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Keeping (Future) Rivals Down: Temporal Social Comparison Predicts Coworker Social Undermining via Future Status Threat and Envy

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The extant social undermining literature suggests that employees envy and, consequently, undermine coworkers when they feel that these coworkers are better off and thus pose a threat to their own current status. With the present research, we draw on the sociofunctional approach to emotions to propose that an anticipated future status threat can similarly incline employees to feel envy toward, and subsequently undermine, their coworkers. We argue that employees pay special attention to coworkers' past development in relation to their own, because faster-rising coworkers may pose a future status threat even if they are still performing worse in absolute terms in the present. With a set of two behavioral experiments ($N = 90$ and $N = 168$), we establish that participants react to faster-rising coworkers with social undermining behavior when the climate is competitive (vs. less competitive). We extended these results with a scenario experiment ($N = 376$) showing that, in these situations, participants extrapolate lower future status than said coworker and thus respond with envy and undermining behavior. A two-wave field study ($N = 252$) replicated the complete moderated serial mediation model. Our findings help to explain why employees sometimes undermine others who present no immediate threat to their status. As such, we extend theorizing on social undermining and social comparison.

Keywords: envy, social comparison, social undermining, status, temporal social comparison

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> "One of the most valuable things I learned was to give the appearance of being courteous while withholding just enough information from colleagues to ensure they didn't get ahead of me on the rankings."
>
> —A Microsoft engineer in Kurt Eichenwald, *Microsoft's Lost Decade*, 2012.

Employees sometimes engage in covert and insidious forms of harming—such as spreading rumors or withholding information—that pose serious costs to organizations (Duffy, Scott, Shaw, Tepper, & Aquino, 2012; Larkin, Pierce, & Gino, 2012). One major driver of these social undermining behaviors (Duffy, Ganster, & Pagon, 2002) is employees' experience of envy toward their coworkers (Cohen-Charash & Mueller, 2007; Duffy, Ganster, Shaw, Johnson, & Pagon, 2006; Duffy et al., 2012; Duffy & Shaw, 2000). According to the literature, envy arises when employees compare themselves with their coworkers and subsequently feel a threat to their own status (Cohen-Charash, 2009; Duffy & Shaw, 2000). In response, employees may strive to sabotage the coworker's status through social undermining, hoping to improve their own status and alleviate the envious feeling (Duffy et al., 2012; Kim & Glomb, 2014; Lam, Van der Vegt, Walter, & Huang, 2011; Tai, Narayanan, & McAllister, 2012).

These studies commonly assume that employees' social undermining behaviors are motivated by a perceived threat to their current status, irrespective of past and future developments in status differences. Yet, Albert (1977) critiqued that these social comparisons reflect comparisons at a single point in time, thereby reflecting a *static status comparison*. Indeed, studies in that tradition propose that only comparisons with those who are currently superior will elicit envy and subsequent social undermining (Lam et al., 2011). Lam and colleagues (2011), for instance, stated that they do "not expect pronounced harming behavior in downward comparison situations" and that "irrespective of the actor's expected future performance similarity, interpersonal harming should remain limited in downward comparison situations" (p. 590). Potentially, these studies assumed that employees already factor their past trajectories into their assessments of current status, but this has not been explicitly tested or clarified.

However, people also care about maintaining their status into the future (Bothner, Kang, & Stuart, 2007; Pettit, Yong, & Spataro, 2010; Scheepers & Ellemers, 2005; Scheepers, Ellemers, & Sintemaartensdijk, 2009). The dimensions that underlie these comparisons change over time and at a different pace for each employee (e.g., some employees receive promotions more often, see faster improvements, or get steeper pay raises than others; Chen & Mathieu, 2008). Thus, it seems theoretically conceivable that employees will compare their past development against their coworkers' development, using these temporal trajectories to extrapolate their possible future status. We refer to these comparisons as *temporal social comparisons*, which integrate social comparison theory (cf. between subjects; Festinger, 1954) with findings on

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status momentum (Pettit, Sivanathan, Gladstone, & Marr, 2013). Taking a sociofunctional view on emotions (Cottrell & Neuberg, 2005), the current paper advances and tests the prediction that employees will also envy and subsequently undermine coworkers who could potentially threaten their future status, irrespective of whether said coworkers pose a current threat. We further expect the relationship between temporal social comparison and future status threat to be stronger in highly competitive organizations. Our theoretical model is depicted in Figure 1.

With our study, we make three major contributions to previous research. First, we introduce unfavorable temporal social comparisons, and the resultant future status threat, as an additional process that leads to social undermining. As such, we extend the social undermining literature by arguing that the core mediating process of envy can also be triggered by future status threat, independent of whether coworkers currently compare more or less favorably. In doing so, we fill a gap in previous theorizing—namely, why some employees decide to undermine coworkers who are not presently better off than they are (Lam et al., 2011).

Second, our investigation into temporal social comparisons involves a combination of social comparison theory (Festinger, 1954), which has portrayed comparisons as static, and the temporal notion of status momentum (Pettit et al., 2013). Aside from Albert (1977) introducing the concept of temporal comparison for individuals' intrapersonal comparisons (i.e., how one performs now vs. in the past), the literature has largely ignored temporal changes in interpersonal comparison dimensions. By applying a temporal component to the study of social comparison, we account for the dynamic nature of status in organizations and, by extension, can help explain why and when employees socially undermine each other.

Third, we extend research on the negative interpersonal effects of competitive reward systems. Specifically, by showing that employees in competitive organizations can perceive both current and future status threats, we highlight that competition leads to more negative interpersonal behavior than previously assumed. Also, by considering the moderating influence of competition, we follow calls to explain social undermining via the interplay of comparison processes and organizational factors (Duffy et al., 2012; Duffy, Shaw, & Schaubroeck, 2008), and thereby provide a better understanding of the involved processes (Jacoby & Sassenberg, 2011; Spencer, Zanna, & Fong, 2005). On the applied side, the present paper may resonate with many practitioners who observe that rising stars in organizations are hindered not only by their direct competitors, but also by their future ones—just like the Microsoft employee in the opening quote who tried to prevent coworkers from getting ahead of him (Eichenwald, 2012).

Theoretical Background

Social Undermining, Envy, and Social Comparison

Social undermining at the workplace comprises "behavior intended to hinder, over time, the ability to establish and maintain positive interpersonal relationships, work-related success, and favorable reputation" (Duffy et al., 2002, p. 332). Employees often undermine when they feel envious toward their coworkers (Duffy et al., 2012) because envy reflects an employee's feeling that s/he "lack(s) another's superior quality, achievement, or possession and either desires it or wishes that the other one lacked it" (Parrott & Smith, 1993, p. 906). According to the sociofunctional approach, which refers to psychological mechanisms intended to facilitate "effective and successful social living" (Cottrell & Neuberg, 2005, p. 770), emotions such as envy have evolved partly to "establish and maintain social hierarchy" (Lange & Crusius, 2015, p. 455). Emotions alert people to immediate threats and subsequently elicit functional cognitions and behaviors that help people to effectively respond to these threats (Neuberg & Cottrell, 2008). In the workplace, envy signals to employees that their place in the social hierarchy is threatened and that action may be needed to eliminate said threat. This often unfolds in a destructive way, with employees undermining the threatening comparison other (Cohen-Charash, 2009; Duffy et al., 2012; Dunn & Schweitzer, 2006; Smith & Kim, 2007; Tesser, 1988). Social undermining is a particularly attractive strategy because it is covert and insidious (Duffy et al., 2002, 2008; Menon & Thompson, 2010): Individuals can spread rumors about a coworker, intentionally delay work to slow a coworker down, or give a coworker false or misleading information.

Several studies provide evidence for the sociofunctional perspective, showing that threatening social comparisons trigger envy toward more successful coworkers, which then inspires social undermining behaviors (Campbell, Liao, Chuang, Zhou, & Dong, 2017; Duffy et al., 2012; Kim & Glomb, 2014; Lam et al., 2011; Schaubroeck & Lam, 2004). Those studies are grounded in Festinger's (1954) social comparison theory, which holds that individuals compare their abilities and opinions to others to reduce uncertainty and evaluate their standing when more objective comparison standards are not available.

Yet, some coworkers may pose more of a threat to a focal employee's future status than to his or her present status. For example, so-called "rising stars" may start at the bottom of the organizational hierarchy, but can pose a threat to the "old dogs" when the latter perceive the former's swift ascension—and, by extension, the prospect of being outperformed in the future. Indeed, people's ranks on relevant comparison dimensions (such as

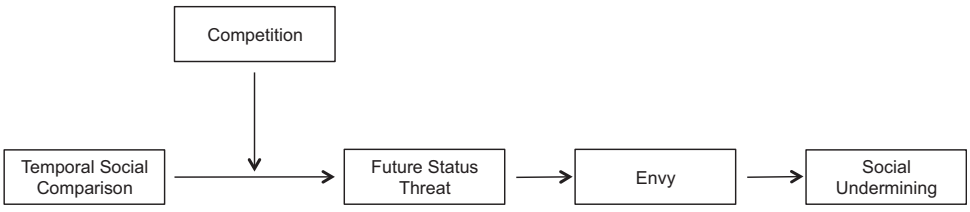


Figure 1. The hypothesized research model.

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performance, pay grade, hierarchy levels, etc.) usually change over time (Chizhik, Alexander, Chizhik, & Goodman, 2003), but not at the same pace for every employee (Chen & Mathieu, 2008). For example, an employee's task performance could improve over time, enabling him/her to match or even outperform a currently better-performing focal employee in the future. Likewise, some employees are faster than others in gaining managerial responsibilities or building strong relationships with their coworkers and supervisors.

To elucidate the ensuing dynamics, we will first introduce future status threat as a distinct motive leading to envy-based social undermining. We will then explain how concerns for future status threat motivate temporal social comparisons, which form the basis for individuals' inferences about their future status.

Future Status Threat as Driver of Envy and Social Undermining

Status is considered a fundamental human motive (Anderson, Hildreth, & Howland, 2015). At work, status motivates employees through its many advantages, such as greater influence (Berger, Rosenholtz, & Zelditch, 1980), respect and support from others (Anderson, John, Keltner, & Kring, 2001; Anderson, Srivastava, Beer, Spataro, & Chatman, 2006), and even higher mental well-being (Adler, Epel, Castellazzo, & Ickovics, 2000). Likewise, the loss of status triggers negative emotions (Kemper, 1991) and impairs performance (Marr & Thau, 2014). The great value that individuals ascribe to status leads them to actively manage it. They attentively scan for cues in their social environment that represent opportunities for status gains or threats to their current status; they engage in impression management, and they react defensively when their own status is at risk (Anderson et al., 2015). Because the status of one employee can reflect on another, members of a workplace monitor signals about the status of coworkers alongside their own (Anderson et al., 2015).

Beyond their evaluations of current status, employees also constantly search for opportunities to improve their status. However, because many opportunities to gain or lose status (e.g., promotions or bonuses) lie in the future, employees' future status is often uncertain. Whether employees will be successful in these situations is a question of their future performance, which cannot be solely deduced from their present status. Thus, these concerns about future status should supplement employees' status cognitions, motivating them to retain their current level of status in the future.

Employees are indeed motivated to avoid status loss (Bothner et al., 2007; Pettit et al., 2010; Scheepers et al., 2009) and respond by trying to avoid the future status loss at the cost of other people (Garcia, Song, & Tesser, 2010; Pettit et al., 2010). However, status loss in extant studies would have always been the result of a threat to one's *current* status. Some authors even explicitly reject the possibility that employees would harm coworkers whom they currently outperform, even when accounting for how these coworkers might perform in the future (Lam et al., 2011). We challenge this assumption and instead argue that the temporal element of relative past trajectories will be used to extrapolate future status threat. In other words, just the mere expectation that others will have higher future status can be enough to generate a perceived threat and envy. The envy resulting from future status threat may spur social undermining to hinder the coworkers' efforts to excel. At the very least, social undermining should be a successful strategy for avoiding even lower future status.

Temporal Social Comparison as Predictor of Future Status Threat

People should be motivated to understand the future trajectory of their status. From a sociofunctional perspective on emotions, people should actively search for information that informs them about threats to their future status. We propose that employees can accomplish this by comparing the perceived development of their relative standing against a coworker's development—a process we refer to as temporal social comparison. Such comparisons should allow employees to extrapolate their relative trajectory into the future. The concept of temporal social comparison is based on social comparison theory (Festinger, 1954) and studies on status momentum (Pettit et al., 2013). According to social comparison principles, employees take others as a reference point when assessing their organizational standing (Festinger, 1954; Greenberg, Ashton-James, & Ashkanasy, 2007). However, these social comparisons may not simply refer to an employee's standing at one point in time (Albert, 1977): To borrow Redersdorff and Guimond's (2006) summary, "we may keep track of where we stand over time compared with one of our friends" (p. 77).

Employees may formally learn about their own and their coworkers' performance development through regular performance reviews, which are often based on relative performance (Creelman, 2013) or through publicly visible awards in the organization (e.g., employee of the month award, sales tournaments, etc.). Informally, employees may learn about coworkers' status trajectories through conversations with their colleagues or gossip (Wert & Salovey, 2004), or through other publicly available information (e.g., executive compensation, formal job positions on LinkedIn). Even if compensation is officially kept secret, employees are often well informed about their coworkers' pay (Edwards, 2005). Sometimes, employees will actively compare themselves with coworkers on these attributes (Brown, Ferris, Heller, & Keeping, 2007); at other times, they are unwillingly or subconsciously confronted with and affected by such comparison information (Mussweiler, Rüter, & Epstude, 2004)—for instance, when a supervisor highlights a coworker's excellent development.

Previous research in social comparison has yet to test the idea of temporal social comparison, but several studies from related fields of research show how temporal changes affect our evaluation of others (Barnes, Reb, & Ang, 2012; Pettit et al., 2013; Reb & Greguras, 2010). For instance, employees receive more favorable performance evaluations when they have shown a positive (as opposed to a negative or stagnating) performance trend in the past (Reb & Greguras, 2010). Likewise, a study by Barnes and colleagues (2012) showed that NBA basketball players' performance trends positively affect changes in their compensation levels. It is important to note that in these studies, the performance trend predicted evaluations (performance rating and compensation decisions) above and beyond mean performance level (Barnes et al., 2012; Reb & Greguras, 2010). Studies by Pettit and colleagues (2013) have likewise shown that individuals at the same rank in a status hierarchy are ascribed higher status when their rank has improved over time compared with when it had decreased over

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time. These studies' underlying rationale is that evaluators form expectations of individuals' future status based on their past trajectory (Markman & Guenther, 2007; Pettit et al., 2013; Reb & Greguras, 2010). This argument derives from principles of psychological momentum (Finke & Shyi, 1988; Freyd & Finke, 1984; Markman & Guenther, 2007), which posit that individuals expect past trends of social dimensions (e.g., status or performance) to continue in the future (Markman & Guenther, 2007; Pettit et al., 2013). In other words, a positive (negative) trajectory in the past would suggest higher (lower) future status.

We transfer this principle of momentum to the context of social comparisons: If a focal employee's standing showed a steeper trajectory in the past compared with a coworker's standing, this would suggest that the focal employee can expect higher status than said coworker in the future. Likewise, a weaker trajectory should point to lower future status expectations. With these temporal social comparisons, so we argue, employees can extrapolate their future status relative to a comparison target. Unfavorable comparisons—meaning the focal employee expects the coworker to have higher future status—should elicit envy and social undermining. Hence, our approach implies that employees can envy and socially undermine coworkers independent of their current relative standing.

Moderating Role of Competition

Competition refers to "the degree to which employees perceive organizational rewards to be contingent on comparisons of their performance against that of their peers" (Brown, Cron, & Slocum, 1998, p. 89). In competitive organizations, status is a scarce resource and employees can only achieve higher status or avoid lower status at the cost of their coworkers (Cohen-Charash, 2009). Unsurprisingly, then, scholars have argued that competitive organizational climates induce envy and social undermining (Duffy et al., 2008; Dunn & Schweitzer, 2006; Vecchio, 2000). This is the result of emphasizing employees' differences and shortcomings relative to coworkers (Dunn & Schweitzer, 2006; Lam et al., 2011; Vecchio, 2000), which creates uncertainty for employees regarding their standing (Brown et al., 2007; Dunn & Schweitzer, 2006). The envy arising from such uncertainty alarms employees about potential threats and spurs them to manage their social environment. We argue that the same holds for temporal social comparisons, but even more so in competitive (than in cooperative) environments because of the aforementioned uncertainty (Pettit et al., 2010; Scheepers et al., 2009).

By the same token, the organizational practices that accompany a competitive climate may make comparisons among coworkers more salient. For instance, firms may readily provide information about employees' relative performance, perhaps in the form of sales tournament rankings or public promotion announcements, all of which becomes hard to ignore (Greenberg et al., 2007). In fact, competition may serve as a catalyst for comparison processes (Duffy & Shaw, 2000), with employees extrapolating their future status simply because the comparison information is so salient. This would also make accompanying emotions like envy more salient and accessible. In sum, we expect that the relationship between temporal social comparison and future status threat will be stronger for competitive organizations. As a consequence, unfavorable temporal social comparisons should lead to more future status threat, envy, and social undermining in competitive organizations compared with noncompetitive organizations (see Figure 1). Together, this leads to the following integrative hypothesis:

> *Hypothesis 1:* The positive relationship between temporal social comparison and social undermining will be stronger when competition in the organization is high than when competition in the organization is low, and this relationship is mediated by future status threat and envy.

Overview of Studies

To test our hypothesis, we conducted three studies with complementary methods. In Study 1a and 1b, we manipulated temporal social comparison and competition to establish the basic rationale that negative temporal social comparison can lead to actual and meaningful social undermining behaviors under high competition. To keep study realism high and demand characteristics low, we refrained from separately measuring the psychological processes of future status threat and envy. We saved that measurement for Study 2, using a vignette to manipulate static and temporal social comparison, as well as competition. Specifically, we asked participants for their reaction to the vignette and how they would behave (cf. Robinson & Clore, 2001, who argue that imagined experiences are a reasonably proxy for actual experiences). Study 3, finally, was a two-wave field study in which we asked participants to think of a real coworker and then measured our constructs of interest.

Data were collected using Amazon Mechanical Turk (MTurk).[1] We followed recommendations to improve data quality when using MTurk samples by only recruiting workers from the U.S. with a high reputation (i.e., those who have at least 50 completed tasks and a high ratio (95%) of approved-vs.-submitted tasks), as well as including instructional manipulation checks (IMCs) in Studies 2 and 3 (Meade & Craig, 2012; Oppenheimer, Meyvis, & Davidenko, 2009). If participants failed to correctly answer the manipulation checks, they could still finish the survey, but were excluded from subsequent analyses. To check the robustness of our results, we ran our analyses for both Study 2 and 3 with and without these screenouts, but found the same results. We also checked for nonsense response patterns and outliers in terms of completion time,[2] but the results did not change significantly (i.e., our hypothesis would still be supported).

Study 1

Study 1 examined the joint effect of temporal social comparison and competition on social undermining in a realistic setting. Two

[1] The university where this research was conducted does not have an Institutional Review Board; however, the authors were aware of and in compliance with APA's ethical guidelines during the study's data collection.

[2] To test for nonsense response patterns, we ran the analysis in Study 3 with and without participants who strongly agreed (disagreed) on the item "If I want to learn more about something, I try to find out what others think about it" and strongly disagreed (agreed) on the item "I always like to know what others in a similar situation would do" from the social comparison orientation scale (Gibbons & Buunk, 1999). To test for outliers in completion time, we ran the analysis for both studies but excluded participants whose completion time fell above or below two standard deviations from the final sample's mean response time.

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separate samples were acquired, yielding Study 1a and 1b, which were almost identical in their procedures, but each of them captured a different aspect of social undermining. Moreover, Study 1a employed a mixed design, with temporal social comparison as a within-subjects factor and competition as a between-subjects factor, whereas Study 1b had a between-subjects design.

Study 1a Method

Sample. We recruited $N = 108$ participants from MTurk and randomly assigned them to one of two conditions (high vs. low competition). Of these participants, $n = 18$ (17%) indicated at the end of the experiment (before debriefing) that they had at least some doubts about the realism of the procedure. As our measurement of undermining depended on participants believing our instructions, we excluded these participants for the subsequent analysis, leading to a final sample of $N = 90$ participants (53% females, $M_{age} = 37$ years, $SD = 10$ years).

Procedure. Participants on MTurk were invited to a study called "Intellectual performance in the presence of a co-actor." We used this title to give MTurkers a credible reason for why they would be matched and compared with another participant in the study. Upon entering the study, participants had to first sign into a virtual group chat that was designed for this study. This virtual group chat was described as a virtual waiting room where participants allegedly had to wait until they could be matched to another participant. To increase realism, we designed the chat so that people could see other participants entering, leaving or waiting in the group chat because people had to sign in with a name. Participants stayed during the entire study in the chat room because at some point during the study they would be matched with another participant. The number of participants was always visible on the screen, newcomers or leavers were announced, and the entire list of participants in the chat room could be viewed by clicking on an included symbol. We did not allow participants to communicate via the chat or directly with each other (unseen from us). When people entered the chat room, they were then redirected to the actual study. We employed the virtual waiting room to increase realism because our design made it theoretically possible that someone could not be matched right away. We reason that this design is similar to lab studies where respondents first meet in a waiting room before entering a cubicle, at which point they are told that they will allegedly be working with the other respondents via computer-mediated communication.

In the actual study, participants had to first perform five rounds of a verbal ability test before they were told that they would be matched with another participant and then have to complete a final round of the test. We also told them that they could earn a bonus of $1.00 depending on their performance in the final round. After the first five rounds, participants received bogus temporal social comparison feedback on their test performance relative to two potential matching partners (other participants; more on this later). Then we asked them to "Please indicate how much you want to be matched with this participant?" (1 = *I do not want to be matched with this participant at all*, 7 = *I very much want to be matched with this participant*) for both potential matching partners. Because the competition for status and recognition constitutes one behavioral indicator of social undermining (Duffy et al., 2002), we used their answers on this item as our measure of undermining. We reasoned that respondents who chose to exclude someone who had developed favorably over time would seek to maximize their chance of winning the bonus while hindering the other participant's chances. After indicating their matching preference, participants answered some questions about the credibility of the procedure. Finally, they were debriefed about the real purpose of the study and were rewarded with $2.00 on MTurk.

Manipulations. Temporal social comparison (TSC) was manipulated as a within-subjects factor by giving participants bogus performance feedback on a verbal ability test (solving anagrams) relative to two potential matching partners. An anagram is a string of letters that needs to be unscrambled into a real word or a different word using the letters in the string (e.g., the solution to the anagram "being" would be "begin," and "omon" would become "moon"). Using anagrams to manipulate relative performance feedback is a common procedure in studies on comparisons and/or unethical behavior (Flynn & Amanatullah, 2012; Gino & Pierce, 2009; Pierce, Kilduff, Galinsky, & Sivanathan, 2013). To make the comparison more relevant and engaging, we framed the anagram test as a measure of analytic reasoning, which is an important skill in many domains (academic work, professional life, etc.), and told them that people with high scores in this test usually have more successful careers. To minimize their ability to track their performance and their suspicion about the feedback, we told participants that their scores would be based on the number of anagrams they correctly solved, as well as the length and difficulty of these anagrams. Furthermore, we only presented them with their rank relative to other participants, rather than their absolute scores.

For each of the two potential matching partners, participants received bogus feedback on both their own performance and that of their potential matching partner across the five rounds. The performance feedback was presented graphically (see Figure 2), and we randomized the order in which participants were presented with each of the two TSC figures. The favorable TSC showed a potential matching partner whose performance slightly decreased over the five rounds of the anagram task. The unfavorable TSC showed a potential matching partner whose performance strongly increased over the five rounds. The participant's performance in both comparisons stayed relatively constant over the five rounds with some slight fluctuations to make it look realistic. In both comparisons, we held the current static comparison (SSC) in round 5 constant to rule out the possibility that SSC could explain the results. The difference in round five between the participant and each of the two potential matching partners was five ranks, with the participant holding rank 90 and the potential matching partners holding rank 85 (of 100, which represented the best performance in the task).

For competition, which we treated as a between-subjects factor, we embedded the manipulation into the instruction for the anagram task. Participants in the high competition condition were told that they could earn an additional $1.00 if they outperformed their matching partner in the final round of the anagram task. Participants in the low competition condition were told that they could earn an additional $1.00 if their individual performance in the final round exceeded a certain threshold independent of how well they performed relative to their matching partner. Regardless of the condition, all participants received the additional $1.00 at the end.

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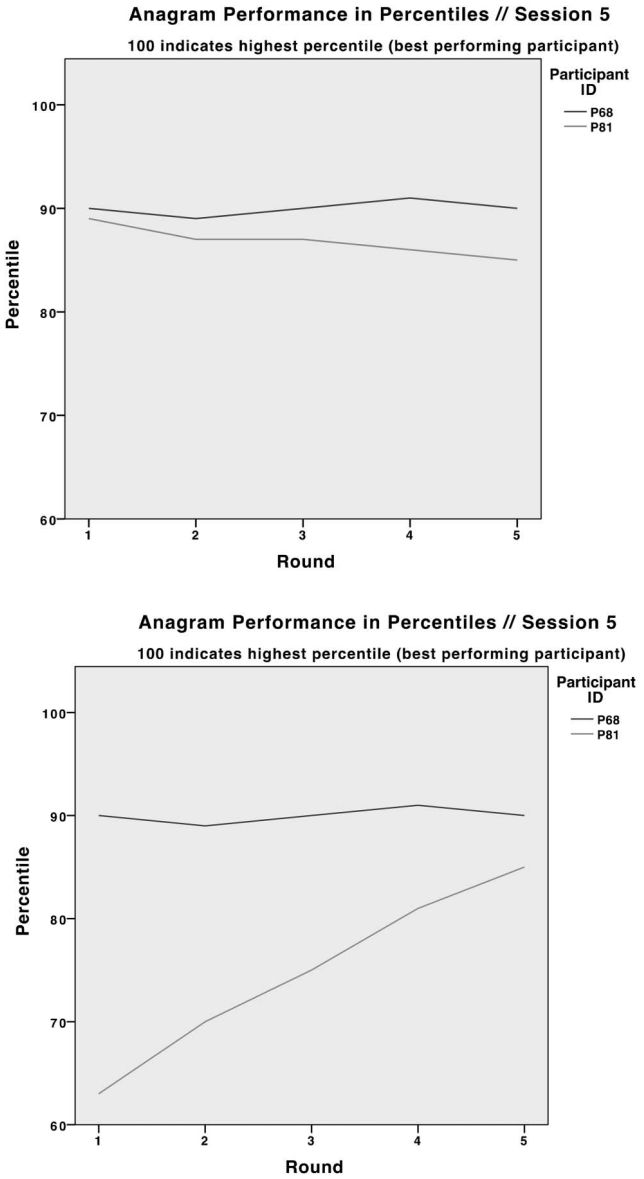


Figure 2. Study 1, manipulation of temporal social comparison. The first upper graphic shows the favorable TSC condition, the graph at the bottom shows the unfavorable TSC condition.

Study 1a Results

We tested the joint effect of TSC and competition on social undermining, measured as the unwillingness to be matched to the other participant, using multilevel ordered logistic regression. An ordered logistic regression is used when the outcome is measured on an ordinal scale, such as in our study. We applied the multilevel version of it (i.e., the MEOLOGIT command in Stata) because TSC was manipulated as a within-subjects factor and observations were therefore nested within individuals. The interpretation of the logit coefficients in the model follows the same rationale as the interpretation of coefficients in logistic or multinomial regression: It shows the increase in the log-odds of choosing a higher category in the order of the dependent variable for a one-unit increase in the independent variable, while the other variables in the model remain constant.

The main effects of both TSC ($b = -.03$, $p = .933$, 95% CI [−.81, .74]) and competition ($b = .38$, $p = .412$, 95% CI [−.52, 1.28]) on social undermining were not significant. The logit coefficient for the TSC × competition interaction was −.95, $p = .086$, 90% CI [−1.86, −0.04], 95% CI [−2.04, .14], and thus significant on a two-tailed 10% level as indicated by our directed hypothesis. An analysis of this interaction effect showed that, under high competition, participants were more likely to prefer to be matched to the other participant when the TSC was favorable compared with unfavorable. Specifically, contrasts revealed that under high competition, the log-odds for expressing a higher matching preference for the potential matching partner in the favorable TSC condition ($b = 4.20$) were higher than the log-odds for expressing a higher matching preference for the potential matching partner in the unfavorable TSC condition ($b = 3.22$), contrast = −.98, $p = .012$, 90% CI [−1.63, −0.34], 95% CI [−1.75, −.22]. Under low competition, the difference in expressing a higher matching preference for the potential matching partner in the favorable TSC condition ($b = 3.82$) and the unfavorable TSC condition ($b = 3.79$) was not significant, contrast = −.03, $p = .932$, 90% CI [−0.68, 0.62], 95% CI [−.81, .74]. Importantly, as indicated by the significant interaction effect, the difference in expressing a higher matching preference between the favorable and the unfavorable TSC condition was larger under high competition than the same difference under low competition, contrast = −.95, $p = .086$, 90% CI = [−1.86, −0.04], 95% CI [−2.03, .14], and thus significant on a two-tailed 10% level as indicated by our directed hypothesis. In short, we found support for our hypothesis that unfavorable temporal social comparisons (TSC) would increase social undermining, particularly in a competitive context.

Study 1b Method

Sample. We recruited $N = 205$ MTurkers and randomly assigned them to one of four conditions (high vs. low competition, unfavorable vs. favorable TSC). Of these participants, $n = 37$ (18%) indicated at the end of the study (before debriefing) that they had at least some doubts about the realism of the procedure. As in Study 1a, we excluded these participants for the subsequent analysis, leading to a final sample of $N = 168$ participants (53% females, $M_{age} = 37$ years, $SD = 10$ years).

Procedure and manipulation. The procedures and manipulations were almost identical to Study 1a. The only difference in the procedure was that participants were given TSC information for only one other participant (their matching partner), so both competition and TSC were manipulated as between-subjects factors.

Measure. After the TSC manipulation, we told participants that

> we are conducting this experiment as a first of many and therefore we are curious how to optimize it. In particular, we are trying to differentiate *honest* players from those who might have *cheated*. In order for us to better detect cheaters, we count on your opinion. Before we start we like to get to know your honest opinion of P81. Your answer will help us to develop better algorithms to detect cheating in anagram solving tasks.

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P81 was the comparison person. We then asked participants whether they would agree with the statement "I would not recommend to invite P81 to such an experiment again" (1 = *Strongly disagree*, 7 = *Strongly agree*). Thus, higher values measured a reluctance to recommend Alter. This behavior draws on the question "Talked bad about you behind your back" from the social undermining scale (Duffy et al., 2002).

Study 1b Results

We used ordered logistic regression to test the interactive effect of TSC and competition on social undermining, which was measured as the reluctance to recommend Alter for another experiment. In support of our hypothesis, the ordered logistic regression model revealed a significant interaction effect of TSC × competition, $b = 1.32$, $p = .027$, 95% CI [.15, 2.48]. The main effects were .73, $p = .066$, 95% CI [−.05, 1.51] for TSC and −.77, $p = .083$, 95% CI [−1.64, .10] for competition. Contrasts showed that, under high competition, participants were more reluctant to recommend Alter for another experiment when TSC was unfavorable compared with when TSC was favorable. Specifically, the log-odds for expressing a greater reluctance to recommend Alter in the unfavorable TSC ($b = 1.82$) condition were higher than in the favorable TSC condition ($b = -.23$), contrast = 2.05, $p = .001$, 95% CI [1.15, 2.95]. Under low competition, the difference in the log-odds between the favorable TSC ($b = .53$) and the unfavorable TSC condition ($b = 1.27$) was .73, $p = .066$, 95% CI [−.05, 1.51]), and thus significant on a 10% level. In other words, when competition was low, participants were more reluctant to recommend Alter for another experiment when TSC was unfavorable compared with favorable. Meanwhile, the difference between the unfavorable TSC and the favorable TSC condition under high competition was larger than the difference between the same conditions under low competition, contrast = 1.32, $p = .027$, 95% CI [.15, 2.48]. This supports our hypothesis that unfavorable TSC leads to social undermining under high competition.

Discussion

Studies 1a and 1b tested the joint effect of temporal social comparison and competition on social undermining toward a comparison person. In two independent samples that used different designs (within-subjects design in Study 1a; between-subjects design in Study 1b) and different behavioral indicators of social undermining, we found that an unfavorable temporal social comparison (vs. a favorable one) led to more social undermining, but only when participants competed with the comparison person. Study 1 provides first evidence that people undermine a comparison person when their relative development is unfavorable. In addition, and complementary to previous studies on negative interpersonal behavior (e.g., Lam et al., 2011), this study measured actual undermining behavior in a realistic, yet controlled setting in which participants were highly involved. As temporal social comparison information was presented separately for the participant and Alter, Study 1 also suggests that people naturally pick up on patterns of relative trajectory and engage in temporal social comparisons.

To keep realism high and demand character low, Studies 1a and 1b did not include psychometric measures of the assumed mediating variables. Study 2 complements Studies 1a and 1b by testing the full model in a controlled environment using a different method (scenario experiment). Whereas Studies 1a and 1b held static social comparison constant, Study 2 manipulated static social comparison to test whether temporal social comparison and competition explain social undermining irrespective of one's current standing.

Study 2

Method

Sample. We recruited $N = 401$ participants from MTurk and randomly assigned them to a 2 (TSC: performance trend better than coworker, performance trend worse than coworker) by 2 (Competition: high, low) by 2 (Static Social Comparison (SSC): current performance better than coworker, current performance worse than coworker) between-subjects factorial design. Of these participants, 25 (6%) failed to correctly answer the IMC. We also compared completion times, finding that those who failed the IMC completed the survey faster (mean completion time = 3.2 min) than those who passed the IMC (mean completion time = 4.8 min). This difference was significant at a 10% level, suggesting that participants who failed the IMC paid less attention to the survey. We therefore removed them for the analysis, leaving a final sample of $N = 376$ (40% females, $M_{age} = 35$ years, $SD = 9.65$).

Manipulation. To manipulate TSC, SSC and competition, we used a vignette that asked participants to imagine the situation as vividly as possible. Such vignette studies have been shown to elicit responses that are comparable to actual lab designs (Robinson & Clore, 2001). Participants first read that they have been working in a company for several years alongside a particular colleague, the fictitious comparison person Alex, who has the same position with similar tasks, responsibilities, and company tenure (to avoid gender effects, we chose a name that could belong to either a female or male person). Next, participants read about whether their performance evaluation was a) better (vs. worse) than Alex's performance in the current year (SSC) and b) better (vs. worse) than Alex's performance development in the last two years (TSC). At the end of the scenario, participants read about the competitive (vs. noncompetitive) nature of the organization. We derived the sentences for this manipulation from the competitive climate scale by Brown and colleagues (1998). This scale measures competition in terms of the degree to which employees' recognition depends on their performance relative to others.

After the manipulation, participants rated their future status threat, whether they would envy Alex, and how much they would socially undermine Alex. At the end of the survey, participants provided us with some demographic variables and were rewarded with $1.00.

Measures.

Future status threat. To assess future status threat, we asked participants for their expected future status relative to the comparison person. We adapted the four-item expected future status scale by Pettit and colleagues (2013) that asks for an individual's status, prestige, recognition, and admiration in an organization. A sample item is "Soon, Alex will have higher status in the company than I

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will have." We used a 7-point scale ranging from "1 = *strongly disagree*" to "7 = *strongly agree*" (α = .96).

Envy. We measured envy with the five-item scale by Vecchio (2000) and reformulated the items so that they referred to the fictitious colleague Alex. A sample item is "My supervisor values the efforts of Alex more than she/he values my efforts." We used a 7-point scale ranging from "1 = *strongly disagree*" to "7 = *strongly agree*" (α = .89).

Social undermining. We used the coworker undermining scale by Duffy and colleagues (2002), but reformulated all 13 items so that they directly referred to Alex instead of a general other. Sample items include: "Give Alex incorrect or misleading information about the job," and "Talk badly about Alex behind Alex's back." Respondents answered each item on a 7-point scale (α = .93, 1 = *never*, 7 = *everyday*).

Results

With Hypothesis 1, we predicted that the positive indirect relationship between TSC and social undermining via future status threat and envy is stronger when competition in the organization is high (compared with when it is low). In other words, we expected competition to moderate the first stage between TSC and future status threat (see Figure 1). To test this hypothesis, we applied a serial moderated mediation model (Hayes, 2015; Taylor, MacKinnon, & Tein, 2008). In order for moderated serial moderation to be supported, the serial indirect effect—which is the effect of the independent variable (IV) on the dependent variable (DV) passing through two mediators (M1 and M2) in series—has to vary at high and low levels of the moderator (Mod). Thus, for our hypothesis to be supported, the indirect effect of TSC on social undermining via future status threat and envy has to be positive and significant at high levels of competition, as well as significantly stronger at high compared with low levels of competition.

To calculate the serial indirect effect, we estimated three multiple regression models. In the first model, the first mediator was regressed on the independent variable, the moderator, and their interaction term. In the second model, the second mediator was regressed on the independent variable, the moderator, their interaction, and the first mediator. In the third model, the dependent variable was regressed on the independent variable, the moderator, their interaction, and the two mediators. The coefficient for the conditional serial indirect effect was calculated as the product of three coefficients (IV × Mod → M1, M1 → M2, M2 → DV) at high (+1 *SD*) and low (−1 *SD*) levels of the moderator (Hayes, 2015).

In the first mediator model, the coefficient for the TSC × competition interaction on future status threat was significant (β = .26 $p < .001$; see Figure 3). In the second mediator model, only the effect of future status threat on envy was significant (β = .93 $p < .001$). In the third model, the effect of envy on social undermining was significant (β = .54 $p < .001$). In all three models, we controlled for SSC and the interaction between SSC and competition. Table 1 depicts the results of these three regression models.

Following Taylor, MacKinnon, and Tein (2008), we calculated the coefficient for the serial indirect effect as the product of these three coefficients (TSC × competition → Future Status Threat, Expected Status → Envy, Envy → Social Undermining) at high and low levels of competition. Next, we used a bootstrap procedure with 10,000 samples to check whether these conditional indirect effects were significant. Bootstrapped results provide more accurate estimates than the Sobel test because the former account for the fact that indirect effects and their standard errors are not normally distributed (Hayes, 2015; Preacher, Rucker, & Hayes, 2007). In line with Hypothesis 1, the conditional indirect effect of TSC on social undermining via future status threat and envy was more positive when competition (+1 *SD*) was high (estimate = 0.36, 95% CI [0.246; 0.501]) than when competition was low (−1 *SD*; estimate = 0.13, 95% CI [0.045; 0.237]). This difference was significant (difference = .22, 95% CI [0.105; 0.376]). Thus, Study 2 supports Hypothesis 1.

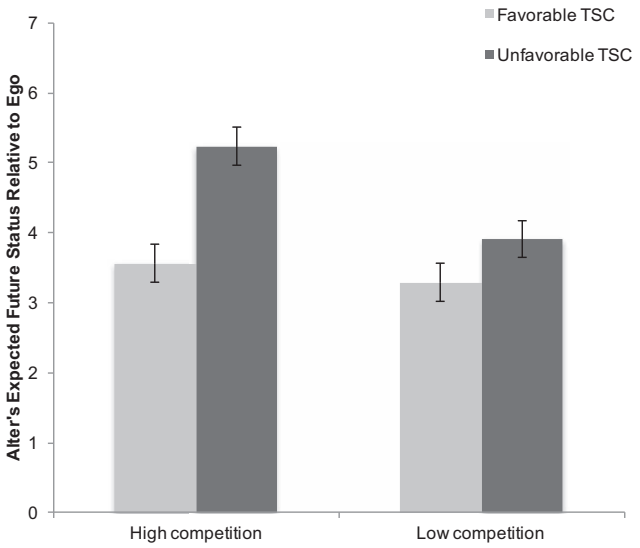


Figure 3. Study 2, Mean future status ratings under high and low competition in the organization as a function of temporal social comparison (Ego's performance development [PD] better over time vs. Alter's performance development better over time). Error bars denote 95% upper and lower limit confidence intervals.

Discussion

Study 2 indicates that unfavorable temporal social comparison can lead to future status threat, which then motivates envy and the intent to socially undermine a coworker. As expected, the indirect effect of temporal social comparison on social undermining via future status threat and envy was stronger under high competition. Thus, Study 2 adds to Study 1 by establishing the psychological process in the relationship between unfavorable temporal social comparison and social undermining in competitive contexts. Specifically, the study showed that envy can also be elicited by future threats, and that unfavorable temporal social comparisons inform individuals about such threats. Moreover, by controlling for static social comparison, we showed that future status threat motivates envy and social undermining above and beyond that resulting from a currently unfavorable standing relative to a coworker.

Our experimental design allowed us to draw causal inferences with a high degree of internal validity, albeit with drawbacks regarding the generalizability (external validity) of our findings. Our manipulation was a hypothetical scenario and did not allow us to test whether unfavorable temporal social comparisons lead

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Table 1
Study 2 Regressions for Moderated Serial Mediation

Variable	Future status threat						Envy						Social undermining					
	β	*SE*	*z*	*p*	LLCI	ULCI	β	*SE*	*z*	*p*	LLCI	ULCI	β	*SE*	*z*	*p*	LLCI	ULCI
Constant	4.01	.07	59.73	.000	3.88	4.14	3.37	.05	63.67	.000	3.27	3.48	2.07	.05	43.44	.000	1.98	2.16
SSC	.50	.07	7.45	.000	.37	.63	.18	.06	3.12	.002	.07	.29	−.05	.05	−.91	.364	−.15	.05
TSC	.56	.07	8.27	.000	.43	.69	−.19	.06	−3.24	.001	−.30	−.07	−.05	.05	−.95	.343	−.15	.05
Competition	.40	.07	6.00	.000	.27	.53	−.08	.06	−1.47	.140	−.19	.03	.03	.05	.55	.584	−.07	.13
SSC × Competition	.30	.07	4.47	.000	.17	.43	.06	.05	1.01	.311	−.05	.16	.00	.05	.02	.984	−.10	.10
TSC × Competition	.26	.07	3.82	.000	.13	.39	.02	.05	.45	.654	−.08	.13	.02	.05	.36	.723	−.08	.11
Future status threat							.93	.07	14.08	.000	.80	1.06	−.16	.07	−2.17	.030	−.30	−.02
Envy													.54	.07	8.21	.000	.41	.67
R^2				.34						.45						.18		
F				40.46						52.85						12.06		

Note. $N = 376$. LLCI = 95% confidence interval lower limit; ULLCI = 95% confidence interval upper limit; TSC = Temporal Social Comparison; SSC = Static Social Comparison, two-tailed.

employees to engage in social undermining at their real jobs. Also, employees in reality can assess their standing in organizations on more dimensions than just performance. Study 3 addresses those limitations. First, we used a field sample to increase the external validity of our findings. Second, we measured temporal and static social comparison more broadly by including other dimensions, such as the quality of interpersonal relationships, employees' pay level, or their benefits.

Study 3

Method

Sample and procedures. We conducted two surveys via MTurk that occurred at two different time points, two weeks apart. Registered MTurkers could participate in the study at Time 1 if they were at least 18 years old, presently employed at an organization with a minimum tenure of two years, and willing and able to participate at both time points. At Time 1, the survey asked participants to think of a colleague who has been working in the company for at least two years and then type in the first name of that colleague. To avoid having participants think of a friend and thereby obtaining a broad range of performance trends, we randomly asked them to think of a colleague with either a below-average, an average, or an above-average performance development in the past few years. We personalized all items via dynamic programming so that they directly referred to the indicated colleague (in the measures below, "Alter" is a placeholder name for the comparison other). We then assessed all variables except for our dependent variable, social undermining. At Time 2, participants were reminded of the name of the coworker (Alter) they provided at Time 1 and then filled out the social undermining measure.

At Time 1, $N = 640$ participants completed the survey, 62 of which (10%) failed to pass one or more of the Time 1 IMCs. A total of 283 participants (44% of Time 1) completed the Time 2 survey, 17 of which (6%) failed to pass the respective IMC. Again, we compared the T1 completion times of participants who passed all attention checks ($n = 252$) or failed at least one attention check item ($n = 31$). We found a marginally significant difference in the mean duration time, which was 11.14 min for those who passed all IMCs and 8.87 min for those who failed at least one IMC. Thus, we only included participants who passed all IMCs at Time 1 and Time 2 (Meade & Craig, 2012; Oppenheimer et al., 2009), leading to a final sample of $N = 252$ participants, who were between 21 and 69 years old ($M = 36.95$ years, $SD = 9.89$) and from the United States. Of this sample, 47% ($n = 118$) were female and 80% ($n = 202$) were Caucasian. Participants came from various industries, but the largest clusters were in services (16%), retail trade (14%), or finance, insurance, and real estate (12%). On average, participants had been working for their company for 6.83 years ($SD = 4.62$) and had 17 years ($SD = 9.37$) of total work experience.

Measures.

Temporal social comparison (Time 1). To measure TSC, we adapted Brown and colleagues' (2007) 8-item social comparison scale, which covers eight comparison dimensions that relate to employees' workplace standing: performance, salary, working conditions, quality of relationship to supervisor, quality of relationship to coworkers, career progression, benefits, and prestige (Buunk, Zurriaga, Gonzalez-Roma, & Subirats, 2003; Geurts, Buunk, & Schaufeli, 1994). To assess TSC, we used the same eight dimensions but asked participants "[. . .] to think how your development over the last two years compares to the development of Alter" and "[. . .] how much better or how much worse Alter's development was in comparison with yours." A sample item is "In the last two years, how did Alter develop relative to you in terms of performance?" Participants responded using a 7-point scale ($\alpha = .86$, 1 = *much worse*, 7 = *much better*).

Static social comparison (Time 1). It was important for us to statistically control for the effects of static social comparison, as we want to show that TSC explains variance in social undermining above and beyond SSC. Therefore, we adapted our 8-item measure of temporal social comparison to measure respondents' assessments of their current relative standing compared with Alter. We told participants "[. . .] we are interested in how you compare to Alter at the moment" and "[. . .] to indicate the extent to which Alter is currently better/worse off than you on the following dimensions." As the dimension of career progression is inherently dynamic, we asked for a formal job position (the "static" equivalent) instead. A sample item of the scale is "Currently, Alter's

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salary in comparison with my salary is [. . .].” Again, participants responded using a 7-point scale (1 = *much worse*, 7 = *much better*, α = .87).

Competition (Time 1). We measured competitive climate in terms of low cooperation among team members, using the same items from Lam and colleagues' (2011) studies on social comparison and interpersonal harming. The three items stem from the cooperative goal scale by Tjosvold, Yu, and Hui (2004). The items were “Our team members 'swim or sink' together,” “Our team members' goals go together,” and “Our team members seek compatible goals.” We used a 7-point scale for each item (1 = *strongly disagree*, 7 = *strongly agree;* α = .83).

Future status threat (Time 1). Like in Study 1, we measured future status threat in terms of participants' expected status relative to Alter in the future. We again used the four items adapted from Pettit and colleagues (2013; 1 = *strongly disagree*, “7 = *strongly agree,* α = .95).

Envy (Time 1). We again measured envy with the five-item envy scale by Vecchio (2000) and reformulated the items so that they referred to Alter instead of coworkers in general. We used a 7-point response scale (1 = *strongly disagree*, 7 = *strongly agree*, α = .89).

Social undermining (Time 2). We again used the coworker undermining scale by Duffy and colleagues (2002), reformulating all 13 items so that they directly referred to Alter instead of a general other. We measured participants' actual undermining behavior toward Alter and asked them “How do you behave toward Alter? Please indicate how often you have shown the behavior described in the statements below in the last two weeks.” A sample item is “Spread rumors about Alter.” We used a 7-point scale ranging from “1 = *never*” to “7 = *everyday*” (α = .85).

Control variables (Time 1). Based on recent recommendations (Bernerth & Aguinis, 2016) to only include control variables if there are statistical and/or theoretical reasons to include them, we controlled for the participants' gender (0 = *female*, 1 = *male*), age, and company tenure (both in years), which is consistent with previous research on social undermining (e.g., Duffy et al., 2012). Indeed, these demographic variables may influence negative behavior toward others at the workplace (Barling, Dupré, & Kelloway, 2009). Because some people have a stronger tendency to engage in social comparisons than others, and subsequently place more importance on these comparisons (Buunk et al., 2003), we controlled for participants' social comparison orientation using Gibbons and Buunk's (1999) 11-item scale (α = .91, 1 = *strongly disagree*, 7 = *strongly agree*). A sample item is “I am not the type of person who compares often with others.” Finally, we controlled for participants' trait competitiveness because competitive employees might aim to undermine coworkers more often (Houston, Mcintire, Kinnie, & Terry, 2002). We measured trait competitiveness using Helmreich and Spence's (1978) 4-item scale (α = .90, 1 = *strongly disagree*, 7 = *strongly agree*). A sample item is “I enjoy working in situations involving competition with others.” We tested our model with and without these five control variables, and the results remained virtually unchanged (i.e., our model still holds).

Results

Response bias checks and measurement issues. To test whether participants in our final sample (N = 252) differed from those who only completed the Time 1 survey (N = 316), we compared them using the control and study variables collected at Time 1: namely, the participants' gender, age, tenure, social comparison orientation, trait competitiveness, static and temporal social comparison, competition in the organization, future status threat, and envy. These variables were not significantly related to Time 2 participation, suggesting that our final sample did not differ significantly from those participants who only completed the Time 1 survey.

As temporal social comparison is a construct that has not, to the best of our knowledge, been measured before, and because of the high correlation between TSC and SSC in our sample (r = .71), we tested whether our participants cognitively differentiated between static and temporal social comparison. In other words, we assessed their discriminant validity. First, we used confirmatory factor analysis (CFA) to compare the fit of a two-factor model with SSC and TSC as separate latent factors against a model with all 16 items loaded on a single factor. Given that some fit indices are sensitive to sample size (Hu & Bentler, 1999), we performed the analysis on the full sample at Time 1 (N = 581 participants who completed the T1 survey and passed all attention checks at T1). We permitted the error terms of items measuring the same comparison dimension (e.g., current performance as an indicator of static social comparison and performance development as an indicator of temporal social comparison) to correlate. This is recommended when there are similarities in the item content and/or wording, as it is with the indicators of our two measures (Brown, 2015). CFA results show that the two-factor model explained the data better, $\chi^2(95) = 572.80$, $p < .001$, CFI = 0.91, TLI = 0.89, RMSEA = 0.09; SRMR = 0.07, than a one-factor model, $\chi^2(96) = 1256.41$, $p < .001$, CFI = 0.78, TLI = 0.73, RMSEA = 0.14; SRMR = 0.08. The difference between the two-factor and the one-factor model in terms of model fit was significant, $\chi^2(2) = 683.60$, $p < .001$. Hence, participants in our sample apparently distinguished between static and temporal social comparison.

To further assess discriminant validity, we tested whether TSC explains unique variance above and beyond SSC (Ng & Feldman, 2015; Pierce, Gardner, Cummings, & Dunham, 1989). If TSC is significantly related to a relevant outcome variable after controlling for SSC, this would provide evidence that TSC has incremental validity (Ng & Feldman, 2015; Pierce et al., 1989). Thus, we regressed our first mediator, future status threat, on our control and study variables, as well as on the two relevant interaction terms (SSC × competition, TSC × competition). Multiple regression analysis revealed a significant coefficient for TSC (β = .46, $p <$ .001), as well as for the interaction between TSC and competition (β = −.28, $p < .003$). Further, there was a significant difference in explained variance between the regression models with and without TSC and the TSC × competition interaction, $\Delta R^2 = .04$, $F(2, 241) = 13.07$, $p < .001$. This suggests that TSC has incremental validity above and beyond SSC. Taken together, these tests provide convergent evidence for the discriminant validity of TSC and SSC.

Hypothesis tests. Table 2 shows the descriptive statistics and bivariate correlations for all study variables. To test our hypothe-

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Table 2
Means, Standard Deviations, Intercorrelations, and Reliability Estimates in Study 3

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11
1. Gender	.53	.50	—										
2. Age	36.95	9.89	−.09	—									
3. Tenure	6.83	4.62	−.07	.49***	—								
4. Trait competitiveness	4.55	1.54	.11	−.18**	−.15*	(.90)							
5. SCO	4.22	.85	−.01	−.17**	−.09	.35***	(.91)						
6. SSC	3.92	.91	−.10†	−.10	−.18**	.03	.16*	(.87)					
7. TSC	4.11	.97	−.12†	.05	−.04	.04	.13*	.71***	(.88)				
8. Competition	5.31	1.24	.01	.06	.03	.03	−.02	−.02	.06	(.83)			
9. Future status threat	3.38	1.67	−.05	−.02	−.15*	.03	.13*	.74***	.63***	−.08	(.95)		
10. Envy	2.34	1.15	−.01	−.08	−.15*	.07	.18**	.62***	.42***	−.17**	.66***	(.89)	
11. Social undermining (T2)	1.26	.35	.12†	−.05	−.07	.23***	.23***	.11†	.06	−.12†	.15*	.26*	(.85)

Note. $N = 252$. Alpha coefficients are presented on the diagonal, and intercorrelations are presented below the diagonal. Variables were assessed at time 1 except where noted. Gender: 0 = female, 1 = male, SCO = Social Comparison Orientation; SSC = Static Social Comparison; TSC = Temporal Social Comparison.
† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$, two-tailed.

sis, we used the same moderated serial mediation model (Hayes, 2015; Preacher & Hayes, 2008) as in Study 1. In all three multiple regression models, we controlled for SSC, the SSC × competition interaction, and participants' gender, age, tenure, social comparison orientation, and trait competitiveness. Table 3 depicts the results of the three regression models.

The results show that the TSC × competition interaction significantly predicted future status threat ($\beta = -.28$, $p = .003$; Model 1); that future status threat significantly predicted envy ($\beta = .50$, $p < .001$; Model 2), and that envy significantly predicted social undermining ($\beta = .07$, $p < .028$; Model 3). Figure 4 depicts the interaction of TSC and competition on future status threat. To test the indirect and moderated effect of TSC on social undermining via future status threat and envy, we used a bootstrap procedure with 10,000 samples. In support of Hypothesis 1, the indirect effect of TSC on social undermining via future status threat and envy was more positive when cooperative team goals were low (i.e., competition was high; −1 *SD*; estimate = 0.023, 95% CI [0.003; 0.056]) than when cooperative team goals were high (i.e., competition was low; −1 *SD*; estimate = 0.005, 95% CI [−0.002; 0.023]). These indirect effects were also significantly different from each other (difference = .017, 95% CI [0.002; 0.052]). Based on recent recommendations regarding the use of control variables (Bernerth & Aguinis, 2016), we conducted the same analysis and excluded all controls except for SSC and SSC × competition interaction; the results were virtually the same, however. Thus, Study 3 supports Hypothesis 1.

Discussion

Study 3 complements Study 2 by replicating the serial indirect effect of temporal social comparison on social undermining under high competition, albeit in a field setting with actual rather than hypothetical measures (future status threat, envy, social undermining); thus, the study strengthens the external validity of our results. Moreover, Study 3 complements both Studies 1 and 2 by using a

Table 3
Study 3 Regressions for Moderated Serial Mediation

	Future status threat						Envy						Social undermining					
Variable	β	*SE*	*Z*	*p*	LLCI	ULCI	β	*SE*	*z*	*p*	LLCI	ULCI	β	*SE*	*z*	*p*	LLCI	ULCI
Constant	3.34	.10	33.81	.000	3.15	3.54	2.32	.08	30.83	.000	2.17	2.47	1.23	.03	40.84	.000	1.17	1.29
Gender	.12	.14	.89	.373	−.15	.39	.06	.10	.57	.566	−.14	.26	.06	.04	1.36	.173	−.02	.14
Age	.14	.08	1.86	.063	−.01	.30	−.03	.06	−.46	.648	−.14	.09	−.00	.02	−.04	.970	−.05	.05
Tenure	−.12	.08	−1.49	.136	−.27	.04	.00	.06	.06	.950	−.11	.12	−.02	.02	−1.00	.318	−.07	.02
SCO	.04	.07	.58	.560	−.10	.18	.08	.06	1.53	.127	−.02	.19	.05	.02	2.43	.015	.01	.10
Trait competitiveness	−.01	.07	−.16	.875	−.15	.13	.04	.06	.66	.512	−.07	.15	.06	.02	2.58	.010	.01	.10
SSC	.91	.10	9.28	.000	.72	1.10	.41	.09	4.78	.000	.24	.58	−.02	.04	−.48	.632	−.09	.05
TSC	.44	.10	4.58	.000	.25	.63	−.12	.08	−1.56	.118	−.27	.03	.00	.03	.07	.942	−.06	.06
Competition	−.18	.07	−2.63	.008	−.32	−.05	−.15	.05	−2.82	.005	−.25	−.05	−.05	.02	−2.35	.019	−.09	−.01
SSC × Competition	−.28	.10	2.72	.007	.08	.48	.08	.08	.98	.325	−.08	.23	.02	.03	.47	.638	−.05	.08
TSC × Competition	−.28	.09	−2.98	.003	−.45	−.09	−.11	.07	−1.54	.124	−.25	.03	−.05	.03	−1.63	.103	−.10	.01
Future status threat							.50	.08	6.22	.000	.34	.66	.01	.03	.23	.818	−.06	.08
Envy													.07	.03	2.19	.028	.01	.12
R^2			.58						.49						.13			
F			36.14						22.84						4.15			

Note. $N = 252$. LLCI = 95% confidence interval lower limit; ULLCI = 95% confidence interval upper limit; SCO = Social Comparison Orientation; TSC = Temporal Social Comparison; SSC = Static Social Comparison, two-tailed.

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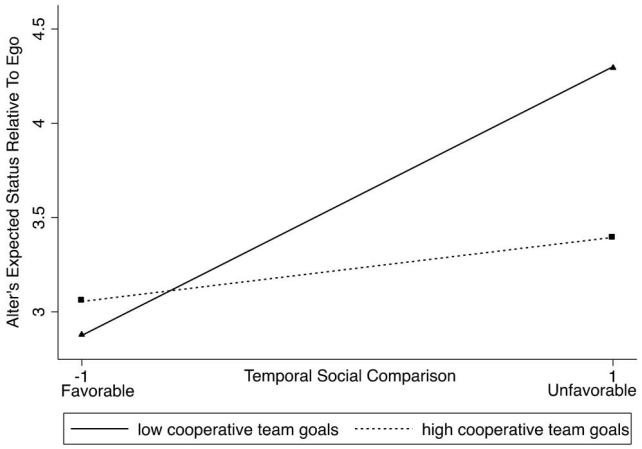


Figure 4. Study 3, two-way interactive effects of temporal social comparison and cooperative team goals on expected future status of the comparison person.

measure for temporal social comparisons that includes various aspects of workplace status. Additionally, we tested for and show the discriminant and incremental validity of temporal social comparison above and beyond static social comparison.

General Discussion

The present paper proposed that employees' envy and social undermining toward coworkers arises not only from perceptions of current status threat (i.e., being presently worse off than a coworker), but also via an anticipated future status threat (i.e., being potentially worse off than a coworker in the future irrespective of current relative standing). Across three experiments and a field study, we confirmed that employees anticipate future status threat when they perceive that their own past development trajectory is less favorable than a coworker's. In response, the respective employees feel envy and subsequently undermine the coworker. As expected, competitive scenarios exacerbated the outcomes of such temporal social comparisons. These dynamics exceeded employees' social comparisons regarding their current status.

This study contributes to the envy and social undermining literature by introducing future status threat as an additional motivation for employees' undermining behavior. Previous research in this domain suggested that employees only envy and undermine coworkers who are already better off and, thus, threaten their present status. Consequently, scholars did not expect undermining in situations where a coworker is currently worse off than the focal employee (Lam et al., 2011). Although this notion is both logically sound and empirically supported, the temporal perspective reveals that other comparisons can be equally threatening. Because individuals are concerned with how their status will develop in the future (Pettit et al., 2010; Scheepers et al., 2009), they are sensitive to signals of potentially lower future status. This anticipated lower status then drives their feelings and behavior toward the comparison person in the present. This may explain why employees would harm coworkers with lower current standing. Previous research assumed that these low performers experience hostility and victimization as a punishment for their inferior contributions toward joint goals (Jensen, Patel, & Raver, 2014). There is empirical support for this argument, yet we contend that envy could also prompt harming behaviors if an employee feels that a coworker's future status poses a threat.

Moreover, our studies represent a first step in disentangling the cognitions that underlie employee comparisons. In their studies, Lam and colleagues (2011) told participants to compare their last two weeks of personal performance against a colleague's; Kim and Glomb (2014) asked participants to think of the performance feedback they received from their supervisor in the past year, and Jensen and colleagues (2014) used the overall performance ratings that their participants had received. Although the employee and/or supervisor ratings in these studies do cover a time frame, and could have been informed by the participants' personal and/or relative performance development, the respective measures did not distinguish participants' relative development from their current relative performance. As a consequence, it was not clear how participants construed the comparison information, which aspects of performance they considered (i.e., current relative performance, relative performance trend, or some combination thereof), and which of them finally drove their negative interpersonal behavior. By considering past, present, and future status assessments simultaneously, we provide a more nuanced picture of how different types of status threat (current/actual vs. future/potential) elicit the same functional emotions (envy) and behaviors (social undermining) to defend one's status.

Our studies also raise a question: Would classically "upward comparisons" still be experienced as threatening when individuals also consider their relative development (Exline & Lobel, 1999, 2001; Wills, 1981)? Upward comparisons might be less threatening if the comparison target's standing shows a weaker relative trajectory, which would suggest that the focal person may quickly surpass the comparison other. As such, future studies may want to account for the temporal nature of status at the workplace by considering the net effects of static and temporal social comparisons (Chizhik et al., 2003; Pettit et al., 2013).

More generally, our studies contribute to the question of how individuals evaluate their current status and which comparisons they use to predict their future status. Interestingly, both Study 2 and 3 found that employees' comparisons of current relative standing also predict future status threat. Although we did not present any a priori hypothesis on this relationship, this does make sense. If individuals currently enjoy a much higher standing than the comparison person, they may expect to have higher status in the (near) future as well, because it may simply take a while until the comparison person "catches up" and reaches the same level in terms of standing.

In this context, there is a question about which organizational situations spur people to consider their past status development, their present status, or their expected future status. At this time, we speculate that past status developments (and the resulting expectations for future status) should be particularly relevant when employees work together with the same coworkers for longer periods of time, have the chance to observe their own and others' trajectories, and potentially compete with these coworkers for future awards and promotions. In contrast, current status assessments will likely be more important in short-term-oriented work relationships—for instance, project teams in consultancies, where

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employees' direct colleagues (and hence their potential comparison persons) frequently change.

Finally, our study established that interorganizational competition significantly moderates the impact of temporal social comparisons: Specifically, a highly competitive climate exacerbates the social undermining that follows from such comparisons. Competing with coworkers for status and recognition increases employees' uncertainty regarding their future status (Dunn & Schweitzer, 2006; Festinger, 1954), which makes comparisons with coworkers more salient. Contrast this with more cooperative contexts, where employees' successes and shortcomings are less visible and have less impact on their rewards. Thus, our findings coherently extend research on the negative side effects of competitive reward systems (Larkin et al., 2012) by showing that competition also leads to higher future status threat.

Taking a broader perspective, we think that comparisons of relative trajectory might prove interesting for organizational topics beyond social undermining—for example, pay comparisons or employees' relationships with their leader(s) (Thau, Tröster, Aquino, Pillutla, & De Cremer, 2013; Tse, Lam, Lawrence, & Huang, 2013; Vidyarthi, Liden, Anand, Erdogan, & Ghosh, 2010). Building on Messersmith and colleagues' (2011) study, which strived to predict executives' turnover based on their average salaries, one could speculate that executives who receive higher (vs. lower) pay raises than their same-level colleagues might be more (vs. less) willing to stay with the company. As both pay raises and turnover entail costs for the organization, whether from maintaining or replacing personnel, organizations may benefit from knowing how pay comparisons over time affect turnover (Messersmith, Guthrie, Ji, & Lee, 2011; Tröster, Van Quaquebeke, & Aquino, in press). Similarly, one could investigate how temporal social comparisons of leader-member exchange (LMX) influence job satisfaction (Tse et al., 2013; Vidyarthi et al., 2010) or organizational citizenship behavior. LMX is assumed to be inherently dynamic and develop over time (Graen & Uhl-Bien, 1995), so some employees may cultivate a better relationship quality with their leader more quickly. The subsequent perceptions of such differences might affect on-the-job behavior and performance.

Limitations and Directions for Future Research

Although we used a mixed-method design to test our model and replicated the effect in four different samples, the present research has some limitations. Although it is now common practice to conduct behavioral research with online panels such as MTurk (Goodman, Cryder, & Cheema, 2013; Hauser & Schwarz, 2016; Mason & Suri, 2012; Paolacci & Chandler, 2014), these venues still provide limited control over participants' honesty and attention. It is possible that participants were distracted with other tasks or simply not focused on the survey (e.g., from tiredness). To limit this concern, we employed several recommended measures for increasing data quality (IMCs; inclusion of MTurkers with high approval rate and experience; Hauser & Schwarz, 2016) and designed Studies 1a and 1b to be highly engaging for participants (Greenberg & Eskew, 1993). Furthermore, any distractions should occur randomly and thus not negate our findings. Moreover, MTurk offered us the advantage of a diverse sample that was not company- or industry-specific, which increases the generalizability of our findings. To be fair, participants on MTurk tend to have lower-paying jobs (Bartel Sheehan & Pittman, 2016), so future research may want to investigate the effects of future status threat in higher-paying professions, such as in the finance industry. In sum, an increasing body of literature continues to investigate the MTurk population with respect to data quality and generalizability, suggesting that MTurk samples are suitable for behavioral research so long as one takes steps to ensure high data quality (Goodman et al., 2013; Mason & Suri, 2012; Paolacci & Chandler, 2014).

Another possible limitation is the use of self-ratings in Study 3, which invites common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). To somewhat alleviate such concerns, we assessed social undermining two weeks after we assessed all other variables. Moreover, common method bias cannot create artifactual interactions between variables; rather, it attenuates the variance explained by existing interactions, which ultimately makes it more difficult to detect them (Evans, 1985; McClelland & Judd, 1993). Further, social undermining is a rather covert form of harming another person, making it difficult to use other-ratings. Given previous research, we felt comfortable assessing social undermining in the form of self-reports in Study 3 (e.g., Duffy et al., 2012). In addition, we assessed two different aspects of undermining behavior in Studies 1a and 1b (behavioral experiments in a realistic setting). Nevertheless, future research could utilize more objective measures for employees' relative standing and how their standing has developed: for instance, their actual salary, formal job position, or objective performance data (e.g., sales or customer satisfaction).

In this regard, we must note that our test of mediation in Studies 2 and 3 was mediation via measurement rather than via an experimental causal chain (Spencer et al., 2005). Also, we simultaneously measured the psychological process via future status threat and envy, which could have created some demand character. Our decision to still measure these constructs partly stemmed from the number of experimental conditions that we already had in Studies 1a and 1b (2×2) and in Study 2 ($2 \times 2 \times 2$). Manipulating an additional two variables (future status threat and envy) would have resulted in a large number of experimental conditions and made it more difficult to establish a realistic context. Further, measuring future status threat in Study 2, rather than manipulating it, allowed us to test whether people mentally extrapolate their past relative trajectories to predict their future status.

For future research, scholars could determine when individuals rely on temporal versus static social comparisons, and investigate contextual factors beyond competition, like career stage or social motivations. For example, employees who are fresh in their career, and who are uncertain as to whether they will be able to meet their future targets, might particularly rely on temporal social comparisons to predict whether they will be able to keep up with their coworkers (self-evaluation motive). In contrast, employees at later stages in their career, who have limited opportunities for growth (e.g., because they already occupy a high-status position), might prefer static social comparisons to reassure themselves of their high status (self-enhancement motive; cf. Tröster et al., in press). In terms of individual difference variables, individuals' temporal focus (Shipp, Edwards, & Lambert, 2009) could influence the extent to which they engage in temporal social comparisons vis-à-vis other types of comparisons, but so could the accessibility of such information in their memory. Individuals with a strong future focus might rely more on temporal than static social comparisons to extrapolate their future status, while the opposite may be true for present-focused individuals. Meanwhile,

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those with a strong past focus may derive their self-evaluations from past status levels and the associated trajectory.

Practical Implications

Social undermining among employees negatively affects employee outcomes (e.g., Duffy et al., 2002) and thereby creates social costs for organizations (Cole, Shipp, & Taylor, 2016). Further, recent research suggests that being undermined can lead employees to reciprocate (i.e., engage in undermining themselves; Lee, Kim, Bhave, & Duffy, 2016), thus initiating a vicious cycle of ever-broader levels of social undermining. Clearly, organizations have a vested interest in minimizing such behavior. Our study offers suggestions as to what managers could do to circumvent social undermining at the workplace. Given that comparisons among coworkers are ubiquitous in organizations (Greenberg et al., 2007) and comprise a rich source for employees' self-evaluations, simply trying to reduce the frequency of such comparisons seems improbable. However, managers can help make comparisons less threatening to employees—for instance, by assigning different spheres of influence to employees who compete for status. They can, for example, give these employees different tasks or assign them to different projects to invite less comparison among them. Additionally, managers may give employees opportunities to improve their standing in these domains through mentoring and training. If employees are able to improve their performance over time, they can make more favorable inferences about their expected status, particularly when they are not in direct competition with their coworkers. As the need to defend one's standing becomes less salient, employees may abstain from social undermining. On this point, managers should note that unfavorable temporal social comparisons are particularly salient in a competitive (Study 1 and 2) or uncooperative (Study 3) climate. In practice, such dynamics may be fueled by organizational practices, such as highly competitive reward systems or forced rankings (Creelman, 2013; Eichenwald, 2012). Thus, our findings clearly suggest that managers should try to reduce interpersonal competition and instead foster a cooperative climate.

Granted, the above may be easier said than done. For organizations, there is a central question about whether the benefits of competition and comparison still outweigh their social costs (Larkin et al., 2012; Lazear & Rosen, 1981; Peterson, 2013). Managers in organizations thus face a dilemma: They have to motivate their workforce to work hard and develop their full potential, which might be accomplished by competitive reward systems that induce comparisons (and envy). Yet, this comes at the cost of potentially lower performance among those who are being undermined. To add to this, our study indicates that employees engage in both "upward" (i.e., toward those who are better off; Lam et al., 2011) and "downward" undermining (i.e., toward those who represent a future threat). Thus, the field may be underestimating the social costs of undermining at work.

Practitioners may also consider these dynamics in light of other organizational areas, like talent management. For instance, supervisors with stagnating performance might refuse to support "rising stars" because of the future threat they present. As such, they may reduce their support and mentoring, or actively undermine new talent to avoid being outperformed in the future. Going one step further, supervisors with weak past performance might even abstain from hiring potential employees who could pose a future threat to their position (Garcia et al., 2010). As Pfeffer and Sutton (2006) put it, "A players hire other A players. B players hire C players. C players hire F players" (p. 89). In the so-called "war for talent" (Chambers, Foulon, Handfield-Jones, Hankin, & Michaels, 1998), companies may encounter serious difficulties in attracting and retaining high-potential employees simply because the old guard is afraid of being outpaced by younger workers.

Conclusion

Previous studies, which were predominantly conceptual, have repeatedly argued that static time perspectives in organizational behavior research may oversimplify reality (Cole et al., 2016; Sonnentag, 2012). Instead, they advocated for considering time dynamics, which may pertain to the past and/or future (Redersdorff & Guimond, 2006; Shipp et al., 2009). In this vein, our study provides a case-in-point that using broader time perspectives can meaningfully extend a prolific research domain such as social undermining. In short, it is about time to consider time.

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