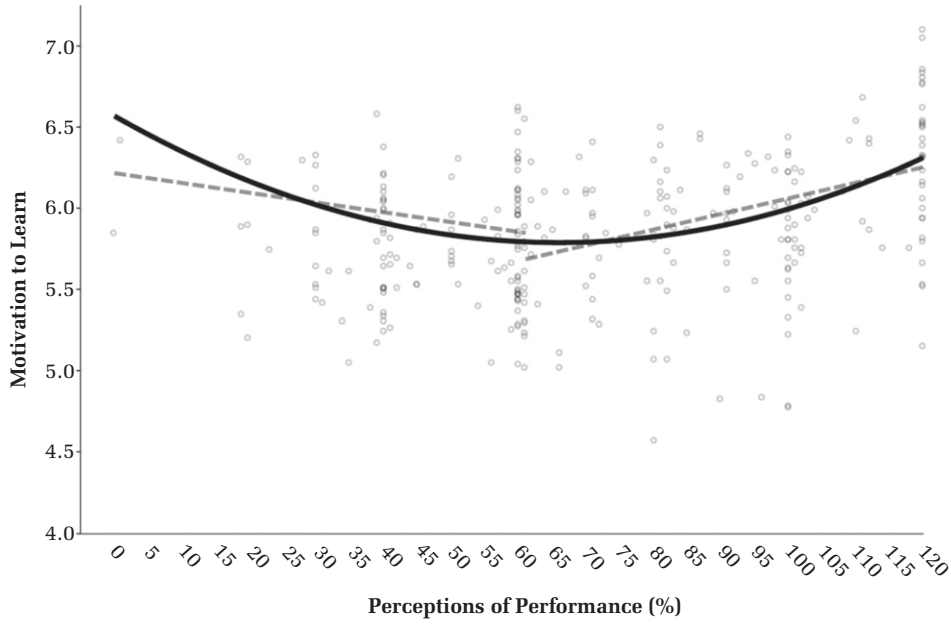
Mediation and moderation results. To explore the potential mediating and moderating effects of surprise and interest on the relationship between perceptions of others' performance and motivation to learn, we used Hayes' (2013) MEDCURVE macro (to examine mediation) and multiple regression (to examine moderation). We considered mediation and moderation for both variables. We examined each variable as a mediator first. As can be seen in Table 5, the first model reveals that perceptions of performance had no effect on surprise ($B_{\text{main effect}} = –0.67$, $p = .66$; $B_{\text{quadratic effect}} = 1.13$, $p = .25$), the second model reveals that surprise had no effect on motivation to learn ($B = 0.06$, $p = .19$), and the 95% bootstrapped confidence intervals for the instantaneous indirect effect of perceptions of performance on motivation to learn (through surprise) contain 0 at low, medium, and high levels of perceptions of performance (low = [–0.04, 0.18], moderate = [–0.01, 0.19], high = [–0.02, 0.34]). These results suggest that surprise did not mediate the effect of perceptions of performance on motivation to learn.

Table 5 also displays the analyses for interest mediating the relationship between perceptions of performance and motivation to learn. The third model reveals that perceptions of performance had significant direct and quadratic effects on interest ($B_{\text{main effect}} = -3.96$, $p = .002$; $B_{\text{quadratic effect}} = 2.98$, $p < .001$), the fourth model reveals that interest has a significant effect on motivation to learn ($B = 0.55$, $p < .001$), and the 95% bootstrapped confidence intervals for the instantaneous indirect effect of perceptions of performance on motivation to learn excluded 0 at high levels of perceptions of performance, but not low or moderate levels (low = [-1.61, 0.06], moderate = [–0.25, 0.61], high = [0.48, 1.79]). This pattern of results suggests that interest mediated the effect of perceptions of others' more exceptional success on motivation to learn, but not the effect of perceptions of others' more normal success or failure.

Table 6 displays the results of our moderation analyses. The first model reveals that there was a significant interaction of surprise with both perceptions of performance ($B = 1.60$, $p = .04$) and perceptions of performance squared ($B = -1.05$, $p = .03$). Plotting this interaction (see Figure 3), and probing slopes using Dawson's indirect calculation of simple slopes (see Dawson, 2014) at each value of surprise

Was there anything that surprised you about the findings?

FIGURE 2
Study 2: Effect of Perceptions of Performance on Motivation to Learn



Notes: Plot depicts predicted values (gray circled points) and quadratic effect (solid black line) from the final regression model (Model 3 in Table 4) tested in Study 2. Dashed gray lines depict the linear effects generated for Simonsohn's (2018) two-lines test. Quadratic and linear effects are depicted with all continuous control variables set to their sample means and all categorical control variables set to 0.

plotted (i.e., mean, 1 *SD* below mean, and 1 *SD* above mean), revealed that at low (1 *SD* below mean) and average (mean) levels of surprise, the relationship between perceptions of others' performance and motivation to learn took the anticipated curvilinear shape (with coefficients for the quadratic effect of $B = 3.18$ $p = .001$ at low surprise and $B = 1.66$, $p = .02$ at mean surprise). However, at high levels of surprise (1 *SD* above mean), the effect changes shape and significance, reflecting a nonsignificant (i.e., flat) effect of perceptions of performance on motivation to learn (with no significant coefficients for either the linear or quadratic effect of perceptions of performance when surprise was high; $p \geqslant .89$ for both).

The second model in Table 6 reveals that interest did not moderate the relationship between perceptions of performance and motivation to learn, as can be seen by the interaction effects of interest with perceptions of performance ($B = 0.05$, $p = .94$) and with perceptions of performance squared ($B = –0.04$, $p = .94$). However, the main effect of interest on motivation to learn was again significant ($B = 0.53$, $p = .03$), consistent with our mediation analysis.

Discussion

Our scenario-based study replicated the curvilinear relationship between perceptions of others' performance on an individual's motivation to learn observed in Study 1, and plotting the results revealed a similar *U*-shaped relationship. Specifically, the results of this study replicated the beneficial effects of exceptional success observed in Study 1, such that perceiving others' performance as more of an exceptional success was associated with greater motivation to learn, relative to perceiving others' performance as more of a normal success. Perceiving others' performance as more of a failure seemed to be associated with higher motivation to learn; however, the linear slope over this portion of the performance-perception continuum was not statistically significant in Simonsohn's (2018) two-lines test.

Our analyses also revealed key mediating and moderating roles for interest and surprise, respectively, that help shed additional light on the nature of the relationship between perceptions of others' performance (and specifically exceptionally successful performance) and individual motivation to learn. Specifically, these results revealed that perceptions of exceptional success motivated learning (at least in part) through the interest individuals felt in the task, which in turn positively impacted motivation to learn. Results also revealed that surprise significantly moderated the effect of performance perceptions on motivation to learn, such that the curvilinear effect was strengthened at low levels of surprise,

TABLE 5
Study 2: Exploration of Surprise and Interest as Mediators of the Effect of Perceptions of Performance on Motivation to Learn

	Surprise			Motivation to Learn			Interest			Motivation to Learn		
Parameters	**Estimate**	***SE***	***T***	**Estimate**	***SE***	***t***	**Estimate**	***SE***	***t***	**Estimate**	***SE***	***t***
Constant	2.39	0.69	3.46***	4.95	0.50	9.83***	4.29	0.56	7.71***	2.74	0.43	6.39***
Control Variables												
Age	0.01	0.01	1.00	0.01	0.00	1.78	0.01	0.00	2.44*	0.00	0.00	0.44
Health professional	−0.03	0.27	−0.13	−0.07	0.19	−0.35	0.14	0.22	0.65	−0.15	0.15	−0.97
Exceptional success story	0.81	0.23	3.55***	−0.35	0.17	−2.12*	−0.25	0.18	−1.33	−0.17	0.13	−1.35
Failure story	0.45	0.24	1.90†	0.03	0.17	0.19	−0.05	0.19	−0.27	0.09	0.13	0.64
Empathy	0.15	0.06	2.70**	0.25	0.04	6.15***	0.34	0.05	7.41***	0.08	0.04	2.17*
Independent Variable												
Perceptions of FP's performance	−0.67	1.54	−0.44	−2.33	1.10	−2.11*	−3.96	1.24	−3.18**	−0.20	0.89	−0.23
Perceptions of performance squared	1.13	0.99	1.15	1.73	0.71	2.45*	2.98	0.80	3.75***	0.16	0.57	0.29
Mediators												
Surprise				0.06	0.04	1.32						
Interest										0.55	0.04	13.24***
F	9.75***			7.75***			13.62***			33.99***		
R^2	0.19			0.18			0.25			0.49		
Bias-corrected bootstrap confidence interval for instantaneous indirect effect when:												
Perceptions of performance = 0.44			0.02, CI = [–.04, 0.18]						−0.73, CI = [-1.61, 0.06]			
Perceptions of performance = 0.73			0.05, CI = [–.01, 0.19]						0.20, CI = [–0.25, 0.61]			
Perceptions of performance = 1.01			0.09, CI = [–.02, 0.34]						1.13, CI = [0.48, 1.79]			

Note: $n = 296$.
†$p \leq 0.10$
*$p \leq 0.05$
**$p \leq 0.01$
***$p \leq 0.001$

TABLE 6
Study 2: Exploration of Surprise and Interest as Moderators of the Effect of Perceptions of Performance on Motivation to Learn

Parameters	Estimate	*SE*	*t*	Estimate	*SE*	*t*
Constant	6.89	1.15	5.97***	2.81	1.26	2.23*
Control Variables						
Age	0.01	0.00	1.96†	0.00	0.00	0.44
Health professional	−0.03	0.19	−0.18	−0.15	0.15	−0.97
Exceptional success story	−0.39	0.17	−2.33*	−0.18	0.13	−1.34
Failure story	0.01	0.17	0.08	0.09	0.13	0.64
Empathy	0.26	0.04	6.26***	0.08	0.04	2.11*
Independent variables						
Perceptions of PF's performance	−8.43	3.13	−2.70**	−0.46	3.56	−0.13
Perceptions of performance squared	5.80	2.00	2.91**	0.36	2.41	0.15
Moderating Variables						
Surprise	−0.48	0.30	−1.61			
Surprise × perceptions of performance	1.60	0.79	2.04*			
Surprise × perceptions of performance squared	−1.05	0.49	−2.15*			
Interest				0.53	0.24	2.22*
Interest × perceptions of performance				0.05	0.68	0.07
Interest × perceptions of performance squared				−0.04	0.45	−0.08
F	6.74***			27.01***		
R^2	0.19			0.49		

Note: $n = 296$.
†$p \leq 0.10$
*$p \leq 0.05$
**$p \leq 0.01$
***$p \leq 0.001$

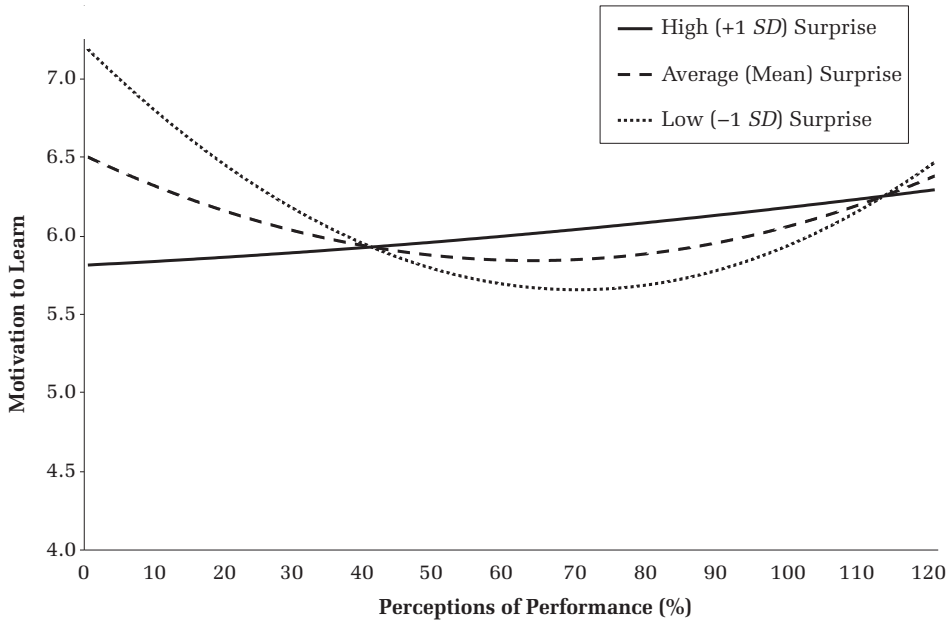
and reduced to nonsignificance (for both linear and quadratic effects) at high levels of surprise. Interpreting the plot of this effect suggests that when participants were highly surprised after reading about a normal success, their motivation to learn was effectively equivalent to that arising from reading about more exceptional success (where motivation to learn seemed to be more consistent across levels of perceived performance). In other words, as long as participants felt a high level of surprise, perceiving any level of others' performance had a similar impact on their motivation to learn (reflected in the nonsignificant slope of performance perceptions on motivation to learn at high levels of surprise). We further discuss the implication of these exploratory analyses, in concert with our primary analyses, in the general discussion.

GENERAL DISCUSSION

Across two studies, we found that when individuals encounter and perceive others' exceptional success, the individuals are more motivated to learn, relative to perceiving others' performance as demonstrating more normal, expected success. We also observed limited (and mixed) evidence for the effect of others' failure, relative to normal success, on individuals' motivation to learn across the two studies. The effect of failure on motivation to learn is consistent with emotion-as-feedback theory (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001), which proposes that negative emotions have a stronger impact than do positive emotions on information processing, motivation, stereotyping, and other psychological phenomena. However, our results suggest a modification to this theory, at least with regard to our context and topic. If we restate our results in the language of emotion-as-feedback theory, we could say that when it comes to motivating individuals' learning from others' experiences, bad might be (somewhat) stronger than good, but exceptionally good is also (significantly) stronger than good. Our second study also explored interest and surprise as potential mediators and moderators of the effects of others' performance on motivation to learn. Specifically, we observed that interest mediated the relationship between perceived performance and motivation to learn, whereas surprise moderated this relationship. When surprise was high, normal success had effectively the same impact on motivation to learn as did failure and exceptional success.

The curvilinear relationship observed in our studies between perceptions of others' performance (ranging from failure, through success, to exceptional success) and motivation to learn is important—and even more intriguing—given the many recent findings that have highlighted the value of learning from others' failures, though typically

FIGURE 3
Study 2: Quadratic Effect of Perceptions of Performance on Motivation to Learn Moderated by Surprise



Note: Effects are depicted with all continuous control variables standardized and all categorical control variables set to 0.

without examining motivation to learn. Indeed, much research on how people learn in organizations has typically assumed that learning is motivated but has not explicitly examined that motivation, or has examined behaviors that might be considered proxies for motivation to learn (e.g., the value or relevance of particular information [Borgatti & Cross, 2003; Quinn & Bunderson, 2016]). This is particularly true of studies that have examined how individuals might learn from others' knowledge, experience, and performance, which have implicitly assumed some level of individual motivation to learn or improve, but generally relied on observed behavior change or improved performance displayed by the individual as an indirect indicator of this motivated learning. Many of these studies have argued that trying to learn from others' exceptional success is more likely to generate biased conclusions (Denrell, 2003; Denrell et al., 2013; Denrell & Liu, 2012), or that greater understanding and performance improvement occurs in response to others' failure than in response to others' success (e.g., Joung, Hesketh, & Neal, 2006; KC, Staats, & Gino, 2013).

In contrast, our results highlight interesting observations and possibilities for future exploration. For example, on one hand, greater motivation to learn from exceptional success that generates biased conclusions could be quite dangerous. On the other hand, analyzing and understanding exceptionally successful cases is also known to promote deeper understanding of substantial learning opportunities (Starbuck, 1993), greater firm innovation (Lilien et al., 2002), and the scaling of idiosyncratic successes through organizations and communities (Cooperrider & Whitney, 2005; Pascale, Sternin, & Sternin, 2010). The validity of the conclusions drawn from another's experience will inherently depend on how it is adapted and applied to some future task, so it may be the case that some conclusions are not relevant for an individual's immediate context, but may in fact be valuable as novel, innovative solutions to some future problem.

Moreover, our results suggest the existence of at least three distinct levels of performance in work tasks (failure, success, and exceptional success) and reveal that considering them simultaneously helps develop more nuanced understandings of individuals' motivation for learning. For instance, in studies where people were observed to learn more (or at least improve their performance more) from others' failure than from others' success, it may be that the researchers were comparing failure with normal success rather than with exceptional success. Alternatively, moderating factors, such as surprise, may be at play; it may be that they were examining performance that was not surprising, and if the performance was surprising, they would find that perceived normal success leads to as much learning as perceived failure does when the performance is surprising. It may also be simply that the performance benefits of others' failure observed in these

studies occurs through a mechanism other than increased motivation to learn, inviting further exploration of what factors undergird these complex vicarious learning processes.

Mechanisms

Exploring psychological mechanisms, our results do allow us to begin identifying, as well as ruling out, potential explanations for why exceptional success increased motivation to learn. For instance, our field study revealed some evidence that an individual's baseline motivation to learn and empathy influence their motivation to learn from a story of another's experience, but that profession and typical levels of learning behavior do not. This suggests that some individual difference measures likely matter in understanding this relationship, but that motivation to learn is not purely learner-driven, nor purely socioemotional. Indeed, we observed the effects of perceptions of performance above and beyond the beneficial effects of individuals' empathy for the protagonist of a story of performance (indicative of their social or emotional connectedness to the protagonist). The motivating value of others' exceptional success for individual learning thus seems likely to operate through a more nuanced mechanism of aspirational information processing, rather than through one that is purely due to individual differences or relational characteristics.

We also found evidence for an indirect curvilinear effect of performance perceptions on motivation to learn through interest, suggesting that high levels of perceived performance can pique an individual's interest and curiosity, motivating them to learn. People become interested in events when those events are novel or complex, but comprehensible (Silvia, 2008). Exceptional performance is novel because it does not happen as often, by definition, as normal success does, and it may also be complex. Further, we examined how exceptional success affects motivation to learn among people performing the same or similar tasks, which means that their exceptional success was likely to be comprehensible to them. This may explain why it interested them and subsequently motivated them to learn. Alongside the idea that achieving exceptional success is desirable to most people, and that if someone else has achieved success, it may seem safe to pursue similar success, this adds to people's motivation to learn. The result that surprise moderates the curvilinear effect of performance on motivation to learn augments these arguments. Motivation to learn was equally high for all levels of performance when people were surprised, but the curvilinear pattern of motivation to learn—with greater motivation at the tails of the performance spectrum—emerged at average and low levels of surprise.

Exceptional success stories may also increase motivation to learn for identity-focused reasons. When exceptional events happen, they can cause people to question accepted beliefs, including beliefs about their own identity (e.g., Weick, 1993). For example, if an emergency-department doctor hears about how a patient lived after being impaled through the stomach (knowing that most people die from such injuries), they may wonder whether they could save a patient in a similar situation. If they are not sure, they may wonder what that says about their identity as an emergency medicine physician. Because humans feel a need to perceive themselves as positive, competent, and consistent (Erez & Earley, 1993), this doctor would likely feel the need to try to reestablish or rebuild their identity. Since "[i]dentities are constructed out of the process of social interaction" (Weick, 1995: 20), the doctor would be motivated to talk with others about what this story means for them (e.g., Mead, 1934; Pratt & Barnett, 1997). Because these conversations are about the doctor's capability, they are likely to involve making sense of how the exceptional success of their colleague who saved that patient was accomplished. The doctor's desire to continuously establish and reestablish their identity as a competent professional thus motivates them to learn.

Author's voice:
What is the social relevance of your research?

Arenas for Learning

The impact of perceptions of others' performance on a person's motivation to learn has implications for an array of topics studied by organizational scholars in addition to vicarious learning and training. One such topic is leadership. For example, if perceptions of performance influence motivation to learn by giving employees a more aspirational orientation to their work, then exceptional performance may be one way for a leader (or potential leader) to lift the vision of followers (or potential followers). Research on leader vision communication (e.g., Stam, Van Knippenberg, & Wisse, 2010) has tended to focus on how leaders frame their appeals to followers. However, another—and perhaps more powerful—way to lift the vision of followers is by achieving exceptional success, because it motivates followers to learn, increasing the chance that they may achieve exceptional success as well.

The relationship between exceptional success and motivation to learn may also have implications for research on creativity and innovation. Innovative output is created by recombining ideas across social domains

(Hargadon, 2003), and exceptional success is an important cue for deciding which ideas in other domains to pay attention to when trying to learn (Lilien et al., 2002). Even so, creativity and innovation can be difficult and even frustrating processes (Van de Ven, Polley, Garud, & Venkataraman, 1999). If exceptional success motivates learning because it increases interest (as suggested by our exploratory results), then exceptional success is not only a cue for which ideas to pay attention to but also a source of positive motivation that may help during an innovation process that might otherwise be difficult or frustrating.

Limitations and Future Directions

As with any exploratory, abductive study, the results we present here are preliminary, and require more research to fully establish them. For example, although we found that there is a curvilinear relationship between perceptions of performance and motivation to learn that is moderated by surprise and mediated by interest, it is possible that other variables that we did not include in our study also influence these relationships. For example, motivation to learn may be influenced by individual characteristics such as openness to experience or conscientiousness, both of which we might expect to positively influence motivation to learn and may also influence judgments about others' performance. We control for several individual differences across our two studies, including individuals' degree of domain expertise (via the control for physician [vs. other health provider] participants in Study 1 and health professionals in Study 2), baseline learning motivation and behavior (in Study 1), age (in Study 2), and empathy with the story protagonist (in both studies), but additional characteristics may be at play when individuals' perceive others' performance and motivate their resultant learning from it. Our limit to the individual differences examined is in part inherent in our design, as the self-report nature of our studies might have introduced concerns about common method variance inflating our results if we included these other measures (though, as noted earlier, such concerns do not impact our primary results, as curvilinear effects cannot suffer from common method variance [Siemsen et al., 2010]). Therefore, we encourage future research using a broad range of study designs, including laboratory experiments, to further examine this relationship.

In addition to considering additional individual characteristics, it is important for future research to examine these effects in other contexts with varying situational characteristics, and to explore boundary conditions for this phenomenon. For example, the reliability of the source of information about the performance, the similarity between the person who achieved exceptional performance and the individual perceiving that performance, and the similarity between the performer's work to the work of the individual may all influence this relationship. If people perceive exceptional performance in tasks that are too different from their own, or exceptional success of people who they believe are too different from them, they may assume that the exceptional performance is not relevant to them. Probing these factors and influences—alongside other questions, such as examining one's own exceptional successes as a motivator of learning, would likely yield important scholarly insights into how and when individuals learn vicariously from others' performance at work.

Practical Implications

Beyond these theoretical contributions and provocations, the idea that exceptional success stories motivate learning offers a practical and useful insight, because it suggests that managers can inspire learning in their employees without having to rely solely on stories or examples of failure (a popular recommendation in prior research and managerial discourse). In this way, the possibility that exceptional success stories can motivate learning provides a relatively safe tool for managers to encourage continuous improvement in employees. Our research findings suggest that managers could motivate learning in their employees by sharing stories of exceptional success as part of the normal workday routine. Failure stories have been shown to better motivate learning in classroom or training settings compared to success stories (Bledow, Carette, Kühnel, & Pittig, 2017; Joung et al., 2006), and there are certainly appropriate times for sharing failure stories. However, failure stories can be problematic if they cause people to feel threatened (Cannon & Edmondson, 2001). Eliciting a reciprocal cooperative interpersonal process (Kopelman, 2020) of sharing stories of exceptional success would motivate learning and foster beneficial group outcomes, while being less likely to promote individual defensiveness and vulnerability. The implications of our findings viewed through a positive lens for organizational scholarship (Cameron, Dutton, & Quinn, 2003; Spreitzer, Myers, Kopelman, & Mayer, 2019) suggest that sharing exceptional success stories is a positive organizational practice that emphasizes what is going well and encourages learning that promotes future success.

CONCLUSION

Opportunities for learning abound for individuals at work. Understanding how perceptions of others' performance have a curvilinear effect on individuals' motivation to learn provides unique insights for advancing

our knowledge of how people learn from others' failures, successes, and exceptional successes. Given that people can benefit significantly by learning from others' experiences, but that this learning can be quite difficult to accomplish, continuing to study the motivating effects of perceiving different levels of performance in others' work will expand both our theoretical and practical understanding of vicarious learning in organizations.

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APPENDIX A

PERCEPTUAL MEASURES

All perceptual measures used in both studies are presented here.

Perceptions of Performance—Study 1

How successful were the people in this story at achieving the goals of the emergency department?

Motivation to Learn—Study 1 (adapted from Colquitt & Simmering, 1998; Noe & Schmitt, 1986)

To what extent do you agree or disagree with the following statements?

- This week, I intend to exert considerable effort on activities related to learning and development.
- I try to learn as much as I can from my work in the emergency department.
- I have a strong desire to learn and develop new skills through my work in the emergency department.

Learning Behaviors—Study 1 (Edmondson, 1999)

How often do you. . .

- Seek out and take advantage of learning opportunities.
- Take initiative to learn new skills to expand your contributions to the organization.
- Plan ways to develop your capabilities.
- Make active efforts to acquire new knowledge.
- Regularly take time to reflect on ways to develop and improve.
- Get all the information you possibly can from others to learn and develop.
- Seek out new information that leads to gains in personal knowledge and skills.
- Frequently seek new information that leads to growth.

Empathy—Study 1 (adapted from Parker & Axtell, 2001)

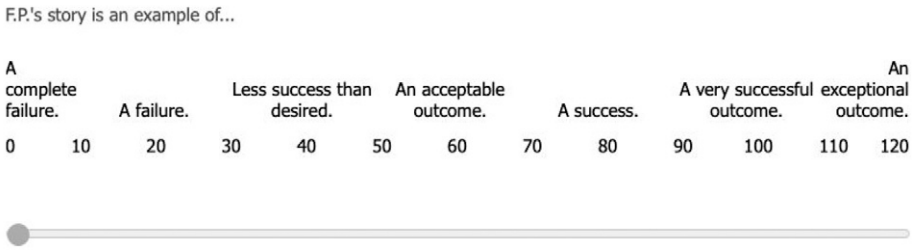
Please answer these questions quickly and honestly.

- I felt concern for the protagonist of this story.
- It pleased me when the protagonist did well.
- I understand the problems the protagonist experienced.
- The protagonist did the best they could, given the circumstances.
- If the protagonist made a mistake, it was probably not their fault.
- The protagonist worked just as hard as I would have.

Perceptions of Performance—Study 2

How successful was FP at achieving the goals of this task? Move the slider on the scale below to identify the appropriate level of success.

Motivation to Learn—Study 2 (adapted from Colquitt & Simmering, 1998; Noe & Schmitt, 1986)



To what extent do you agree or disagree with the following statements?

- I intend to exert considerable effort on learning and developing in this task.
- I will try to learn as much as I can from my work on this task.
- I have a strong desire to learn and develop new skills through my work on this task.

Empathy—Study 2 (Advertisement response empathy scale [Escalas & Stern, 2003])

Please answer quickly and honestly based on your impressions of FP after reading the summary.

- I felt as if FP's experience was really happening to me.
- I felt as though I were FP.
- I experienced many of the same feelings that FP probably experienced.
- I felt as if FP's feelings were my own.
- I felt as if what happened to FP was happening to me.

Surprise—Study 2 (Izard, 1977; Kotsch et al., 1982)

Please indicate the degree to which each of these words describe how you feel about the HJB identifying task after reading FP's story.

- Surprised
- Amazed
- Astonished

Interest—Study 2 (adapted from Mitchell, 1993)

Please indicate the extent to which you agree with each of these statements.

- Identifying HJBs should be fun.
- I actually look forward to identifying HJBs.
- Identifying HJBs should be dull [reverse coded].
- I think I will like identifying HJBs.
- I don't find anything interesting about identifying HJBs [reverse coded].
- Other activities would be more interesting than identifying HJBs [reverse coded].