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Proactively performing teams: The role of work design, transformational leadership, and team composition

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This study investigated the determinants of team proactive performance amongst 43 shift teams from a UK chemical processing plant. Using external ratings of team proactive performance, the study found that the most proactive teams were those with higher levels of self-management, transformational team leaders, and a higher-than-average level of proactive personality. The relationship between transformational leadership and team proactive performance was mediated by favourable interpersonal norms. In addition, lower diversity of proactive personality amongst team members had an indirect association with team proactive performance via its negative effect on favourable interpersonal norms.

> 'Teams are remarkably passive and accepting even when given work that is inappropriate for performance by a team, when the design of the team's task is flawed, or when contextual supports for teamwork are unavailable or inadequate … '
> *Oldham and Hackman (2010, p. 474)*

As suggested in the above quote, some work teams can be overly passive and adaptive when a more appropriate response might be to take charge and proactively change the situation. Yet, despite considerable research on individual-level proactivity (Bateman & Crant, 1993; Frese & Fay, 2001; Parker, Williams, & Turner, 2006), few studies have focused on what drives this behaviour at the team level. As Oldham and Hackman (2010, p. 474) concluded 'little is known about the roots of this passivity or what it would take to foster greater team proactivity about such matters. It would be good to know more'. In this study, we focus on the determinants of team proactive performance and the processes through which team proactive performance is achieved. We consider four types of ambient stimuli that could influence the proactivity of the team

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(work design, leadership, norms, team composition), and the possible mediating role of favourable interpersonal norms. Our study suggests unique insights into factors that lead teams to take charge and initiate change in their environment or the team.

Team proactive performance

Most research and theory has considered the concept of proactivity at the individual level. Individual-level proactive behaviour refers to self-starting, future-focused action in which the individual aims to change the external situation, such as improving work methods, or to change some aspect of his/her self, such as improving one's performance by actively seeking feedback from a supervisor (Parker *et al.*, 2006). Such behaviour is more active, change oriented, and future focused than either core task performance or adaptive performance, and, as such, is particularly important in uncertain contexts in which there is a lack of predictability in the inputs, processes, or outputs of work systems (Griffin, Neal, & Parker, 2007). When uncertainty is high, work-roles cannot be formalized precisely; they must emerge dynamically in response to changing conditions and demands. Proficient compliance with specifications is not sufficient; nor is it enough just to adapt and respond to these dynamic changes. Individuals need to take charge of situations, anticipate problems before they arise, and initiate change in the work system and work-roles. Researchers have shown the importance for individual and organizational outcomes of such individual-level proactivity (Fuller & Marler, 2009).

Our focus in the current paper is on proactive teams rather than proactive individuals. We propose that team proactive performance is a team-level concept that has theoretical similarity with individual-level proactive performance and thus define proactive team performance as the extent to which a team engages in self-starting, future-focused action that aims to change the external situation or the team itself. Examples of proactive team behaviours include the team introducing new work methods, the team preventing problems rather than only reacting to them, or the team scanning the environment to identify potential opportunities. Such team proactivity is collective in emphasis: it is about the way the team behaves as a group, that is, as an interdependent and goal-directed combination of individuals (Morgeson & Hofmann, 1999). As such, proactive team performance is not the same as the sum of individual team member proactive performances, such as multiple individual team members acting proactively to contribute to individual or team goals (Strauss, Griffin, & Rafferty, 2009). Individuals within a team might behave proactively, such as by introducing new methods, but unless this effort is coordinated, the team itself might not be proactive.

Team proactive performance is an emergent property of teams that reflects and shapes team interactions. When a team carries out its tasks, team members interact with each other to plan how they will meet their goals, monitor goal achievement, monitor external conditions, and coordinate interdependent activities (Marks, Mathieu, & Zaccaro, 2001). Through these interactions, team members develop shared and enduring ways of responding to challenges in the environment, which then become the team's behavioural patterns. For some teams, these interactions lead to the team trying to meet their goals in proactive ways, such as by planning ahead to prevent future problems. Other teams collectively develop routines for managing these processes of goal setting, monitoring, and performing in more passive ways. Team proactive performance, whilst distinct from individual-level proactive performance in structure (because it is composed of the interactions of team members rather than individual behaviour), is thus similar to individual-level proactive performance in function (Morgeson & Hofmann, 1999).

There are relatively few studies of team proactive behaviour, but those that do exist suggest that proactive teams achieve positive outcomes. Hyatt and Reddy (1997) found that proactive behaviour of maintenance work groups was positively related to the response time of teams. Kirkman and Rosen (1999) found that team proactive behaviour was positively linked to team-level customer service and productivity. Similarly, Tesluk and Mathieu (1999) found that road crews who used highly self-starting strategies to manage performance barriers (e.g., taking advantage of low-workload times to improve methods) were most effective. Finally, Druskat and Kayes (2000) found that team proactivity in problem solving (defined as anticipating and heading off problems through proactive investigation, assessment, and action) predicted team learning and team performance in short-term student project teams.

Determinants of team proactive performance

Understanding the determinants of team proactive performance is important because one cannot simply assume homology across levels. As Chen, Bliese, and Mathieu (2005) argued: 'if researchers find that relationships are homogolous across levels of analysis, it adds to the parsimony and breadth of theories. In contrast, should relationships not prove to be homogolous across levels, it signals a boundary condition and a need to refine theories and to better understand how the processes operate at each distinct level' (p. 376). Moreover, team proactive performance is distinct from other team-level performance concepts that have had more attention, such as team adaptability. Kirkman and Rosen (1999) identified team empowerment (i.e., the team's collective feelings of meaning and control) as a determinant of team proactive performance, and empowerment in turn was predicted by external team leader behaviours, production/service responsibilities, team-based HR policies, and social structure. Likewise, Tesluk and Mathieu (1999) found that proactive crew management strategies were predicted by self-management, leadership, and teamwork processes. However, the mediating links between the variables of work design, leadership, and team processes were not considered in these studies, and team composition was not examined as a determinant.

Our study seeks to expand understanding of the determinants of team proactive performance by considering a broader range of team-level variables than considered thus far (see Figure 1 for model). To identify predictors, we draw on Chen and Kanfer's (2006) categorization of factors that influence team motivation and behaviour. These scholars proposed a reorganization of person and situation factors according to their stimulus characteristics, not their impact. They identified ambient and discretionary inputs to teams. Ambient stimuli refer to team-oriented stimuli that pervade the team as a whole, such as socio-technical aspects of work like work design, whereas discretionary stimuli are those that are directed at or presented to specific team members, such as personalized feedback to individual team members or rewards at an individual level. In the current study, we focus on ambient stimuli because these have stronger and more direct effects on team-level motivation and performance than discretionary stimuli (Chen & Kanfer, 2006). Of the four categories of ambient inputs identified by Chen and Kanfer (2006), we include three categories for which there are clear theoretical reasons to expect associations with proactive performance: work design (i.e., team self-management), leadership (i.e., the transformational leadership of the team leader), and norms (i.e., the extent to which there are favourable interpersonal norms within the team). We expected these stimuli to operate similarly to how they

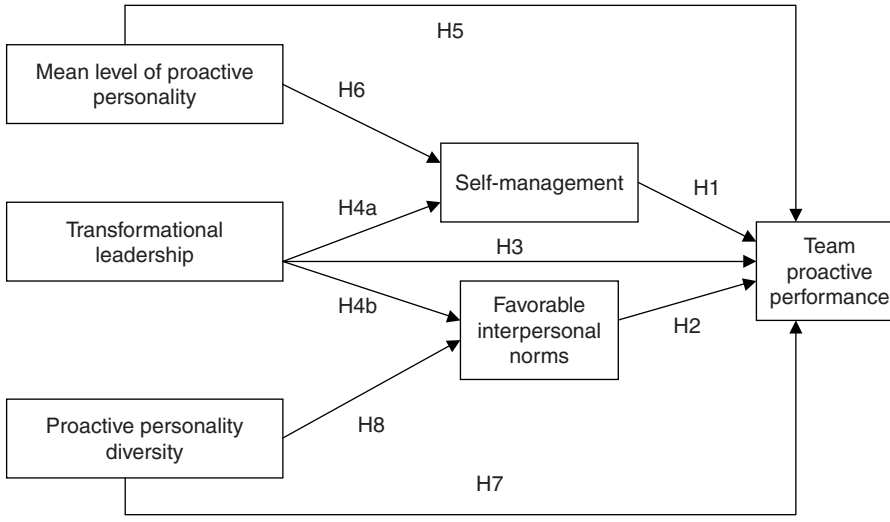

Figure 1. Hypothesized model.

operate at the individual level of analysis. We did not include team feedback, the fourth category of ambient stimuli identified by Chen and Kanfer, because we expected feedback to be more important for fostering core, proficient performance rather than proactive performance.

In addition to work design, leadership, and norms, we included team composition as a determinant. Specifically, we considered both the mean level of individual proactive personality and the diversity of proactive personality within the team. Although past research has investigated how the proactive personality of individuals affects individual-level proactivity (e.g., Parker *et al.*, 2006), research has not investigated how team member personality characteristics combine to affect team-level proactivity. Team composition has been found to be a key factor in predicting team effectiveness (e.g., see Ilgen, Hollenbeck, Johnson, & Jundt, 2005; Williams & Allen, 2008, for reviews) and, as we elaborate shortly, there are compelling reasons to consider this attribute of teams in relation to team proactive performance. The inclusion of team composition means we test a hybrid theory of homology (Chen *et al.*, 2005) that identifies certain homologous predictors across levels (e.g., leadership, self-management), but also some predictors that are only meaningful at the group level (team composition).

Work design: Team self-management

In terms of work design, our focus is on team self-management. Self-managing teams are interdependent groups of individuals who assume collective responsibility for the day-to-day operations of the team (Goodman, Devadas, & Griffith-Hughson, 1988; Parker & Wall, 1998). Members of self-managing teams typically experience greater variety, feedback, task significance, and task identity as a result of the self-managing design, but the most important feature is the greater collective autonomy that individuals have over their activities. For example, self-managing production teams typically allocate tasks amongst themselves, decide on the timing of their methods, and take responsibility for aspects such as quality and machine maintenance. In essence, team self-management is a form of shared leadership focused around decision-making, with shared leadership

defined as 'an emergent team property that results from the distribution of leadership influence across multiple team members' (Carson, Tesluk, & Marrone, 2007, p. 1218).

At the individual level of analysis, job autonomy has been identified as one of the most consistent determinants of proactive behaviours, such as proactive problem solving and idea implementation (Parker *et al.*, 2006), personal initiative (Frese, Kring, Soose, & Zempel, 1996), voice (LePine & Van Dyne, 1998), and suggesting improvements (Axtell *et al.*, 2000). We suggest the same positive effects of autonomy operate at the team level. Self-managing teams allow team members the control and opportunity to manage their demands (variances) more actively. In essence, team autonomy 'allows' the team to be more proactive. Self-management also increases the team's motivation to be proactive. Thus self-managing teams, through greater task control and engagement in challenging tasks, develop a shared sense of collective efficacy that they can shape their environment in a proactive way. Prior research shows that self-management enhances collective efficacy which in turn drives performance (Chen & Kanfer, 2006). Team self-management could also enhance team proactive performance through a cross-level process in which team self-management, because of the greater autonomy it affords individuals as well as teams, results in greater individual proactive motivation which in turn drives individual proactive behaviour. Although we do not test this cross-level process, it provides a further explanation as to why team self-management might affect team proactive performance. In sum, there is good reason to expect that team self-management will be associated with team proactive performance, as indeed shown by two team-level studies (Kirkman, Rosen, Tesluk, & Gibson, 2004; Tesluk & Mathieu, 1999). We aimed to replicate these findings. Our hypothesis is:

Hypothesis 1: Team self-management will be positively related to team proactive performance.

Group norms: Favourable interpersonal norms

Norms are informal 'rules' present in a group that regulate the behaviour of members belonging to the group and establish a common code of conduct (Feldman, 1984). Chen and Klimoski (2003) argued that interdependent contexts amplify the importance of group norms and climate. Here we focus on interpersonal norms, or the code of conduct by which team members typically treat each other. Favourable interpersonal norms are especially important for proactivity because engaging in proactive behaviour can be interpersonally 'risky' (Parker *et al.*, 2006). At the individual level, it is theorized that individuals weigh up the likely benefits and risks before deciding whether to take charge at work (Morrison & Phelps, 1999). Perceived risks are enhanced when individuals fear they might be put down or not respected by colleagues. According to Dutton, Ashford, Lawrence, and Miner-Rubino (2002), when deciding whether to engage in discretionary behaviour, individuals engage in contextual sensemaking assessing 'whether or not the context is favorable for taking some type of action' (p. 355). In support of this, relationship quality between the individual and the people with whom they were to sell was important in predicting issue selling (Ashford, Rothbard, Piderit, & Dutton, 1998), a proactive behaviour in which individuals try to influence the organizational agenda by 'selling' issues to leaders. Further, Parker *et al.* (2006) found team members' trust in co-workers to be positively related to engaging in individual-level proactive work behaviour.

We propose the importance of a favourable interpersonal context at the team level. In deciding whether to suggest ideas or start discussions with other team members

regarding how an anticipated problem can be overcome, team members will assess the way they work together and decide whether the within-team environment is supportive (or favourable) for taking such action. If the norms include team members' supporting and respecting each other, they will more likely take the risk of being proactive. Moreover, when there are favourable interpersonal norms, one team member putting forward suggestions will start positive discussions amongst team members, thus encouraging more ideas to be put forward by the team. Some support for this idea comes from Tesluk and Mathieu (1999), who found that team work processes of coordination, potency, and familiarity were positively related to problem-management actions and strategies. Likewise, Zárraga and Bonache (2005) found a 'high care' atmosphere (incorporating issues such as respect within the team) facilitated the transfer and creation of knowledge in self-managed teams. Similarly, team psychological safety has been found to be important to team learning behaviour (Edmondson, 1999), and team norms supporting innovation predict team innovation (Anderson & West, 1998). We therefore suggest that, for the team to be proactive, it requires members to appraise the interpersonal norms as favourable so that they are willing to speak out and challenge the *status quo*, and are prepared to put forward suggestions and ideas for improvement. We hypothesize that:

> *Hypothesis 2:* Favourable interpersonal norms within the team will be positively related to team proactive performance.

Leadership: Transformational team leader

According to Chen and Kanfer (2006), 'leadership arguably represents the most important of all contextual factors which might affect individual and team motivation' (p. 40). A key type of ambient leadership, directed towards the team as a whole, is transformational leadership. Transformational leaders motivate teams by transforming the values and priorities of team members and inspiring them to perform beyond expectations (Bass, 1985). Bass's (1985) four components of transformational leadership (idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration) collectively inspire followers to achieve more than was thought possible. Importantly for proactivity, transformational leaders encourage followers to question assumptions and think about new ways of doing tasks. Consistent with these ideas, transformational leadership has been shown to lead to positive individual and organizational outcomes (Bass & Riggio, 2006; Judge & Bono, 2000). At the team level, research from military units in America (Bass, Avolio, Jung, & Berson, 2003) and Singapore (Lim & Ployhart, 2004) has found that unit commanders' transformational leadership predicts unit performance in operational training exercises. Likewise, Keller (1992) found that transformational leadership in research and development teams predicted superior technical quality of products produced by these teams.

In the current study, we focus on team leaders who are 'hands-on' within the team. We suggest that one reason transformational leadership affects team proactivity is because transformational leaders encourage team self-management. Transformational leaders support individual development (Avolio & Gibbson, 1988) and inspire individuals to want to engage in more challenging tasks, and thereby promote greater collective self-management. In accordance with these arguments, at the organizational level, CEO's transformational leadership has been found to be positively related to empowerment (Jung, Chow, & Wu, 2003). Another reason transformational leadership

might affect team proactive performance is via its effect on interpersonal norms. At the individual level, managers can have a significant impact on the climate for innovation and proactivity (Morrison & Phelps, 1999). Transformational team leaders also affect team performance through influencing a shared vision and increased team reflexivity (Schippers, Den Hartog, Koopman, & van Knippenberg, 2008). Leadership (including individual consideration) has also been found to be related to a positive group atmosphere (e.g., active, open, friendly; Bierhoff & Müller, 2005) and team leaders actively involved in teams facilitate a 'high care' atmosphere within-teams (Zárraga & Bonache, 2005).

In sum, we hypothesize that transformational leadership of the team leader will facilitate both self-management and favourable interpersonal norms, and thus in turn affect team proactive performance. Our hypothesis allows us to test whether individual-level findings of a positive link between transformational leadership and proactive behaviour (Belschak & Den Hartog, 2010; Rank, Nelson, Allen, & Xu, 1999; Strauss *et al.*, 2009) apply to teams. Moreover, we test mechanisms through which transformational leadership might affect team proactive performance. Our hypotheses are:

> *Hypothesis 3:* Transformational leadership will be positively related to team proactive performance.
>
> *Hypothesis 4a:* The effect of transformational leadership on team proactive performance will be mediated by the self-management of the team.
>
> *Hypothesis 4b:* The effect of transformational leadership on team proactive performance will be mediated by favourable interpersonal norms.

Team composition: Proactive personality mean and diversity

As Morgeson and Hofmann (1999) stated, the composition of a unit can have 'a pronounced influence on collective behaviour and systems of interaction, thereby influencing the phenomena that ultimately emerge' (p. 258). Of particular importance are underlying psychological characteristics (often referred to as deep-level composition variables) such as personality factors, values, and attitudes (Bell, 2007). For example, a meta-analysis by Bell (2007) concluded that mean levels of conscientiousness, openness to experience, and collectiveness were strong predictors of team performance. In regard to predicting team proactivity, whilst other personality factors might be important, we focus on team members' proactive personality, a behavioural tendency involving showing initiative, identifying opportunities, taking action, and persevering in attempts to enact change (Bateman & Crant, 1993). At the individual level, proactive personality has been found to predict proactive problem solving (Parker *et al.*, 2006), individual innovation (Seibert, Kraimer, & Crant, 2001), entrepreneurship (Crant, 1996), as well as proactive work behaviour (Parker & Collins, 2010). Investigating whether the impact of proactive personality extends to the team level is an important first step in understanding how team composition relates to team proactive performance.

Team members with a proactive personality are inclined to put forward ideas and make suggestions as to how to improve the way work is done, as well as to spot potential problems and think of ways to get around them. Consequently, the greater the number of team members with proactive personalities the more suggestions and ideas the team will consider. Moreover, interaction amongst team members with proactive

personalities is likely to stimulate team discussions resulting in the team anticipating problems and/or generating collective ideas about improving things. We therefore propose that the mean level of proactive personality in the team will be positively related to team proactive performance. In addition, we suggest that a mechanism through which this will manifest is self-management. Individuals with a proactive personality are more likely to engage in self-managed activities (Parker & Sprigg, 1999), which in turn will lead to increased team proactive performance. For example, if the team contains several members with a proactive personality, these team members will likely make the most of the opportunity to be more self-managing, and will take on more responsibility for activities such as task allocation. Through processes such as role modelling, others in the team will see their peers being self-managing and will be more likely to take up responsibility themselves.

Hypothesis 5: The mean level of proactive personality in the team will be positively related to team proactive performance.

Hypothesis 6: The effect of the mean level of proactive personality in the team on team proactive performance will be mediated by self-management.

Another aspect of team composition likely to be important is diversity in proactive personality. Muchinsky and Monahan's (1987) distinction between supplementary and complementary models of person–organization fit is helpful in this regard. A supplementary model suggests that for some types of personality, job performance will be facilitated by homogeneity in personality (i.e., low diversity) as team members will be more compatible with those with a similar personality (Neuman, Wagner, & Christiansen, 1999). In contrast, a complementary model suggests that the team performance can be improved by diversity when 'each member adds unique attributes that are necessary for the team to be successful' (Neuman *et al.*, 1999, p. 31).

We base our hypotheses about proactive personality diversity on a supplementary model. Having passive team members (i.e., those low in proactive personality) is unlikely to be beneficial to the team in terms of team proactive performance. Passive team members are less likely to put forward suggestions. Moreover, team members with proactive personalities will be more likely to support others' attempts to be proactive because they themselves like to take charge and shape the environment. They will probably better understand the effort involved in being proactive than passive team members, and so actively endorse this effort. Equally, they might experience frustration towards colleagues who prefer to react or adapt to change, rather than initiate it, and who are different from themselves. They may also feel that they are contributing more to the team effort than other team members who have less proactive personalities. All this will reduce the likelihood that proactive ideas become implemented within a team.

Having a team composed of both proactive and passive members will also likely affect the interpersonal norms. Diversity in job satisfaction of team members has been found to be associated with reduced cohesion (Harrison, Price, & Bell, 1998) and less social integration (Van der Vegt, 2002), while diversity in values has been found to be related to increased conflict (Jehn, Northcraft, & Neale, 1999). Although at the individual level and focusing on perceived rather than actual dissimilarity, Williams, Parker, and Turner (2007) found perspective taking is lower amongst team members who perceive themselves to be dissimilar from their fellow team members in terms of work style. Thus, differences amongst team members approach to work can be important to within-team relationships. Differences in the levels of proactive personality

of team members may therefore negatively affect the interpersonal atmosphere within the team, for example, through reduced perspective taking amongst team members, increased arguments and disagreements within the team, lower cohesion, and social integration. We therefore propose that diversity in proactive personality within the team will decrease team proactive performance, and we expect that this negative effect will be due in part to the detrimental effect that diversity will have on favourable interpersonal norms.

Hypothesis 7: Proactive personality diversity will be negatively related to team proactive performance.

Hypothesis 8: The effect of proactive personality diversity on team proactive performance will be mediated by favourable interpersonal norms.

Method

Procedure and sample

The study was conducted within a petrochemical processing plant based in the UK. The teams studied were shift teams consisting of production technicians carrying out day-to-day plant operations such as distillation, steam and energy generation, and ensuring pump reliability. At the time of the study, the process of moving from traditionally managed to self-managing teams had occurred with varying degrees of success across different areas of the plant. The change process involved removing a shift supervisor and broadening the roles of the production technicians. Within each team, one production technician was appointed the lead technician (i.e., team leader). These lead technicians were 'hands-on' members of the team who acted as the central link between the team and upper management. The average team size was 7.16 members ($SD = 3.75$).

The independent variables were measured via a questionnaire that researchers administered to all teams within the plant during work time. The survey response rate was 66% ($N = 289$) with an average within-team response rate of 79%. When aggregated to the team level, this produced usable survey data on 55 teams. As the lead technicians were integral members of the team, their scores were used along with the other team members for all the measures except transformational leadership, for which they were excluded as they were the specific focus of that measure.

To avoid common method variance, external ratings were used to measure team proactive performance. Plant engineers were asked to rate teams with whom they had regular contact on a daily basis. The self-managing teams reported to the plant engineers once the shift supervisors were removed from the hierarchy. In total, 38 engineers returned ratings, resulting in 47 teams being rated by between 2 and 5 engineers (average number of ratings per team = 3.22). The final sample in this study was 43 teams.

Measures

Proactive personality composition

Individual-level proactive personality ($\alpha = .85$) was assessed using four of the highest loading items from Bateman and Crant's (1993) proactive personality scale. This measure has proven reliability and validity (e.g., Bateman & Crant, 1993) and the same abbreviated scale has been used elsewhere (e.g., Parker & Sprigg, 1999). Example

items include: 'If I believe in an idea, no obstacle will prevent me from making it happen' and 'I am excellent at identifying opportunities'. Responses ranged from 1 (*not true at all*) to 5 (*very true*). The mean level of proactive personality was the individual proactive personality measure aggregated to the team level. Proactive personality diversity was operationalized as the standard deviation in proactive personality within the team, which is the most appropriate measure of diversity for interval variables (Harrison & Klein, 2007).

Team self-management

Team self-management was assessed using a measure developed specifically for this study. Focus groups were conducted with 10 engineers and one senior manager who had been involved in the planning and implementation of self-managed teams at the chemical plant. The goal of the focus groups was to identify activities that the team would have been doing prior to the introduction of self-managing teams, as well as all the activities that self-managed teams should be doing once the shift supervisors had been removed. The resulting list comprised 19 activities. Production technicians on the teams were then asked to rate the extent to which they were involved in each activity on a scale from 1 (*not at all*) to 5 (*a great deal*). To identify items reflecting self-management, an exploratory factor analysis was conducted using maximum-likelihood extraction method and oblimin rotation. This analysis indicated that the items loaded onto three factors which, as expected, varied in their degree of self-management. Example items from the 10-item self-managing factor are: 'help to monitor the team's overall performance', 'help to set long-term training goals for the team', and 'help to select new team members'. These are all examples of activities traditionally carried out by supervisors, but which are carried out by team members as self-managing teams. The other two factors that reflected more traditional team tasks included items such as 'carry out housekeeping' and 'carry out own first-fix maintenance', which are about the breadth of tasks rather than the degree of self-management, and are therefore not considered further in the study.

Aggregation analyses showed there to be significant inter-rater reliability, ICC(1) = .101, $F(63) = 1.75$, $p < .01$, and the mean r_{wg} for the measure as a whole was .68. Although the r_{wg} was slightly lower than is desirable, we considered it acceptable because our measure of team self-management is what Kozlowski and Klein (2000) refer to as a configural construct, which are constructs that 'emerge from individuals but do not coalesce as shared properties do' (p. 34). Although many self-managing teams will have higher than average levels of team members involved in self-managing activities, it is not necessary (nor perhaps appropriate) for team members to be equally involved self-managing activities. Consequently, it is not unsurprising that consensus amongst members of the team was lower for this measure than for other measures in our study. Indeed, some even argue it is not necessary to demonstrate within-team agreement for configural constructs (Kozlowski & Klein, 2000). In terms of between-group variance, the ICC(2) was .43. The nature of our measure might partly explain why this is lower than the .70 value which is typically considered acceptable. Another factor is that the team sizes within our sample were small, which lowers ICC(2) (see Bliese, 2000). Schippers *et al.* (2008) argued that when this is the case researchers should rely on r_{wg} and ICC(1) when considering the appropriateness of aggregation. We therefore concluded there was sufficient support for the aggregation of our measure to the team level.

Based on the focus group and interviews with plant managers, we identified two distinct areas within the plant. One area was regarded by our contacts to be taking to self-managed team working well and the other area was struggling. A significant difference in the expected direction was found in our measurement of team self-management in these areas, $t(33) = 3.00$, $p < .01$, thus helping to support the validity of our measure.

Favourable interpersonal norms

Favourable interpersonal norms ($\alpha = .72$) was assessed via three highest-loading items from an adaptation of Donovan, Dragow, and Munson's (1998) measure of co-workers' fair interpersonal treatment, which was demonstrated by Donovan *et al.* to be both reliable and valid. The items are: 'my team-mates put each other down', 'my team-mates argue with one another', 'my team-mates treat each other with respect'. Following Donovan *et al.*, a three-point response scale was used such that negatively keyed items were coded: 1 (*yes*), 2 (*cannot decide*), and 3 (*no*). Consequently, a high score represents favourable interpersonal norms. Donovan *et al.*'s original scale was at the individual level, but our analyses indicated adequate within-group agreement (mean $r_{wg} = .72$) and, given the team sizes within the sample sufficient inter-rater reliability ($F(63) = 2.04$, $p < .001$; ICC(1) = .14, ICC(2) = .51), justifying aggregation of the measure. Finally, in support of the validity of this measure, we found that the teams' ratings of favourable interpersonal norms was significantly correlated to engineers' ratings of the cohesion of the teams ($r = .51$, $p < .01$), which although a narrower construct than favourable interpersonal norms, is a construct that would be expected to correlate with the survey measure.

Transformational leadership

Transformational leadership ($\alpha = .92$) was measured using 10 items from Bass and Avolio's (1997) Multifactor Leadership Questionnaire 5-X, which they demonstrated to be both a reliable and valid measure. Items tapped each of the four components of transformational leadership and the relative factor loadings obtained in Bass and Avolio's analyses, as well as their relevance to our study context, were considered in item selection. Example items include (how often does your team leader): 'do things that build my respect for him/her?', 'talk enthusiastically about what needs to be done?', 'get us to look at problems from many different angles?', 'treat each team member as an individual with unique needs and abilities?'. The response scale ranged from 1 (*never*) to 5 (*always*). Team members (excluding the lead technician) were asked to rate their lead technician, and these ratings were aggregated to produce the team-level transformational leadership score. Aggregation was demonstrated to be appropriate due to adequate within-group agreement (mean $r_{wg} = .95$) and, given the team sizes within the sample, sufficient inter-rater reliability ($F(63) = 3.06$, $p < .001$; ICC(1) = .24, ICC(2) = .67).

Team proactive performance

Team proactive performance ($\alpha = .78$). The measurement model we apply is the aggregate model (Chan, 1998) or global composition model (Kozlowski & Klein, 2000) in which the referent is the team, and the aggregate is based on an aggregate-level measure (in this case, an external rating for the team). Engineers were asked to rate teams in terms of their 'use of initiative to make the most of opportunities and being

proactive in the way it deals with problems' and the extent to which the team 'comes up with novel ideas and solutions to problems'. Both items tap the self-starting, change-oriented behaviours that characterize proactivity. The response scale ranged between 1 (*very low*) and 5 (*very high*). The mean r_{wg} across the teams was .84, ICC(1) was .22 ($F(60) = 2.94$, $p < .001$), and ICC(2) was .66. We therefore concluded that there was sufficient within-team agreement amongst raters to average the engineers' ratings for each team.

Confirmatory factor analysis of predictors

Confirmatory factor analysis using LISREL 8.3 (Jöreskog & Sörbom, 1999) with covariance matrix as input was conducted to assess the factorial validity of each of the team-report measures. As our sample was small given recommendations for parameter-to-sample ratios within structural equation modelling (Bentler & Chou, 1987), we created item parcels (Landis, Beal, & Tesluk, 2000). For transformational leadership, we created an item parcel for each of the four components of transformational leadership; for self-management, we randomly assigned four items to one parcel and three items to each of the other two parcels; for proactive personality, we randomly assigned two items to each of the two parcels; and for favourable interpersonal norms, we randomly assigned two of the three items to one parcel, and the remaining item reflected the second parcel.

We used maximum-likelihood estimation, and in addition to chi-squared values, we also report the root mean squared error of approximation (RMSEA; Steiger, 1990), for which values of less than .10 are desired (Kelloway, 1998). These measures can, however, be affected by sample size. We therefore also report the comparative fit index (CFI; Bentler, 1990) which Hu and Bentler (1998) suggested to be most appropriate for small sample sizes (< 250 cases). CFI values lower than .90 are considered to indicate a poor fit.

Although the hypothesized four-factor model provides only a modestly good fit to the data [$\chi^2(38) = 149.81$, $p < .01$; RMSEA = .11; CFI = .91], an alternative one-factor model was a poor fit [$\chi^2(44) = 654.49$, $p < .001$; RMSEA = .24; CFI = .45], and was significantly poorer than the four-factor model ($\Delta\chi^2(3) = 504.68$, $p < .05$). The four-factor model was also a significantly better fit than various three-factor models that combined measures for those scales most closely intercorrelated. For example, the model in which transformational leadership and favourable interpersonal norms were combined into a single factor was a significantly poorer fit than the four-factor model [$\chi^2(41) = 238.45$, $p < .01$; RMSEA = .11; CFI = .79; $\Delta\chi^2(3) = 88.64$, $p < .001$]. Moreover, all model parameters in the four-factor hypothesized model were significant and loaded highly onto their intended factor (see Appendix). This provides support for the discriminant validity of our measures; a conclusion supported by the fact that the highest correlation between the latent constructs was .30 which indicates the constructs are sufficiently distinct from one another to be considered separately.

We also tested the convergent and discriminant validity of the constructs using the approach advocated by Fornell and Larcker (1981). The average variance extracted for each of the underlying constructs of interest was .67, .51, .80, and .73 for transformational leadership, self-management, proactive personality and favourable interpersonal norms, respectively. As the average variance extracted for each latent constructs exceeds .50, we can conclude that the variance captured by the construct is larger than the variance due to measurement error (Fornell & Larcker, 1981), thus demonstrating convergent validity. In addition, the average variance extracted was

greater than the squared correlations between constructs, thus demonstrating discriminant validity (Fornell & Larcker, 1981).

Results

Table 1 shows the descriptive statistics and zero-order correlations among study variables, conducted at the team level. Overall, the zero-order correlations support our model, although a notable exception to this is that transformational leadership and self-management are not significantly correlated ($r = .11$, ns). However, to investigate the hypothesized relationships whilst taking into account the other study variables; we tested our model using observed variable path analysis (Kelloway, 1998). The analyses discussed below were conducted controlling for team size, and an inspection of modification indices did not indicate the need to specify any specific pathways. It is important to note that, because the analyses were conducted at the team level ($N = 43$), it was not appropriate to compute a full structural model.

Table 1. Descriptive statistics and correlations among study variables

	M	*SD*	1	2	3	4	5	6	7
1. Team size	7.26	3.75	–						
2. Mean level of team proactive personality	2.29	0.43	−.48**	–					
3. Team proactive personality diversity	0.70	0.30	.00	.07	–				
4. Transformational leadership	3.47	0.54	−.02	−.02	−.25	–			
5. Favourable interpersonal norms	2.57	0.38	.06	.14	−.45**	.59**	–		
6. Self-management	2.36	0.52	−.62**	−.51**	.09	.11	.09	–	
7. Team proactive performance	3.06	0.57	−.41**	.32**	−.21	.29†	.45**	.31*	–

†$p < .1$; *$p < .05$; **$p < .01$.

Our findings indicate that a fully mediated version of our hypothesized model (i.e., no direct pathways between the independent variables and team proactive performance) provides a reasonable fit to the data, $\chi^2(9) = 12.88$, $p > .05$; RMSEA = .10; CFI = .90. We compared this model against other theoretically plausible models as recommended Kelloway (1998). First, we compared the fully mediated model to a partially mediated version. Specifically, we added three direct paths from the mean level of proactive personality, proactive personality diversity, and transformational leadership to team proactive performance. As shown in Table 2, this model was a less good fit to the data ($\chi^2(6) = 12.67$, $p > .05$; RMSEA = .17; CFI = .88).

The second alternative model to which we compared our fully mediated model predicted both mediators to be important in the relationship between each of the compositional and transformational leadership variables and team proactive performance (i.e., we added paths from the mean level of proactive personality to favourable interpersonal norms and from proactive personality diversity to self-management). This model provided a relatively good fit to the data ($\chi^2(7) = 10.47$, $p > .05$; RMSEA = .11; CFI = .91); however, tests of comparative fit suggest this additional mediators model was not significantly different from the hypothesized model, ($\Delta\chi^2(2) = 2.41$, $p > .05$). We therefore also considered indices of model parsimony using the parsimonious normed fit index (PNFI; James, Mulaik, & Brett, 1982). With this fit index, comparatively

Table 2. Summary of models tested and LISREL fit statistics

Model	χ^2	*df*	RMSEA	CFI	PNFI
Fully mediated model	12.88	9	.10	.90	.35
Alternative model 1 (partially mediated version of fully mediated model)	12.67	6	.17	.88	.24
Alternative model 2 (full mediation with both mediators related to all independent variables)	10.47	7	.11	.91	.28
Alternative model 3 (partial mediation with both mediators related to all independent variables	10.14*	4	.20	.89	.17
Alternative model 4 (direct effects version of fully mediated model)	40.21**	4	.28	.38	.20
Adjusted hypothesized model (fully mediated model with pathway between transformational leadership and self-management removed)	13.54	10	.09	.90	.39

*$p < .05$; **$p < .01$.

higher values are considered an indication of more parsimonious fit, but there are no common thresholds, so Kelloway (1998) recommends choosing the model with the highest value. As the PNFI for the hypothesized model (PFNI = .35) was greater than for the partially mediated version (PFNI = .24), we conclude that the hypothesized model is a better fit to our data.

A third alternative model was a partially mediated version of the second alternative model (i.e., in addition to the added mediation paths, we also added three direct paths from the mean level of proactive personality, proactive personality diversity, and transformational leadership to team proactive performance). This model was a poor fit to the data; $\chi^2(4) = 10.14$, $p < .05$; RMSEA = .20; CFI = 0.89.

The final alternative model to which we compared our fully mediated model was a direct model whereby self-management and favourable interpersonal norms were not mediators (i.e., we removed the paths between mean level of proactive personality and self-management, transformational leadership and self-management, transformational leadership and favourable interpersonal norms; and proactive personality diversity and favourable interpersonal norms). Again, this model was a poor fit to the data; $\chi^2(10) = 40.21, p < .001$; RMSEA = .28; CFI = .38.

Figure 2 shows the significant pathways for the fully mediated model. Both team self-management ($\beta = 0.27$, $p < .05$) and favourable interpersonal norms ($\beta = 0.42$, $p < .01$) were positively related to team proactive performance, thus supporting Hypotheses 1 and 2. In relation to the effects of the independent variables, transformational leadership was positively related to favourable interpersonal norms ($\beta = 0.51$, $p < .01$) but unrelated to self-management ($\beta = 0.12$, ns). This non-significant finding means that Hypothesis 4a is not supported by our data. The mean level of proactive personality was, however, positively related to self-management ($\beta = 0.51$, $p < .01$) and proactive personality diversity was negatively related to favourable interpersonal norms ($\beta = -0.32$, $p < .01$). Squared multiple correlations show the model explains 27, 44, and 27% of the variance in team proactive performance, interpersonal norms, and self-management, respectively.

Apart from Hypothesis 4a, the significant pathways are in accordance with our mediation hypotheses (i.e., Hypotheses 4b, 6, and 8). However, it is not sufficient to demonstrate a relationship between independent variable and mediator, and mediator

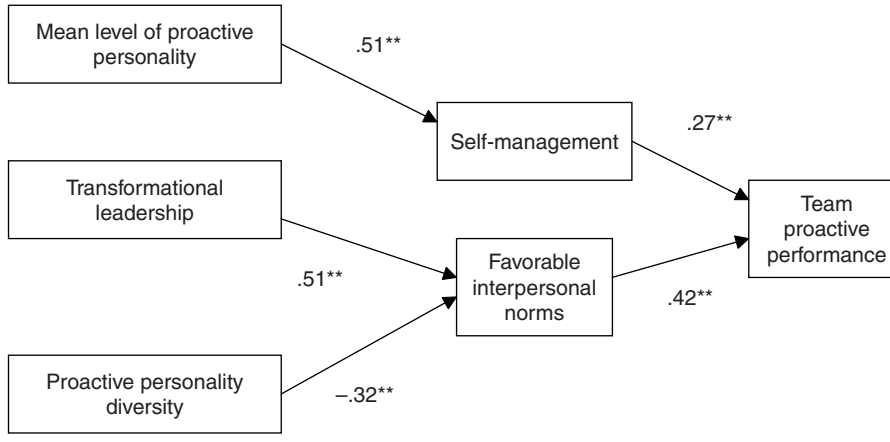

Figure 2. Significant pathways in supported model. *Note*. *$p < .05$, **$p < .01$. Team proactive performance: $R^2 = .27$; favourable interpersonal norms; $R^2 = .44$; self-management $R^2 = .27$. Team size was controlled for in the model; an inspection of the modification indices did not indicate that any specific pathways needed to be modelled.

and dependent variable. Rather, there should be a non-significant relationship between the independent variable and the dependent variable after controlling for the mediator (Baron & Kenny, 1986). Alternative model 1 was a test of these relationships (it specified direct and indirect pathways) and inspection of the pathways shows team proactive performance was not significantly related to mean level proactivity ($\beta = 0.18$, ns), proactive personality diversity ($\beta = -0.08$, ns), nor transformational leadership ($\beta = 0.06$, ns).

A final condition of mediation put forward by Baron and Kenny (1986) was that there should be a significant relationship between the independent variable and dependent variable when the mediator was not controlled for. To test this, we tested a model in which there were only pathways between the independent variables and the dependent variable. As expected, this model was a poor fit ($\chi^2(1) = 7.84$, $p < .01$; RMSEA = .40; CFI = .77). Inspection of the pathways showed that both the mean level of proactive personality ($\beta = 0.33$, $p < .01$) and transformational leadership ($\beta = 0.25$, $p < .05$) were significantly related to team proactive performance; these effects support Hypotheses 3 and 5. Proactive personality diversity was not significantly related to team proactive performance ($\beta = -0.17$, ns). However, although this demonstrates that proactive personality diversity does not directly affect team proactive performance there remains the possibility that the effect of proactive personality diversity on team proactive performance is indirect. Moreover, although a direct effect between the independent variable and dependent variable was a condition of Baron and Kenny's (1986) test of mediation, it has more recently been suggested that this condition is not necessary, especially in small sample sizes (LeBreton, Wu, & Bing, 2009). Instead, LeBreton *et al.* recommend testing indirect effects, estimated as the product-of-coefficients. Using procedures advocated by Preacher and Hayes (2004) to conduct Sobel tests, we found significant indirect effects for the proactive personality diversity to favourable interpersonal norms to team proactive performance relationship ($Z = 2.04$, $p < .05$) and the transformational leadership to favourable interpersonal norms to team proactive performance relationship ($Z = 2.10$, $p < .05$). There was, however, a non-significant indirect effect in the mean level of proactive personality to self-management

to team proactive performance relationship ($Z = 1.08$, ns). Our findings therefore show that favourable within-team context mediates the effect of transformational leadership on team proactive performance, and that proactive personality diversity has an indirect negative effect on team proactive performance via its negative effect on favourable interpersonal norms. Self-management does not, however, mediate the relationship between mean level of proactive personality and team proactive performance, nor is there an indirect effect between these variables.

In sum, supporting Hypotheses 1 and 2, our findings show that team proactive performance is predicted by both self-management and favourable interpersonal norms. There was a direct relationship between transformational leadership and team proactive performance, thus supporting Hypothesis 3, and this effect was found to be mediated by favourable interpersonal norms, but not self-management. Therefore, whilst Hypothesis 4b is supported, the data does not provide support for Hypothesis 4a. Supporting Hypothesis 5, we found a direct relationship between mean level of proactive personality and team proactive performance, but contrary to Hypothesis 6 this relationship was not mediated by self-management. Finally, we found that proactive personality diversity had an indirect negative effect on team proactive performance via favourable interpersonal norms, thus our data supports Hypothesis 8, but not Hypothesis 7.

Discussion

This study aimed to extend our understanding of the determinants of team proactive performance. Overall, some of our findings are unique to the team level, such as the importance of team composition, whereas other findings parallel those at the individual level, such as the importance of the ambient team stimuli of self-management and leadership for proactivity.

Key findings and their implications

Our study is the first to examine how the composition of the team relates to its proactive performance. The findings demonstrate the importance of considering team members' proactive personalities. The more proactive members in a team, the greater its innovation and taking charge behaviour. From a practical point of view, this finding suggests that if teams are working in uncertain environments where team proactive behaviour is important, one of the criteria to be used when selecting team members should be the extent to which the individual has a proactive personality.

Some care does, however, need to be taken because, in addition to finding that the mean level of proactive personality was positively related to team proactive behaviour, our study also shows that diversity of proactive personality is problematic. Specifically, proactive personality diversity had a negative effect on favourable interpersonal norms which in turn was associated with team proactive performance. Thus, a team is more likely to be moderately proactive if it has several moderately proactive individuals than if it has some very proactive individuals and some very passive individuals. Since proactive behaviour involves challenging the *status quo*, passive individuals might feel uncomfortable in the presence of proactive others, and less likely to endorse or actively support their proactive efforts. At the same time, those individuals who are being proactive are doing so on their own volition, and when their proactivity is not welcomed,

this might be demoralizing. More research is needed to test these possibilities. Importantly, our results are in accordance with the idea that proactive personality diversity operates within a supplementary model of person–organization fit, such that team members will be more compatible with those with a similar level of proactive personality. Our findings are also congruent with the now substantial literature demonstrating that non task-related forms of diversity have detrimental effects on team functioning and effectiveness (Mannix & Neale, 2005; Williams & O'Reilly, 1998).

A further finding of our study is the role of self-management. Teams who collectively take on greater responsibility for their day-to-day tasks were also those who were identified by external raters as engaging in proactive problem solving and innovation. Our results add to the literature that suggests self-management is related to individual-level proactivity (Frese & Fay, 2001; Parker *et al.*, 2006) and team-level proactivity (Kirkman & Rosen, 1999; Tesluk & Mathieu, 1999). From a practical perspective, the significance of this finding is high because, despite the prevalence of teams in the workplace, the introduction of genuine self-management is relatively low. The organization in which we collected data for this study is a case in point. Whilst it had officially implemented self managing teams, the reported self-management of most teams were, on average, low. Yet, if further studies with longitudinal designs confirm our findings, self-managing work designs might be a prerequisite for team proactivity.

Further research is needed to understand exactly how team self-management relates to greater team proactive performance. Team self-management might simply enable team members to take charge of their environment because members are in control of critical variances. It is also likely that team self-management motivates team members to be more proactive, both through team-level processes (e.g., by enhancing the collective efficacy of the team to set more challenging goals) and through enhancing individual motivation (e.g., increasing employees' role breadth self-efficacy or flexible role orientation; Parker, 1998). Team self-management might also have its effects through a learning mechanism. Members of self- managing teams have broadened experiences which can lead to greater knowledge and thus more ideas for improving performance.

The current study also demonstrated that favourable interpersonal norms within teams are associated with team proactive performance. This finding supports the idea that engaging in proactivity is a risky behaviour requiring a safe and constructive interpersonal environment in which individuals feel comfortable deciding to take action and be proactive. From a practical point of view, the finding suggests it is not enough to promote self-management; it is also important to ensure that teams develop norms and codes of conduct that are positive and supportive. There might be a role for team building or team development activities in developing this type of team context.

Our study also supports the contention that leadership influences team proactive performance (e.g., Kirkman & Rosen, 1999; Tesluk & Mathieu, 1999). As existing evidence of the relationship between transformational leadership and proactivity has been at the individual level, our findings extend past research by showing that transformational leadership also predicts team proactive performance. Transformational leadership is therefore a homologous predictor of proactivity. More specifically, our study suggests transformational team leadership results in favourable interpersonal norms within the team, rather than affecting the level of team self-management *per se*. This intriguing finding might have reflected the particular leaders we focused on. As hands-on team members, team leaders can influence teams to behave in positive and constructive ways through their role modelling and coaching. However, encouraging the team to be more self-managing might be more difficult because, as team leaders, they

might feel responsible for taking on the management role themselves. It is possible that if we had assessed the transformational leadership style of the managers external to the team (i.e., the plant engineers), then there might have been a stronger link between leadership and self-management. Practically, these findings suggest that coaching team leaders in how they create such norms might be a powerful intervention.

Limitations and future research

The findings of our study should be interpreted in light of its limitations. First, our data was cross-sectional so we cannot be entirely sure of causality. For example, it is possible that proactive teams are afforded more self-management by managers. We think it unlikely, however, that more proactive teams are allocated more transformational leaders or more proactive team members because team membership was decided early in the implementation of the team design. Nevertheless, a key next step for research is to test the model longitudinally.

A distinct strength of our study was the use of external ratings of proactive behaviour. This enabled us to avoid the possibility of same source bias in many of our key findings. There does, however, remain a possibility that common method variance affects the relationships between our independent and mediating variables. Nonetheless, even amongst variables that were assessed using self-reports, different sources were used. In particular, proactive personality diversity was operationalized as a standard deviation. Therefore although still self-report data, this variable is not a perceptual measure and therefore is a different 'source' than the other self-report measures that used means. In addition, as noted above, there is factor analytic evidence for the empirical distinctiveness of the self-reported measures. We are therefore confident that common method variance is not a major issue of concern in this sample.

Our sample was, however, relatively small and thus the non-significant finding regarding the relationship between transformational leadership and self-management, and the non-supported mediation of mean level proactive personality to self-management to team proactive performance, might be due to a lack of statistical power in detecting effects rather than because they are not substantive. As small sample sizes can increase the chances of making a Type II error (Aguinis & Harden, 2009), it might be that we concluded that there is no relationship between these variables when one in fact exists.

Moreover, to reduce questionnaire length and hence facilitate response rate, we used shortened versions of some measures. Therefore, although we have provided support for the reliability and validity of the versions of the measures we use in this study, the shortened nature of our measures should be considered in interpreting our findings. Future research investigating the generalizability of our model would therefore be welcomed. As our teams came from a single context, future research would also do well to test our model in other types of teams and across other industries.

It would also be interesting to investigate the processes by which ambient and indeed discretionary stimuli influence team self-management, favourable within-team context, and team proactive performance. As noted earlier, there are both team-level processes and cross-level processes that could be explored. We also recommend multi-level explorations of the dynamics through which individual and team-level proactivity are related, as well as an investigation of how team proactive performance relates to the other aspects of team performance such as team proficiency or team adaptivity. Moreover, the exact ways that teams develop shared norms and behaviours around proactivity (that is, how the phenomenon of team proactive performance emerges)

deserves further inquiry. Finally, it would be valuable to explicitly investigate homologous models of relationships between determinants and proactivity at the individual and team level simultaneously. Our single-level study was important in suggesting some similar relationships (e.g., the role of leadership and self-management), but expanding this type of work to a full multi-level framework would be useful.

In sum, whilst causality has not been established in our study and there are important areas for future inquiry, our study supports the idea that team proactive performance in part arises from situational factors (team self-management, transformational leadership) and in part from the individuals that make up the team (team composition), both of which influence the interpersonal norms of team working. Our study is one of the first to suggest that too much diversity in personality might inhibit the proactivity of a team. It appears that, because of the nature of proactive behaviour, a dysfunctional dynamic arises when there are large discrepancies in team members' proactive personality. Moreover, our study suggests that organizations requiring teams who use their initiative might consider introducing self-managing work designs led by transformational team leaders.

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Appendix

Model	χ^2	*df*	RMSEA	CFI
Hypothesized model (four-factor model)	149.81**	38	.11	.91
Alternative model 1 (one-factor model)	654.49**	44	.24	.45
Alternative model 2 (three-factor model, transformational leadership and favourable interpersonal norms combined)	238.45**	41	.14	.79
Alternative model 3 (three-factor model, transformational leadership and self-management combined)	380.00**	41	.19	.75
Alternative model 4 (three-factor model, transformational leadership and proactive personality combined)	320.98**	41	.17	.72
Alternative model 5 (three-factor model, self-management and favourable interpersonal norms combined)	274.54**	41	.16	.77
Alternative model 6 (three-factor model, self-management and proactive personality combined)	311.83**	41	.17	.74

**$p < .01$.

Completely standardized parameter estimates for the four-factor confirmatory factor analysis

Parcel					*t*(*SE*)
Transformational leadership 1	.87				16.12(.04)
Transformational leadership 2	.79				13.96(.06)
Transformational leadership 3	.83				15.05(.06)
Transformational leadership 4	.79				14.02(.06)
Self-management 1		.69			10.62(.04)
Self-management 2		.84			13.01(.06)
Self-management 3		.69			10.52(.07)
Proactive personality 1			.95		12.94(.07)
Proactive personality 2			.84		11.74(.07)
Favourable interpersonal norms 1				.74	9.53(.08)
Favourable interpersonal norms 2				.96	11.23(.09)

Note. All *t* values are significant at the $p < .001$ level.

Interfactor correlations

	1	2	3	4
1. Transformational leadership	1.00			
2. Self-management	.07	1.00		
3. Proactive personality	.22**	.29**	1.00	
4. Favourable interpersonal norms	.30**	.21**	.29**	1.00

**$p < .01$.