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Toxic team climate: The causal role of psychopathic personality and lack of teamwork knowledge in dysfunctional team outcomes

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Abstract
We identify the central role of toxic team climate in understanding dysfunctional work teams. We develop and test a model identifying team-level psychopathic personality and teamwork knowledge as proximal contributors to the creation of toxic team climates, which mediates the effects to create dysfunctional team outcomes. We also tested an alternative model that treats teamwork knowledge as a moderator of the relationship between team psychopathy and toxic team climate. Using a four-wave longitudinal design, we evaluated these models in a sample of 508 business students comprising 107 student teams (35 MBA and 72 undergraduate) completing semester-long team projects. Results indicate that (1) teams with relatively higher levels of psychopathy and lower levels of teamwork knowledge were more likely to have toxic team climates, (2) teams with more toxic climates had higher levels of social loafing and interpersonal deviance, and lower team performance and satisfaction, and (3) the effects of psychopathy on dysfunctional outcomes were mediated by toxic team climate, but the effects of teamwork knowledge were not. In addition, teamwork knowledge moderated the relationship between team psychopathy and toxic team climate by reducing its effects. The study yields implications for the management of toxic work teams.

Keywords
personality, psychopathy, toxic, climate, counterproductive behavior, teams, group dynamics, group performance

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Work teams are ubiquitous within organizations. However, sometimes teams become dysfunctional because they have developed toxic climates – such teams are often characterized by interpersonal conflict, lack of cohesion, lack of trust, unfairness, and injustice, all of which can lead to ineffective performance. For example, one survey of over 1,000 US workers found that 68% of respondents reported being part of a dysfunctional team at some point, 40% had witnessed at least one verbal confrontation, and 15% had witnessed a physical confrontation (University of Phoenix, 2013). Apart from the relational costs of team dysfunction (Gamero et al., 2008), there are also financial costs to organizations associated with reduced productivity and management resources that may be necessary to address dysfunction. This is an important area of research to help organizations anticipate when they are likely to occur, identify signs of their formation, and ameliorate them at their early stages.

The central role of team climate is predicated on the long history of recognizing the importance of climate to understanding group functioning (e.g., James & Jones, 1974). Generally speaking, psychological climate refers to individuals' perceptions of their work environments, reflecting especially the valuative meaning and significance that individuals assign to psychologically meaningful work characteristics (cf. James & James, 1989; James & Jones, 1974; Jones & James, 1979; Ostroff et al., 2003; Schneider et al., 2000). As individuals nested in common work units (e.g., teams) interact with one another, their work perceptions may begin to converge to a point where a set of work perceptions is shared across individuals in the same work units – referred to as organizational climate (Jones & James, 1979).
Thus, organizational climate focused on the work environment of teams is likely to play an important role in the interpretation and expectations for teamwork behavior. Our primary thesis is that teams that develop toxic climates are more likely to be dysfunctional, resulting in poor team outcomes.

The causes of a toxic team climate are likely to be myriad, but the psychological adjustment of the members is sure to be a significant contributing factor. Previous research on teams has identified the causal negative influence of individual team members on the overall dynamics and effectiveness of the team (e.g., "bad apples spoil the barrel," in Felps et al., 2006; "cancer within sports teams," in Cope et al., 2010). Although most research on the role of personality in the prediction of performance has focused on the Five Factor Model (FFM), recent research has begun to explore the role of subclinical pathology in the form of toxic personality traits that may be useful for predicting counterproductive work behavior (CWB) and other problematic work-related outcomes (Kaiser et al., 2015; LeBreton et al., 2018; O'Boyle et al., 2012; Spain et al., 2014; Wu & LeBreton, 2011). For example, Scherer et al. (2013) showed that toxic personality traits predicted CWBs beyond the FFM for individuals working in teams performing laboratory exercises. In another laboratory study using student teams, Baysinger et al. (2014) also demonstrated how personality traits such as psychopathy and aggression, when aggregated to the team level, are associated with dysfunctional team behavior (e.g., increased negative socio-emotional behaviors; reduced task participation), resulting in lower levels of team-level performance. These studies suggest that one potentially significant contributor to toxic team climates may be antagonistic team member traits such as aggression and psychopathy. Based on these studies, we hypothesize that teams with higher overall levels of trait psychopathy may be more likely to create work environments with greater levels of conflict, distrust, inequity and unsupportiveness.

In addition to personality traits, teamwork knowledge is another important predictor of team effectiveness, especially interpersonal and self-management knowledge (Stevens & Campion, 1994). There is considerable evidence for the importance of teamwork knowledge in predicting team performance (O'Neill et al., 2012). However, the specific role of teamwork knowledge in the creation of team processes and outcomes is still unclear. A deficit in teamwork knowledge may predict the formation of toxic team climates because teams lacking teamwork knowledge will be incapable of working together effectively. Moreover, they will be unable to overcome the myriad of challenges and obstacles that may be encountered by teams (e.g., unexpected reduction in resources, changes in deadlines, ambiguity involving task delegation, interpersonal disagreement, etc.). Failing to navigate such challenges effectively is likely to contribute to more dysfunctional work environments riddled with tension and conflict, inequity and distrust.

On the other hand, the effects of teamwork knowledge may not be directly related to the development of toxic team climates but instead serve as a critical team asset for weakening the relationship between the team psychopathy and the formation of toxic team climates (i.e., teamwork knowledge might moderate the strength of the psychopathic personality → toxic climate relationship). Previous skills working effectively in teams, as reflected in teamwork knowledge, can help to neutralize the impact of team psychopathy in contributing to a toxic team climate. In contrast, lower levels of teamwork knowledge may serve an exacerbating function for teams with higher levels of team psychopathy by strengthening the relationship between team psychopathy and toxic team climate.

The contributions of this research are threefold. First, we focus on the topic of dysfunctional work teams, which is a potentially fatal weakness of using teams in organizations and in need of further research in the teamwork literature, given the prevalence of such teams. Second, we identify the key role played by a toxic team climate in explaining dysfunctional team outcomes, and we introduce a simple model of how toxic team climates are engendered by team members' psychopathic personality traits. We also test whether teamwork knowledge contributes to preventing the formation of toxic team climates or if it moderates the impact of toxic team climate on team outcomes. Third, we test the model longitudinally using a field sample of teams working together on projects spanning several months. We also derive practical recommendations for understanding and preventing dysfunctional processes and outcomes in team-based work.

Conceptual Framework

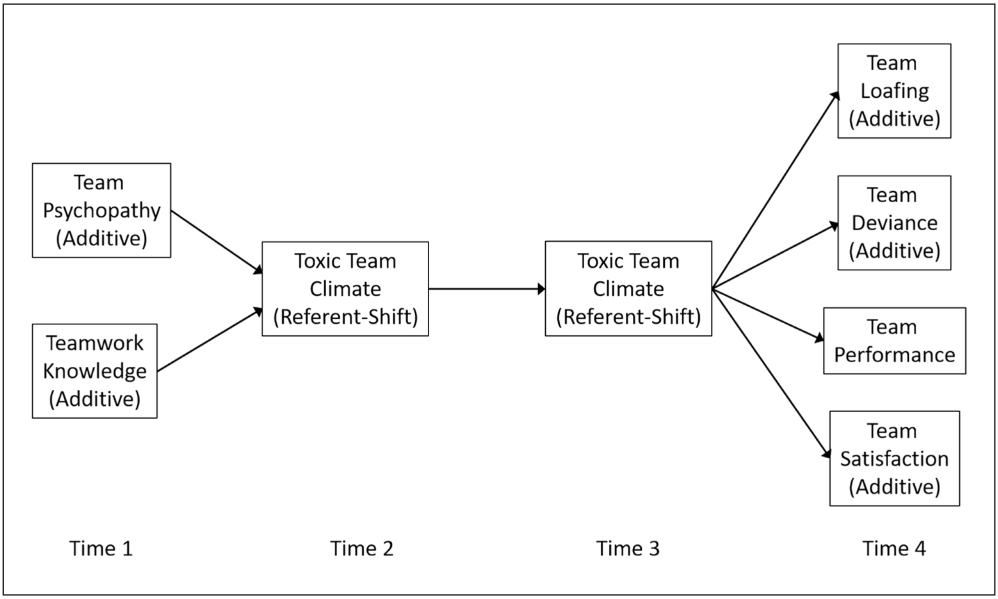
Stohl and Schell (1991) as well as Keyton (1999) have described dysfunctional teams as identifiable by the following characteristics (quoted in part from Keyton, pp. 497–498): "(a) complicating or compromising decision-making procedures. . .; (b) defining issues in reflection of [certain members of the group]; (c) consuming a great deal of energy such as a group talking about [certain members]; (d) exhibiting confusing behaviors in response to the [confusing interaction style of other members]; (e) being consumed with the underlying relationships rather than the task; and (f) displaying negative emotions toward the group [and specific other members]." The result is "misdirected energies and negative emotions" and "the energy of the group becomes misdirected away from the team task." Critical to this definition is that the defining characteristics of dysfunctional groups include components of the climate (e.g., interpretations and interactions) and the causal influence of some members (perhaps reflecting their personalities).

Figure 1 summarizes our proposed model of toxic team climate. After defining toxic team climate, we explain the model and develop the hypotheses in the proposed causal ordering depicted. First, we discuss subclinical psychopathic personality traits and teamwork knowledge as key predictors of toxic team climate. Second, we discuss the role of toxic team climate in predicting dysfunctional team outcomes. Third, we address how toxic team climate mediates the relationship between psychopathic personality traits and teamwork knowledge on dysfunctional team outcomes. Finally, we consider an alternative model where teamwork knowledge instead moderates the relationship between team psychopathy and the formation of a toxic team climate.

The Definition of Toxic Team Climate

Toxic team climate refers to the shared perceptions of team members in the valuative meaning and significance assigned to their teamwork environment in terms of four key dimensions: (a) conflict, (b) unfairness, (c) unsupportiveness, and

Figure 1. Model 1: Hypothesized mediation model of toxic team climate.



(d) distrust. Toxic team climate originates in the perceptions of individual team members; however, it emerges and functions at the team level. Specifically, as team members interact with one another in a shared environment, their perceptions of that environment are likely to become more similar to one another (i.e., converge or agree with one another), eventually reaching a critical mass where a set of perceptions emerges that is generally shared across team members. This transition from individual perceptions to shared perceptions reflects a type of emergence (Crawford & LePine, 2013; Kozlowski & Klein, 2000).

The importance of studying climate at the workgroup level has been well-established for many years (James & James, 1989; James & Jones, 1974). A key turning point in that literature was the transition from the study of general workplace perceptions (e.g., James & Jones, 1974; Jones & James, 1979) to the study of perceptions focused on specific types of work environments. Noteworthy examples in the literature include the climate for safety and customer service (e.g., Schneider et al., 1998, 2002; Zohar, 1980). Consistent with the latter tradition, toxic team climate is introduced as a form of climate uniquely focused on characteristics of the team itself.

Scant research has examined climates that might be related to dysfunctional work behaviors. Notable exceptions include research linking ethical climate and justice climate to dysfunctional outcomes. Ethical climate refers to shared perceptions of ethically correct behavior and how ethical issues should be handled in the organization (Victor & Cullen, 1988). Ethical climates are characterized by interpersonal harmony, rule adherence, and emphasizing the well-being of others before the self. Relationships have been observed between unethical climate and dysfunctional outcomes such as malingering, theft or fraud (Kamp & Brooks, 1991). Toxic team climate differs from ethical climate in that it focuses on shared perceptions of appropriate teamwork behaviors directed towards other team members or team performance, whereas ethical climate focuses on the morality and appropriateness of work behavior and is generally framed in terms of organizationally directed unethical behaviors such as malingering, theft and fraud.

Justice climate emphasizes fairness (e.g., distributive, procedural, interactional) and has been positively linked to effectiveness, performance, and extra-role behaviors (Priesemuth et al., 2013). This type of climate focuses specifically on shared perceptions related to work outcomes (distributive justice), the procedures used to make decisions (procedural justice), and interactions with those involved in executing procedures or determining outcomes (interactional justice). Toxic team climate is similar to justice climate in that it captures fairness, but instead of focusing on the fairness of rewards and procedures used to distribute rewards, toxic team climate examines members' perceptions of whether work within the team is unfairly distributed and whether, within the team, members treat one another in equitable and fair ways.

We anticipate that the most salient aspects of the team climate related to dysfunctional team outcomes are the dimensions of unfairness (vs. fairness), unsupportiveness (vs. supportiveness), distrust (vs. trust), and conflict (vs. harmony). Unfairness focuses on perceptions of injustice with respect to the division of labor within the team (procedural justice) and the interpersonal treatment within the team (interactional justice) (Bies & Moag, 1986; Thibaut & Walker, 1975). Prior research has observed relationships between individual-level justice and fairness perceptions and outcomes such as social loafing, performance, withdrawal, and employee deviance (Colquitt et al., 2002; Priesemuth et al., 2013). Drawing from these findings, we induce that shared perceptions of unfairness will be positively related to team-level loafing behavior and deviance.

Unsupportiveness refers to the extent to which team members perceive members as lacking concern for others and being unwilling to help when problems arise (Eisenberger et al., 1986). Distrust refers to the extent to which team members lack confidence in the reliability, integrity and ability of other team members (Ilgen et al., 2005). The link between these two toxic climate dimensions and deviant behavior and social loafing is based on the idea that social environments can influence different forms of work behavior. For example, Chiaburu and Harrison (2008) suggested that coworker support may buffer against different forms of withdrawal (e.g., social loafing) and interpersonal deviance.

Finally, conflict refers to the extent to which the team is characterized by friction and clashes of values, beliefs and actions (De Dreu & Weingart, 2003). Ilgen et al. (2005) and De Dreu and Weingart (2003) found that conflict is generally detrimental to team performance. Conflict is also likely linked to both deviance and loafing.

Subclinical Psychopathic Personality Traits as a Predictor of Toxic Team Climate

Researchers have examined toxic or aversive personality traits in part because such traits hold the potential for understanding dysfunctional outcomes (LeBreton et al., 2018; O'Boyle et al., 2012; Spain et al., 2014; Wu & LeBreton, 2011). Psychopathy may be conceptualized as a constellation of traits that include antagonism, lack of empathy, narcissism, impulsivity and manipulativeness (LeBreton et al., 2018; Lynam & Widiger, 2007; Shiverdecker & LeBreton, 2019b). In the work setting, the focus is on subclinical levels of psychopathy because we are examining general personality traits, not clinical personality disorders that impair a person's ability to function across one or more major life domains (LeBreton et al., 2006; Reichin et al., 2019).

At the individual level, psychopathy has been linked to making external attributions for performance deficiencies (e.g., an unfair exam rather than a lack of preparation), academic dishonesty, deceitful behaviors, and other forms of counterproductive behavior (O'Boyle et al., 2012; Scherer et al., 2013). Aggregating psychopathy to the team level may be particularly useful for understanding team processes and outcomes. Because psychopathic traits have been linked to interpersonally toxic outcomes, teams characterized by higher average levels of psychopathy are expected to experience more problematic and disruptive team processes, which may in turn lead to dysfunctional team outcomes. For example, Barrick et al. (1998) found that teams with lower mean scores on agreeableness, a trait correlated with psychopathy, tended to have higher levels of conflict and lower social cohesion. Similarly, Baysinger et al. (2014) found that average group-level psychopathy was positively related to group mean levels of negative socioemotional behaviors and negatively related to group mean levels of task participation, commitment and cohesion.

In sum, teams with greater average levels of trait psychopathy are hypothesized to develop work environments characterized as having greater levels of conflict, unfairness, unsupportiveness and distrust. Thus, we hypothesize a positive relationship between team psychopathy and the development of toxic team climates. Stated formally:

> Hypothesis 1: Team Psychopathy (Time 1) will be positively related to Toxic Team Climate (Time 2).

Teamwork Knowledge

It has long been recognized that technical knowledge is an important antecedent to effective teams (Sundstrom et al., 1990). However, Stevens and Campion (1994, 1999) demonstrated that effective teams also require teamwork-related interpersonal knowledge, such as knowledge related to conflict resolution, collaborative problem solving and communication. Teams with greater levels of interpersonal knowledge should be better equipped to facilitate effective interactions and, conversely, we propose that teams that lack that knowledge will be more susceptible to interpersonal deviance and dysfunctional outcomes, especially in team climates that are toxic, where such behaviors are likely common.

Team members are also often tasked with making decisions regarding how work is divided and the best means by which the team can coordinate activities among members. Stevens and Campion (1994) adopted the term self-management knowledge to describe these activities because modern teams often have some autonomy in making decisions regarding planning, coordination and performance management. The lack of such knowledge will render the teams ill-equipped to address these demands, which may result in work environments where work tasks are unfairly distributed, coworkers are perceived as unsupportive and unreliable, and conflict between team members is exacerbated rather than resolved. Teams operating in such work environments may be more likely to have higher levels of interpersonal deviance and higher levels of team-member withdrawal (i.e., loafing).

In sum, teamwork knowledge may predict the formation of a toxic team climate. Teams whose members have higher levels of interpersonal and self-management knowledge and skill may be less likely to develop toxic team climates. On the other hand, teams with lower levels of teamwork knowledge and skills may be more likely to develop such climates. Thus, we hypothesize:

> Hypothesis 2: Teamwork Knowledge (Time 1) will be negatively related to Toxic Team Climate (Time 2).

Toxic Team Climate and Dysfunctional Team Outcomes

It has been long recognized that important outcomes exist for teams beyond performance, such as willingness to work together again (e.g., Campion et al., 1993). In the current study, we include performance as an important outcome but we also include three other likely team-level outcomes related to toxic team climates: team loafing, team deviance and team satisfaction. We focus on these outcomes as opposed to other potential outcomes of teams (e.g., well-being, learning, creativity, etc.) because they are well-recognized problems with teams based on historical research. Social loafing is the tendency for individuals working in teams to exhibit decreased effort compared to the effort they put forth when working alone (Latané et al., 1979). Other team members may also be reticent to compensate for perceived loafers, and consequently will reduce their own effort in order to maintain a sense of equity (Mulvey & Klein, 1998). We believe teams characterized by higher levels of toxic team climate (i.e., higher levels of conflict, unfairness, unsupportiveness and distrust) are more likely to be characterized by higher average levels of social loafing behaviors, which we denote team loafing. Specifically, teams where unsupportiveness, distrust, conflict and unfairness are the norm, are more likely to have team members who disengage from the team and direct less time, energy and effort toward team task completion. Thus, aggregating individual-level social loafing to the team level will allow us to test whether toxic team climates produce lazy teams.

Our second outcome, interpersonal deviance, represents "voluntary behavior that violates significant organizational norms and. . .threatens the well-being of an organization, its members, or both" (Robinson & Bennett, 1995, p. 556). Thus, rather than facilitating the attainment of goals, such behavior hinders performance. We propose that teams characterized as having higher levels of toxic team climate are also more likely to be characterized as having higher average levels of interpersonal deviance, denoted team deviance. Specifically, teams where unsupportiveness, distrust, conflict and unfairness are the norm, are more likely to have team members who will see deviance as an appropriate tool for resolving conflicts and for retaliating against perceived injustices. Thus, aggregating individual-level deviance to the team level will allow us to test whether toxic climates produce harmful teams.

Our third team outcome is (poor) team performance. It is critical to expand the nomological network of toxic team climates to include such important bottom-line outcomes. We propose that teams characterized as having higher levels of toxic climate are less likely to operate in an efficient and effective manner. If team members are perceived to be unsupportive and untrustworthy and social interactions are characterized by volatility and conflict, then the teams will be more likely to struggle with managing timelines, quality control, and overall task completion. Thus, evaluating team performance will allow us to test whether toxic climates produce ineffective teams, which also is consistent with Chan's (2019) observation that "Connecting team performance. . . with constructs studied in other content areas is also helpful" (p. 330).

Our final team outcome is team satisfaction, which reflects the overall feelings and evaluation individuals make about their team. In addition, team satisfaction has been linked to other important work outcomes, including future team performance (e.g., Li et al., 2009). We propose that teams characterized as having higher levels of toxic climate are likely to be characterized as having lower average levels of satisfaction, denoted team satisfaction. Specifically, teams where unsupportiveness, distrust, conflict and unfairness are the norm, are more likely to be populated by team members with lower levels of satisfaction and are more likely to dislike their teammates. Thus, aggregating individual-level satisfaction to the team level will allow us to test whether toxic climates produce (dis)satisfied teams.

In sum, teams with higher levels of toxic team climate are hypothesized to produce more dysfunctional work outcomes. Stated formally:

> Hypothesis 3: Toxic Team Climate (Time 3) will be positively related to (a) Team Loafing, (b) Team Deviance, and negatively related to (c) Team Performance, and (d) Team Satisfaction (all measured at Time 4).

Toxic team climate is expected to mediate the link between team-level psychopathy and dysfunctional team outcomes. Prior work has examined different behaviors (e.g., team conflict, withholding effort, negative interactions; Baysinger et al., 2014; Gamero et al., 2008) as well as attitudinal and affective variables (e.g., negative affective tone, reduced levels of trust; Cole et al., 2008) as potential mediators. We extend this prior research by hypothesizing that, through the impact on team climate, teams characterized by higher levels of psychopathic personality traits are predicted to have higher levels of team loafing and team deviance and lower levels of team performance and team satisfaction. Stated formally:

> Hypothesis 4: Toxic Team Climate (at Times 2 and 3) will mediate the relationships between Team Psychopathy (Time 1) and (a) Team Loafing, (b) Team Deviance, (c) Team Performance, and (d) Team Satisfaction (all measured at Time 4).

As with psychopathic personality, we would also expect that the effects of team-level teamwork knowledge on the outcome will be carried through toxic team climate. Stated formally:

> Hypothesis 5: Toxic Team Climate (at Times 2 and 3) will mediate the relationships between Teamwork Knowledge (Time 1) and (a) Team Loafing, (b) Team Deviance, (c) Team Performance, and (d) Team Satisfaction (all measured at Time 4).

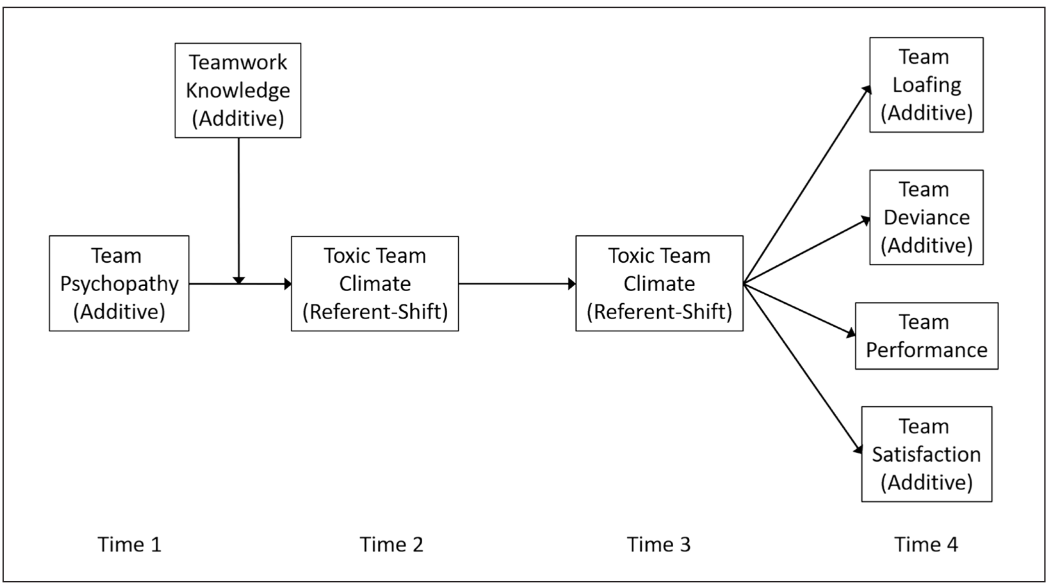
Alternative Model: Moderating Effects of Teamwork Knowledge

Another possible role of teamwork knowledge is that it may instead moderate the impact of team psychopathy on the formation of toxic team climates. Teams low in teamwork knowledge may be unable to mitigate the effects of psychopathic personalities on the development of toxic climates. Such climates are characterized by problems with conflict, communication and coordination, which are some of the defining areas of teamwork knowledge. The overall level of teamwork knowledge on the team should be able to mitigate the problems created by some group members without that knowledge. Specifically, as the average level of teamwork knowledge increases, the strength of the relationship between team psychopathy and the formation of toxic team climates is predicted to weaken. Simply stated, teams that have greater levels of teamwork knowledge are better equipped to mitigate and neutralize the negative impact of team psychopathy. This alternative model, denoted Model 2, is presented in Figure 2. Thus, we also test the following alternative hypotheses for the effects of teamwork knowledge on the outcomes:

> Hypothesis 6: Teamwork Knowledge (Time 1) will moderate the relationship between Team Psychopathy (Time 1) and Toxic Team Climate (Time 2), such that the strength of the relationship becomes weaker as Teamwork Knowledge increases.

> Hypothesis 7: Toxic Team Climate (at Times 2 and 3) will mediate the relationships between Team Psychopathy (Time 1) and (a) Team Loafing, (b) Team Deviance, (c) Team

Figure 2. Model 2: Alternative moderated mediation model of toxic team climate.



Performance, and (d) Team Satisfaction (all measured at Time 4); and these effects will be moderated (at stage 1) by Teamwork Knowledge.

Method

Samples

Table 1 summarizes the structure of our data. Specifically, data were collected and combined from two samples.

Sample 1. Sample 1 consisted of 157 first-year MBA students (nested in 35 teams). Students were enrolled in four different sections of an Organizational Behavior course; all sections were taught by the same instructor. Membership on these teams was consistent across all courses during their first MBA module (8 weeks).

Sample 2. Sample 2 consisted of 351 undergraduate students (nested in 72 teams). Students were enrolled in four different sections of an Introduction to Organizational Behavior course; sections were taught by three different instructors. These students spent the semester (16 weeks) working together on a team project.

Thus, the final sample consisted of 107 teams (N = 508). Power analysis using G*Power Version 3.1.9.6 indicated a sample size of 65 teams would be sufficient to attain a power of .80, assuming a medium effect size (r = .30) and α = 0.05 (we used one-tailed significance tests, given the *a priori* and directional nature of our hypotheses). The estimated effect size was based on a review of studies examining personality, social loafing, and interpersonal deviance. Data were collected at four distinct time points (see Table 2 for the data collection timeline). Individual-level response rates by time points were: 90.55% (n = 460; T1), 88.8% (n = 451; T2), 88.2% (n = 448; T3), and 83.7% (n = 425; T4).

Rationale for combining samples. There were many similarities in tasks across samples: (1) teams frequently interacted throughout the semester, (2) team-oriented work comprised 30% of final grades, (3) the primary course deliverable was a written team case analysis (i.e., analyzing an organization experiencing teamwork-related issues based on a case study [MBAs] or a business plan entailing specific policy recommendations for a small company chosen by the team [undergraduates]), and (4) teams rated individual member contributions at the conclusion of the project.

We combined the samples to increase the statistical power for hypothesis tests given these similarities in the samples and given that most organizations are comprised of teams that may be working on similar but not identical projects with varying timelines and deliverables. Thus, combining the samples may help to enhance the generalizability of the results. However, combining the samples could be problematic for two possible reasons. First, combining samples could

Table 1. Multilevel data structure.

Program	Instructor	Class	# of Teams	# of Students	Team size							
					Mean	Median	Min	Max	N=3	N=4	N=5	N=6
MBA	1	1	8	34	4.3	4.0	3	5	1	4	3	0
	1	2	11	48	4.4	4.0	4	5	0	7	4	0
	1	3	10	48	4.8	5.0	4	5	0	2	8	0
	1	4	6	27	4.5	5.0	4	5	0	3	3	0
Undergraduate	2	5	18	82	4.6	5.0	4	5	0	8	10	0
	3	6	18	89	4.9	5.0	4	6	0	2	15	1
	4	7	18	91	5.1	5.0	5	6	0	0	17	1
	4	8	18	89	4.9	5.0	4	5	0	1	17	0

Table 2. Timeline for survey data collection.

	Time 1	Time 2	Time 3	Time 4
Measures collected	Demographics Psychopathy Teamwork knowledge	Climate Deviance Social loafing Satisfaction	Climate Deviance Social loafing Satisfaction	Climate Deviance Social loafing Satisfaction Performance
Project milestones	Start of semester	Project assigned	Key deliverable due	End of semester
Sample 1: MBAs (8-week module)	1–3 weeks prior to Week 1	Week 3	Week 5	Week 7
		Team case assigned at the end of Week 3	Team case due at the end of Week 4	Module concluded at the end of Week 7; no team presentations
Sample 2: Undergraduates (16-week course)	Week 2	Week 6	Week 13	Week 16
		Project overview due end of Week 5	Team paper due at the beginning of Week 12 or 13	Course concluded at the end of Week 16 following team presentations

introduce random noise into the analyses (i.e., irrelevant and random error variance), which would attenuate the effects (i.e., yield conservative estimates). Alternatively, combining the samples could also introduce systematic noise into the analyses (i.e., irrelevant but systematic variance) attributed to the nesting of teams in higher-level units.

As summarized in Table 1, the data have a distinctly multilevel structure spanning (1) individuals, (2) teams, (3) classrooms, (4) instructors, and (5) programs. However, our hypotheses (and focal variables) were all measured at levels 1 and 2 – individuals and teams. If we ignored the higher levels of nesting (i.e., classrooms, instructors and programs) and proceeded to test our hypotheses at the team level (i.e., after aggregating individual-level data), it is possible that our analyses and results would be misaligned with our hypotheses. Specifically, we might be inferring a team-level relationship between two variables, but the statistic used to inform the team-level relationship is confounded with (i.e., contaminated by) relationships between those two variables at the classroom, instructor or program levels. Thus, to ensure the proper alignment of our theory with our analyses, it is necessary to remove the contaminating influences of the higher-level variables. This is easily accomplished by rescaling (centering) the team-level data around classroom means prior to hypothesis testing. Specifically, by centering the team-level data around the classroom means, any potential irrelevant/confounding effects associated with differences across programs, instructors or classes are removed from the data (cf. Bliese, 2022; Bliese et al., 2018; Enders & Tofighi, 2007; Hofmann & Gavin, 1998; Raudenbush & Byrk, 2002, Shiverdecker & LeBreton, 2019a; Zhang et al., 2009).

The combined sample was mostly male (62.2%) and nonminority (54.3%) with 58.3% previously working full-time and 30.9% employed currently (M = 27.2 hours per week). Mean age was 22.54 (SD = 3.62) and team size was 4.80 (SD = 0.47).

Procedure

Four waves of data were collected during regularly scheduled class sessions or via online surveys. Given the differences in the project timelines within the samples, we needed to align the temporal sampling frames for our four waves of data collection with the sample-relevant tasks and activities. Table 2 describes the critical project milestones for each sample and summarizes the constructs measured during each wave of data collection.

The undergraduate respondents received extra credit for participating in each survey. In contrast, the MBA respondents were entered into a draw for several $45 cash prizes for each completed survey. Participation was voluntary, and no information collected was shared with course instructors.

Measures

Psychopathy (Time 1). Psychopathy was measured as a unique constellation of the facets of the FFM (Widiger & Lynam, 1998). Accordingly, the 30 facets of the FFM were assessed using a 150-item version of the International Personality Item Pool (IPIP; Goldberg, 1999) and item responses were measured with a 5-point scale (1 = *very inaccurate* to 5 = *very accurate*). Scores on the 30 FFM facets were used to compute the psychopathy resemblance index (PRI; Lynam & Widiger, 2007). Higher scores reflect greater levels of psychopathy. The measure is designed to capture subclinical psychopathic personality traits in part because the incidents of clinical-level psychopathic personality is very low in university student samples (e.g., Drvaric & Bagby, 2021). Further details on the computation of the Psychopathy measure are contained in Appendix A of the online supplemental material.

Teamwork knowledge (Time 1). Teamwork knowledge was assessed using the 35-item Teamwork Test (Stevens & Campion, 1994, 1999). Each item describes a hypothetical teamwork scenario and asks respondents to decide which of four responses is likely to be most effective. Questions are dichotomously scored (0 = *incorrect*, 1 = *correct*), and the total score is calculated as the sum of the correctly answered items with higher scores reflecting greater levels of knowledge. A lower-bound estimate of reliability was computed using coefficient alpha ($\alpha = .75$).

Toxic team climate (Times 2 and 3). In order to build a new measure of toxic team climate, we sampled items from James and James (1989), Moorman (1991), Jehn (1995), and N. R. Anderson and West (1998). Although our data were collected prior to the publication of Heggestad et al. (2019), our approach to scale development and validation was generally consistent with their recommendations and the guidelines offered by Hinkin (1998).

Specifically, to ensure dimensions were adequately represented, the items sampled from the aforementioned surveys were supplemented with additional items created for the present study. Six subject matter experts (SMEs; all possessing advanced degrees in Industrial/Organizational Psychology) conducted a content analysis via a sorting exercise. Items that were classified by SMEs with 80% or greater agreement were retained for further use. Four items were selected to measure each of the toxic climate dimensions: distrust (e.g., “Members of my workgroup keep tabs on each other’s activities”), unsupportiveness (e.g., “Members of my workgroup are NOT willing to help each other with work-related problems”), conflict (e.g., “There is tension among the people in my workgroup”), and unfairness (e.g., “Members of my workgroup do not ‘play favorites’”; this item is reverse-keyed). A unit-weighted composite of the 16 items was used as our estimate of overall toxic team climate. A pilot study ($n = 176$) confirmed that each of the climate dimensions was associated with self-reports of workplace incivility and deviance. All the items were scored such that higher scores reflect more toxic climates. Alpha was used to compute a lower-bound estimate of reliability, $\alpha = 0.91$ and 0.90 (Times 2 and 3, respectively). A copy of all items is included in Appendix B of the online supplemental material.

Team loafing (Time 4). Team-level social loafing was assessed via team evaluations, wherein each team member was rated on a 100-point scale (0 points = *this group member did virtually nothing on the* *project*, 50 points = *this group member gave a fair amount of input*, 100 points = *this group member was a mainstay of our project, a major contributor*). Member ratings (excluding self-ratings) were averaged and subtracted from 100. Thus, higher scores indicated greater loafing. A lower-bound estimate of reliability was computed using coefficient alpha, $\alpha = 0.79$.

Team deviance (Time 4). Deviance was assessed using the seven-item interpersonal deviance scale from Bennett and Robinson (2000) and the four-item instigated workplace incivility scale from Blau and Andersson (2005). Collectively, these items capture a range of interpersonally deviant behaviors. Respondents rated the frequency with which team members engaged in the [deviant] behaviors directed toward other team members on a 7-point scale (1 = *never* to 7 = *every day*). A lower-bound estimate of reliability was computed using coefficient alpha, $\alpha = .82$.

Team satisfaction (Time 4). Team satisfaction was assessed using a modified version of the four-item job satisfaction measure from Weiss et al. (1999). The modification simply involved changing the referent from "job" to "team." The items provided a general measure of team satisfaction (i.e., "All in all, I am satisfied with my team", "In general, I don't like my team" (reverse-scored), "In general, I like working with my team", and "I frequently think of quitting this team" (reverse-scored)). Respondents rated the extent to which they agreed with each item using a 7-point scale (1 = *strongly disagree* to 7 = *strongly agree*). A lower-bound estimate of reliability was computed using coefficient alpha, $\alpha = 0.90$.

Team performance (Time 4). Team performance was measured as the percentage of the total possible score assigned to each team's final class project by their respective instructors.

Results

Aggregation of Individual-level Data to Measure Group-level Constructs

Although data were collected from individuals nested within teams, our hypotheses involved team-level relationships. Thus, prior to testing our hypotheses it was necessary to first aggregate data to the team. LeBreton et al. (2023) recently introduced a checklist that researchers could use to enhance the clarity and transparency surrounding data aggregation decisions. A copy of the completed data aggregation checklist is included in Appendix C in the online supplemental material, with a summary provided below.

Aggregation of individual-level data to the team level was based on the logic of two multilevel composition models. These were variable-centered approaches to creating team composition variables (Emich et al., 2022). The first model is the additive model (Chan, 1998), which is also referred to as a pooled unconstrained model of emergence (Kozlowski & Klein, 2000). This model operationalizes the measurement of team-level constructs as the averages or sums of individual-level scores, regardless of the amount of within-team agreement. This model does not assume that all team members have similar levels or scores on the construct, and thus it is possible that the variation within groups could be rather high. This model is appropriate when the focal construct is not defined in terms of convergence or agreement among team members. Kozlowski and Klein (2000) used social loafing and group knowledge as exemplars where this model would be appropriate. The pooled unconstrained/additive model was adopted as our model of emergence for teamwork knowledge, team psychopathy, team social loafing and team deviance because there was no reason to presume that there would be high levels of agreement among the individual-level team members on these constructs.

In contrast, we adopted a referent-shift consensus model (changing the referent from the individual to the team) that treats within-team agreement (i.e., consensus) as a prerequisite for aggregation (Chan, 1998). This model is also referred to as a pooled constrained model of emergence (Kozlowski & Klein, 2000). This composition model presumes that the team-level variable originates in the perceptions of individuals and emerges and functions at the team level, but only when there is sufficient within-team agreement in those perceptions. Consistent with prior research (cf. James and James, 1989; James et al., 1984), we adopted this model of emergence when aggregating individual-level climate perceptions to create team-level toxic climate scores.

To evaluate within-team agreement, we extracted the variance components from a five-level, mixed-effects model where individuals were nested in teams that were nested in classrooms that were nested in instructors that were nested in programs (see Table 1). Using the variance components from these models, we computed estimates of ICC(1) reflecting the proportion of variance in individual-level climate perceptions that is attributed to the nesting of individuals within teams (Bliese, 2000; LeBreton & Senter, 2008). The ICC(1) values were 0.11 and 0.12 at Time 2 and Time 3, respectively. These values, consistent with typical climate studies (e.g., James, 1982; Schneider et al., 2002), indicate that there was a non-trivial effect of team membership on perceptions of team climate.

In addition, we used $r_{WG(J)}$ to estimate the degree of within-team agreement in individual-level climate perceptions. Because we had no reason to believe ratings were systematically influenced by response biases (e.g., central tendency, leniency, severity), we opted to compute $r_{WG(J)}$ using a standard, uniform (rectangular) null distribution; this yielded a null variance of $\sigma^2_{EU} = 4.00$ for our 7-point response scale (see LeBreton & Senter, 2008). We used a data aggregation cutoff of $r_{WG(J)} > .65$ as the target cutoff for data aggregation, as this value reflects moderate to strong levels of agreement (LeBreton & Senter, 2008; LeBreton et al., 2023).

In general, the results of the $r_{WG(J)}$ analyses supported the decision to aggregate individual-level climate perceptions to the team level. The pattern of results across the 107 teams suggested fairly strong levels of within-group agreement at both Time 2 ($r_{WG(J)}$ $M = .92$, $Mdn = .96$, $SD = 0.16$) and Time 3 ($r_{WG(J)}$ $M = .91$, $Mdn = .96$, $SD = 0.20$). Specifically, 95% of the groups at Time 2 and 94% of the groups at Time 3 had $r_{WG(J)}$ values that exceeded the cutoff for moderate agreement ($r_{WG(J)} > .65$). However, for two of the teams at Time 2 and four of the teams at Time 3, the estimates of $r_{WG(J)}$ fell outside the normal range of 0 to 1; these values were reset to zero (cf. LeBreton & Senter, 2008; LeBreton et al., 2005). In addition, at Time 2, there was one team where only a single team member provided climate scores, and thus, it was impossible to compute variance within this team. In summary, at Time 2, five teams had $r_{WG(J)}$ values falling below the 0.65 data aggregation cutoff; at Time 3, six teams had values below the cutoff. Given the limited number of teams with values below the cutoff, we opted to retain and aggregate data for all 107 teams. We concluded that the added "noise" associated with retaining a few teams with weaker levels of agreement would be offset by the greater statistical power associated with using the entire dataset.

Centering Data to Align Theory, Measurement, Analyses and Inferences

Following the aggregation of individual-level data to the team level, it was necessary to ensure any potential confounding, higher-level nesting effects were removed from the data. Specifically, by centering the team-level data around the classroom means, we removed any potential confounding effects on predictor scores, mediator scores or outcome scores that could be attributed to differences between programs, instructors or classes (cf. Bliese, 2022; Bliese et al., 2018; Brincks et al., 2017; Enders & Tofighi, 2007; Hofmann & Gavin, 1998; Raudenbush & Byrk, 2002; Shiverdecker & LeBreton, 2019a; Zhang et al., 2009).[1] Finally, all variables were scaled to have unit variance (i.e., transformed to Z-scores) before computing the cross-product terms between Team Psychopathy and Teamwork Knowledge.

Model Testing Framework

We used a general path analytic framework to test our hypothesized model (see Figure 1) and implemented bootstrapping to test the significance of indirect effects (cf. Edwards & Lambert, 2007; Preacher & Hayes, 2008). In addition, we nested our analysis under a confirmatory analytic framework and implemented supplemental tests of model-data fit as recommended by James et al. (1982) and Williams et al. (2020).[2] Specifically, James et al. (1982) identified ten conditions for drawing causal inferences (e.g., moderated chain mediation). Two of these conditions involved tests evaluating the empirical fit between a hypothesized model and the data used to test that model. Williams et al. (2020) offered best practice suggestions for how to implement these tests using a confirmatory analytic framework.

Condition 10

James et al.'s (1982) Condition 10 for causal inference involves the empirical confirmation of fit between the hypothesized model and the data used to test that model. Williams et al. (2020) recommended comparing one's hypothesized model (see Figure 1) to a saturated structural model. The latter is a model containing all possible paths and is consistent with recommendations by James et al. (1982) and Anderson and Gerbing (1988). The relative fit of these models is compared using a χ^2 difference test. As Williams et al. noted, "The researcher hopes to obtain a nonsignificant chi-square difference value, thus leading to a failure to reject the null hypothesis that the paths are zero, validating their exclusion [from the hypothesized model]" (p. 23). Assuming that the hypothesized model is retained as the better fitting model, Williams et al. recommended using RMSEA to test omnibus model-data fit. Finally, Williams et al. suggested that researchers examine the statistical significance of the added paths. If the hypothesized model is a viable causal model, then none of the added paths in the saturated model should be significant.

Condition 9

James et al.'s (1982) Condition 9 for causal inference involves empirical confirmation of the predicted relationships (i.e., the paths hypothesized to be non-zero should be statistically significant). Williams et al. (2020) recommended two Condition 9 tests. First, they recommended creating a structural null model by dropping all causal paths from one's hypothesized model. A statistically significant χ^2 difference test comparing the hypothesized and null models indicates that the hypothesized model is the better fitting model. The second test involves examining the individual parameter estimates for the paths in the hypothesized model. If the hypothesized model is a viable causal model, estimates of the path coefficients should be statistically and practically significant.

Effect sizes for indirect (mediation) effects. The significance of indirect effects was tested using recommended bootstrapping procedures (Edwards & Lambert, 2007; Preacher & Hayes, 2008). These procedures draw random subsets of the data (with replacement) and estimate the indirect effects in each subset. This is repeated many times and is used to produce an empirical sampling distribution of indirect effects. Finally, the sampling distribution is used to derive bootstrap confidence intervals (CI) for all indirect effect(s). Per Preacher and Hayes (2008), we used 5,000 bootstrap samples for each test and computed bias-corrected and accelerated (BCA) CIs for each effect. We report the maximum likelihood estimates obtained using the lavaan package version 0.6-18 (Rosseel, 2012) in R version 4.4.1 (R Core Team, 2024).

Significance testing. Given the directional nature of our hypotheses, we implemented one-tailed significance testing using $\alpha < 0.05$ (Hays, 1988). The sole exception was the test of moderation (Hypothesis 3), where we used a relaxed $\alpha < 0.10$. Adopting a more liberal threshold when testing for moderation is consistent with existing recommendations. For example, Bing et al. (2007) noted, "Given the low power for detecting interactions, particularly in field research (Chaplin, 1991; Morris et al., 1986), researchers may want to increase power by setting critical alpha (Type I error rate) at .10 for the interaction term in [tests of moderation] as recommended by Cohen

(1988) and others (Champoux & Peters, 1987; Finn & Frone, 2004; McClelland & Judd, 1993)" (p. 360). Additionally, it is important to remember that it is only appropriate to infer support for Hypothesis 3 if the interaction effect is statistically significant, and the observed pattern of regression slope heterogeneity is consistent with the *a priori* predicted pattern.

Model 1: Mediation Model. Descriptive statistics and correlations are presented in Table 3 for both the original (raw metric) data and the centered (within-classrooms) data. Overall, there was strong support for our hypothesized model, denoted Model 1. The non-significant χ^2 (14) = 14.38, p = .420, indicated that the test of perfect model-data fit could not be rejected. Additional fit statistics further supported the viability of Model 1 (RMSEA = .02; CFI = 1.00; TLI = 1.00, RMSR = .05).

Condition 10 tests. The first Condition 10 test involves adding paths to Model 1 to create a saturated structural model and evaluating whether the saturated model has a statistically better fit to the data. Fourteen paths were added to create the saturated structural model. Specifically, we added eight paths linking Team Psychopathy and Teamwork Knowledge to the four outcome variables, two linking Team Psychopathy and Teamwork Knowledge to Toxic Team Climate measured at Time 3, and four linking Toxic Team Climate measured at Time 2 to the outcome variables. The non-significant χ^2 difference test indicated that the additional paths in the saturated model did not significantly improve model fit (χ^2 (14) = 14.38, p = .420).
The second Condition 10 test involves examining the significance of the added paths. If Model 1 is a viable causal model, the newly added paths should be non-significant. Only one of the 14 added paths was significant (~7% of the paths). Specifically, the path linking Toxic Team Climate (at Time 2) to Team Deviance (at Time 4) was positive and statistically significant (β_{22} = .28, Z = 2.32, p = .010). Overall, the supplemental Condition 10 tests supported the viability of the hypothesized model.

Condition 9 tests. The first Condition 9 test involves deleting all causal paths from Model 1 to create a structurally null model. The results of a χ^2 difference test indicated that Model 1 had a better fit to the data than the null model ($\Delta\chi^2$ (14) = 234.59, $p < .001$). The other Condition 9 test recommended by Williams et al. involves examining each path's statistical and practical significance in Model 1. In the context of the current paper, this is equivalent to evaluating each of our separate hypotheses.

Model 1: Test of Individual Hypotheses

Hypothesis 1 – Supported. Consistent with Hypothesis 1, we observed a significant relationship between Team Psychopathy (Time 1) and Toxic Team Climate (Time 2; γ_{11} = .40, $p < .001$) (see Table 4).

Hypothesis 2 – Supported. Consistent with Hypothesis 2, we observed a significant negative relationship between Teamwork Knowledge (Time 1) and Toxic Team Climate (Time 2; γ_{12} = −0.170, p = .029).

Hypothesis 3 – Supported. Consistent with Hypothesis 3, Toxic Team Climate (Time 3) had significant positive relationships with (a) Team Loafing (β_{12} = 0.36, $p < .001$), (b) Team Deviance (β_{22} = .51, $p < .001$), and significant negative relationships with (c) Team Performance (β_{32} = −.20, p = .016) and (d) Team Satisfaction (β_{22} = −.64, $p < .001$) (all outcomes measured at Time 4).

Hypothesis 4 – Supported. Consistent with Hypothesis 4, Toxic Team Climate (at Times 2 and 3) mediated the relationships between Team Psychopathy and the outcome variables. Specifically, Toxic Team Climate mediated the relationship between Team Psychopathy and Team Loafing (H4a; indirect effect = .100, p = .003, 90% CI = .05, .17), Team Deviance (H4b; indirect effect = .14, p = .001, 90% CI = .80, .22), Team Performance (H4c; indirect effect = −.06, p = .027, 90% CI = −.12, −.02), and Team

Table 3. Descriptive statistics and correlations for study variables.

Raw metric	Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9
	1. Team Psychopathy (T1)	177.45	12.53	1.00								
	2. Team Knowledge (T1)	20.44	3.15	–.47	1.00							
	3. Toxic Team Climate (T2)	2.29	0.51	.45	–.35	1.00						
	4. Toxic Team Climate (T3)	2.19	0.51	.37	–.28	.68	1.00					
	5. Team Loafing (T4)	14.26	9.07	.07	.03	.31	.32	1.00				
	6. Team Deviance (T4)	1.41	0.35	.13	.09	.42	.47	.30	1.00			
	7. Team Performance (T4)	86.87	8.75	.01	.01	–.11	–.22	–.26	–.11	1.00		
	8. Team Satisfaction (T4)	6.06	0.74	–.27	.21	–.43	–.67	–.38	–.39	0.19	1.00	
	9. Cross-product of raw data	3607.95	505.92	–.03	.89	–.18	–.14	.06	.16	0.01	0.11	1.00
Centered-within classrooms	Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9
	1. Team Psychopathy (T1)	0.00	10.6	1.00								
	2. Team Knowledge (T1)	0.00	2.72	–.34	1.00							
	3. Toxic Team Climate (T2)	0.00	0.49	.45	–.31	1.00						
	4. Toxic Team Climate (T3)	0.00	0.48	.38	–.30	.71	1.00					
	5. Team Loafing (T4)	0.00	8.44	.21	–.10	.34	.36	1.00				
	6. Team Deviance (T4)	0.00	0.31	.29	–.10	.50	.51	.21	1.00			
	7. Team Performance (T4)	0.00	7.69	–.11	.14	–.11	–0.20	–.19	.01	1.00		
	8. Team Satisfaction (T4)	0.00	0.71	–.27	.22	–.44	–.64	–.41	–.40	.19	1.00	
	9. Cross-product of CWC	−9.71	33.25	−.08	.05	−.15	−.10	−.17	−.11	.00	.18	1.00
	10. Cross-product of Z	−0.34	1.15	−.08	.05	−.15	−.10	−.17	−.11	00	.18	1.00

Note. $N = 107$ teams. Correlations greater than .12 are significant at one-tailed $p < 0.10$, correlations greater than 0.16 are significant at $p < 0.05$, correlations greater than .22 are significant at $p < 0.01$, and correlations greater than .28 are significant at $p < 0.001$.

Table 4. Model 1 (Mediation model): Parameter estimates and indirect effects.

Predictor	Outcome	Estimate	*SE*	*p*	90% CI LL	90% CI UL
Team Psychopathy (T1)	Toxic Team Climate (T2)	.40	.09	<.001	(.24,	.54)
Team Knowledge (T1)	Toxic Team Climate (T2)	−.17	.09	.028	(−.32,	−.02)
Toxic Team Climate (T2)	Toxic Team Climate (T3)	−.71	.07	<.001	(.59,	.81)
Toxic Team Climate (T3)	Team Loafing (T4)	−.36	.09	.001	(.21,	.51)
Toxic Team Climate (T3)	Team Deviance (T4)	−.51	.08	<.001	(.37,	.64)
Toxic Team Climate (T3)	Team Performance (T4)	−.20	.10	.016	(−.36,	−.05)
Toxic Team Climate (T3)	Team Satisfaction (T4)	−.64	.08	.001	(−.76.	−.51)
	Outcome	Model R^2				
	Toxic Climate (T2)	.23				
	Toxic Climate (T3)	.50				
	Team Loafing (T4)	.13				
	Team Deviance (T4)	.26				
	Team Performance (T4)	.04				
	Team Satisfaction (T4)	.40				

Predictor	Outcome	Indirect effect	*SE*	*p*	90% CI LL	90% CI UL
Team Psychopathy (T1)	Team Loafing (T4)	.10	.04	.003	(.05,	.17)
Team Psychopathy (T1)	Team Deviance (T4)	.14	.04	.001	(.08,	.22)
Team Psychopathy (T1)	Team Satisfaction (T4)	−.06	.03	.027	(−.12,	−.02)
Team Psychopathy (T1)	Team Performance (T4)	−.18	.05	.001	(−.28,	−.11)
Team Knowledge (T1)	Team Loafing (T4)	−.04	.03	.100	(−.10,	.01)
Team Knowledge (T1)	Team Deviance (T4)	−.06	.05	.100	(−.14,	.02)
Team Knowledge (T1)	Team Satisfaction (T4)	.03	.02	.145	(−.00,	.07)
Team Knowledge (T1)	Team Performance (T4)	.08	.06	.100	(−.02,	.17)

LL = Lower Limit; UL = Upper Limit.

Satisfaction (H4d; indirect effect = −.18, p = .001, 90% CI = −.28, −.11).

Hypothesis 5 – Not supported. Contrary to Hypothesis 5, Toxic Team Climate (at Times 2 and 3) did not mediate the relationships between Team Knowledge and any of the outcome variables. Specifically, Toxic Team Climate did not mediate the relationship between Team Knowledge and Team Loafing (H5a; indirect effect = −.04, p = .100, 90% CI = −[.10, .01]) Team Deviance (H5b; indirect effect = −.06, p =.100, 90% CI = [−.14, .02]), Team Performance (H5c; indirect effect = .03, p = .145, 90% CI = [−.01, .07]), or Team Satisfaction (H5d; indirect effect = .08, p = .100, 90% CI = [−.02, .17]).

Summary of Results for Model 1

Overall, we observed excellent model-data fit using traditional fit statistics and the supplemental tests recommended by Williams et al. (2020). Specifically, individual parameter estimates associated with Hypotheses 1–3 were statistically significant and in the hypothesized direction. In addition, we observed strong support for the mediating effects of Toxic Team Climate on the relationships between Team Psychopathy and the four outcomes (Hypothesis 4).

Despite finding support for Hypotheses 1–4, results were not consistent with Hypothesis 5 (i.e., Toxic Team Climate did not mediate the relationships between Teamwork Knowledge and the outcome variables). One explanation for these findings could be that the role of Teamwork Knowledge was misspecified in Model 1. Rather than serving as an antecedent of Toxic Team Climate, perhaps Teamwork Knowledge moderates the relationship between Team Psychopathy (Time 1) and the formation of Toxic Team Climate (Time 2); and thus, serves as a moderator of the indirect effects of Team Psychopathy on the outcome variables thru Toxic Team Climate as we explore below.

Model 2: Moderated Mediation Model

Model 2 represents an alternative, moderated mediation model where Teamwork Knowledge is treated as a moderator of the stage 1 relationship between Team Psychopathy and Toxic Team Climate (see Figure 2). Results were consistent with Model 2. The non-significant χ^2 (19) = 18.27, p = .510 indicated that the test of perfect model-data fit could not be rejected. Additional fit statistics further supported the viability of the model (RMSEA = .00, CFI = 1.00, TLI = 1.01, RMSR = .052). Again, we supplemented traditional model-data fit tests with the additional Condition 10 and 9 tests recommended by Williams et al. (2020).

Condition 10 tests. The first Condition 10 test involves adding paths to Model 2 to create a saturated structural model and evaluating whether the saturated model has a statistically better fit to the data. Nineteen paths were added to create the saturated structural model. Specifically, we added fifteen paths linking Team Psychopathy, Teamwork Knowledge, and the cross-product to the four outcome variables and Toxic Team Climate measured at Time 3, and four paths linking Toxic Team Climate measured at Time 2 to the outcome variables. The non-significant χ^2 difference test indicated that the additional paths in the saturated model did not significantly improve model fit (χ^2 (19) = 18.270, p = .510).

The second Condition 10 test involves examining the significance of the added paths. If Model 2 is a viable causal model, the newly added paths should be non-significant. Only one of the nineteen paths was significant (~ 5%). Specifically, the path linking Toxic Team Climate (at Time 2) to Team Deviance at Time 4 was positive and statistically significant (β_{22} = .27, p = .012). Overall, the supplemental Condition 10 tests supported Model 2.

Condition 9 tests. The first Condition 9 test involves deleting all causal paths from Model 2 to create a structurally null model. The results of a χ^2 difference test indicated that Model 2 had better model-data fit than the null model (χ^2 (17) = 237.06, $p < .001$). The other Condition 9 test recommended by Williams et al. involves examining each path's statistical and practical significance in Model 2. In the context of the current paper, this is equivalent to evaluating each of our separate hypotheses.

Model 2: Test of Individual Hypotheses

Hypothesis 1 – Supported. Consistent with Hypothesis 1, we observed a significant relationship between Team Psychopathy (Time 1) and Toxic Team Climate (Time 2; γ_{11} = .39, $p < .001$) (see Table 5).

Hypothesis 3 – Supported. Consistent with Hypothesis 3, Toxic Team Climate (Time 3) had significant positive relationships with (a) Team Loafing (β_{12} = .36, $p < .001$), (b) Team Deviance (β_{22} = .51, $p < .001$), and significant negative relationships with (c) Team Performance (β_{32} = −.20, p = .016) and (d) Team Satisfaction (β_{22} = −.640, $p < .001$) (Time 4).

Table 5. Model 2 (Moderated mediation model): Parameter estimates.

Predictor	Outcome	Estimate	*SE*	*p*	90% CI	
					LL	UL
Team Psychopathy (T1)	Toxic Climate (T2)	.39	.09	.001	(.24,	.54)
Team Knowledge (T1)	Toxic Climate (T2)	−.17	.09	.030	(−.32,	−.02)
Cross-Product (T1)	Toxic Climate (T2)	−.09	.07	.100	(−.22,	−.03)
Toxic Climate (T2)	Toxic Climate (T3)	−.71	.07	<.001	(.59,	−.82)
Toxic Climate (T3)	Team Loafing (T4)	−.36	.09	.001	(.21,	−.51)
Toxic Climate (T3)	Team Deviance (T4)	−.51	.08	.001	(.37,	−.64)
Toxic Climate (T3)	Team Performance (T4)	−.20	.10	.016	(−.36,	−.05)
Toxic Climate (T3)	Team Satisfaction (T4)	−.64	.08	<.001	(−.76,	−.51)
	Outcome	Model R^2				
	Toxic Climate (T2)	.24				
	Toxic Climate (T3)	.50				
	Team Loafing (T4)	.13				
	Team Deviance (T4)	.26				
	Team Performance (T4)	.04				
	Team Satisfaction (T4)	.40				

Figure 3. Moderating effect of teamwork knowledge on the relationship between team psychopathy and toxic team climate.

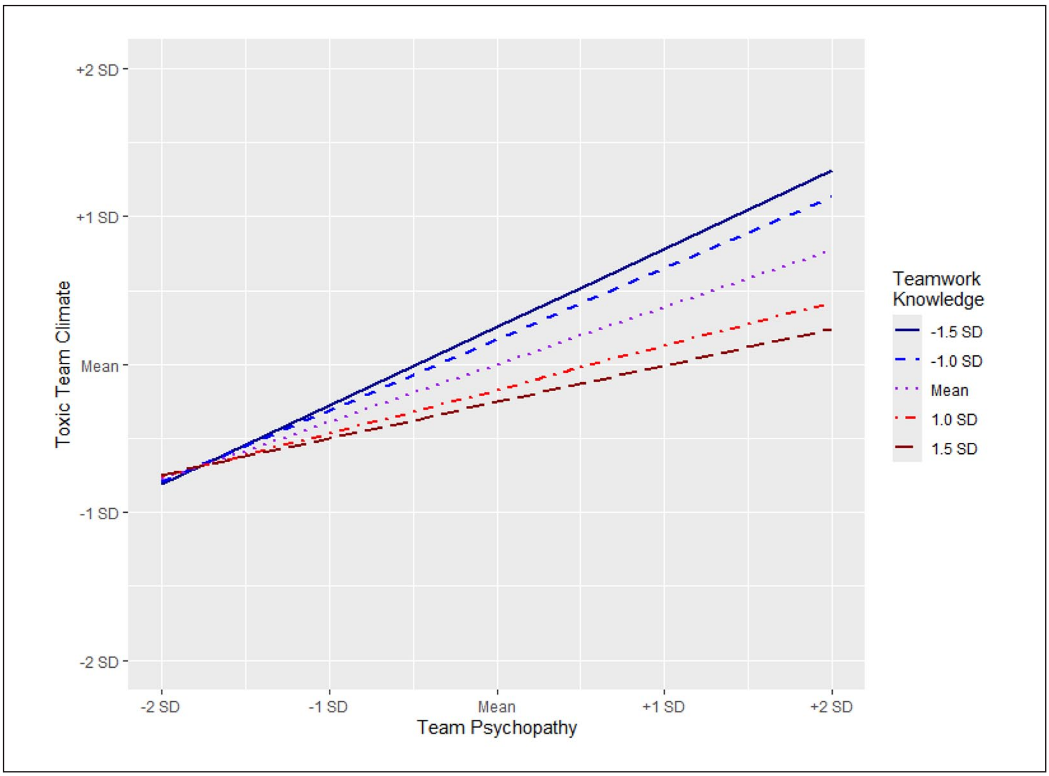


Table 6. Model 2 (Moderated mediation model): Conditional indirect effects.

Predictor	Outcome	Level of moderator	Indirect effect	*SE*	*p*	90% CI	
						LL	UL
Team Psychopathy (T1)	Team Loafing (T4)	−1.5 SD	.13	.06	.008	(.06,	.25)
	Team Loafing (T4)	−1.0 SD	.12	.05	.004	(.06,	.22)
	Team Loafing (T4)	Mean	.10	.04	.004	(.05,	.18)
	Team Loafing (T4)	+1.0 SD	.07	.04	.043	(.02,	.16)
	Team Loafing (T4)	+ 1.5 SD	.06	.05	.112	(−0.01,	.15)
Team Psychopathy (T1)	Team Deviance (T4)	−1.5 SD	.19	.07	.003	(.10,	.33)
	Team Deviance (T4)	−1.0 SD	.17	.06	.001	(.10,	.29)
	Team Deviance (T4)	Mean	.14	.04	.001	(.08,	.22)
	Team Deviance (T4)	+1.0 SD	.11	.06	.028	(.02,	.12)
	Team Deviance (T4)	+1.5 SD	.09	.07	.097	(−.03,	.19)
Team Psychopathy (T1)	Team Performance (T4)	−1.5 SD	−.08	.04	.032	(−0.16,	−0.02)
	Team Performance (T4)	−1.0 SD	−.07	.04	.026	(−0.14,	−0.02)
	Team Performance (T4)	Mean	−.06	.03	.027	(−0.12,	−0.02)
	Team Performance (T4)	+1.0 SD	−.04	.03	.082	(−0.11,	−0.01)
	Team Performance (T4)	+1.5 SD	−.04	.03	.147	(−0.11,	.00)
Team Psychopathy (T1)	Team Satisfaction (T4)	−1.5 SD	−.24	.08	.001	(−0.39,	−0.13)
	Team Satisfaction (T4)	−1.0 SD	−.22	.06	.001	(−0.34,	−0.13)
	Team Satisfaction (T4)	Mean	−.17	.05	.001	(−0.28,	−0.11)
	Team Satisfaction (T4)	+1.0 SD	−.13	.07	.031	(−0.25,	−0.02)
	Team Satisfaction (T4)	+1.5 SD	−.11	.09	.100	(−0.25,	.04)

Hypothesis 6 – Supported. We observed a small ($\Delta R^2 = .01$) but statistically significant interaction effect between Teamwork Knowledge (Time 1) and Team Psychopathy (Time 1) in predicting Toxic Team Climate (Time 2) ($\gamma_{13} = -.09$, $p = 0.10$). Consistent with Hypothesis 6, as Teamwork Knowledge increased, the strength of the relationship between Team Psychopathy and Toxic Team Climate decreased (see Figure 3).

Hypothesis 7 – Supported. Consistent with Hypothesis 7, Teamwork Knowledge moderated (to varying degrees) the indirect effects of Team Psychopathy on the outcome variables via Toxic Team Climate, such that the indirect effects were stronger for low levels of Teamwork Knowledge and weaker for high levels of Teamwork Knowledge. Table 6 summarizes the magnitude of the conditional indirect effects across five levels of Teamwork Knowledge (−1.5 *SD*, −1.0 *SD*, *M*, +1.0 *SD*, and +1.5 *SD*).

Summary of Results for Model 2

Overall, there was strong and consistent support for Model 2. First, we observed an excellent fit between Model 2 and our data using traditional fit statistics and the supplemental tests recommended by Williams et al. (2020). Second, the individual parameter estimates for all hypothesized paths in Model 2 were statistically significant and in the hypothesized direction. Third, we observed strong support for the mediating effects of Toxic Team Climate on the relationships between

Team Psychopathy and the outcome variables. Finally, we found a small, but significant, moderating effect of Teamwork Knowledge on the indirect effects of Team Psychopathy on the outcome variables.

Discussion

Overall, our findings were largely consistent with our proposed model. Team-level psychopathy and teamwork knowledge at the start of the teams' formation positively predicted team toxic climate measured at later points in time. Team-level toxic climate positively predicted dysfunctional team outcomes, including team-level deviance and loafing, and it negatively predicted team performance and satisfaction. The effects of psychopathy on the outcomes were mediated by toxic climate. Moreover, teamwork knowledge served as a moderator of the relationship between team psychopathy and toxic team climate by reducing its effects. Contrary to our hypotheses, the effects of teamwork knowledge on the outcomes were not mediated by toxic climate, and an alternative hypothesis treating teamwork knowledge as a moderator of the relationships between toxic climate and the outcomes was also not supported.

Implications for Theory

The findings of this study make several contributions to the literature. First, the study identifies the role of toxic team climate in understanding dysfunctional work teams. Drawing on several related literatures, we define the construct and then develop a model depicting its central role in explaining dysfunctional work teams. The model incorporates two key predictors (in the form of team composition variables of team toxic personality and teamwork knowledge) and four important dysfunctional outcomes (in the form of social loafing, interpersonal deviance, poor team performance, and team dissatisfaction), with toxic team climate playing the mediating role. The mediating effects of toxic team climate are also a contribution to the literature. Specifically, toxic team climate plays the most proximal role in creating dysfunctional outcomes. Collective perceptions concerning the interpersonal atmosphere within the team influenced both task-relevant behavior (loafing) and non-task relevant behavior (deviance), as well as actual team performance and attitudinal (satisfaction) reactions to the team. These findings are consistent with social information processing theories, as aspects of teams' social environment in terms of the general tone or atmosphere (climate) were useful predictors of behavior. Teams characterized by higher levels of psychopathy have climates comprised of greater distrust, unfairness, unsupportiveness and conflict, which in turn results in poorer team outcomes.

Second, the study contributes to the literature on team personality. Although not a new finding, this study reinforces the value in researchers shifting their focus from individual personality traits to the examination of team-level traits. Results of this research suggest that toxic traits have the potential to augment our understanding of both the process of team interaction and different domains of effectiveness.

The findings of the study demonstrate that team psychopathy is an important contributor to the formation of toxic team climates. Teams characterized by higher average levels of antagonism, lack of empathy, narcissism, impulsivity and manipulativeness may be more likely to cultivate toxic team climates. Toxic climates are plagued by perceptions of unfairness, unsupportiveness, distrust and conflict. Such climates likely engender dysfunctional interactions in the team, resulting in greater levels of team loafing and team deviance and lower levels of team performance and team satisfaction.

These findings extend the previous literature on the dysfunctional outcomes associated with psychopathic personality at the individual level (e.g., O'Boyle et al., 2012; Spain et al., 2014; Wu & LeBreton, 2011) by examining the influence of team-level psychopathic personality in creating dysfunctional team-level outcomes. Baysinger et al. (2014) examined average group-level psychopathy in teams performing a laboratory exercise. However, that study did not examine the formation of dysfunctional teams outside of the lab in a longer-term team context like the present study. The current study further documents that psychopathic personality can be defined and reliably measured at the team level, and that it is a temporally proximal predictor of toxic team climates and a temporally distal predictor of dysfunctional team-level outcomes.

Future research might examine how psychopathy functions differently at the team versus the individual level. For example, while psychopathy at the individual level might result in aggression by that person toward another person, psychopathy at the team level might result in aggression as a group against a person as in mobbing or bullying.

Third, the study identifies and incorporates the role of aptitudes (i.e., teamwork knowledge), along with personality (i.e., psychopathy) to better understand the formation of dysfunctional teams. The observed relations between teamwork knowledge and climate suggest that teams possessing higher levels of interpersonal and self-management skills are more likely to have more functional climates and, as a result, may be less likely to create dysfunctional outcomes such as deviance and social loafing. Conversely, teams lacking interpersonal knowledge of conflict resolution, collaborative problem solving, and communication, and/or lacking self-management knowledge of planning, coordination, and performance management, were more likely to develop toxic team climates, while teams with that knowledge were more likely to avoid the formation of such climates.

In addition, teamwork knowledge emerged as an important moderator of the relationship between team psychopathy and toxic team climate, weakening the positive relationship between team psychopathy and toxic team climates. Consequently, the indirect effects of team psychopathy on the outcome variables (via toxic team climate) decreased as teamwork knowledge increased. This suggests that enhancing teamwork knowledge is one important way that organizations may mitigate the deleterious effects of dysfunctional teams.

These findings are also an extension of the previous literature on the consequences associated with teamwork knowledge. That research has been predominantly focused on predicting the teamwork component of individual job performance (O'Neill et al., 2012; Stevens & Campion, 1994, 1999). The current study shows that teamwork knowledge can be defined and reliably measured at the team level, and that the lack of teamwork knowledge predicts the formation of toxic team climates. Although this effect did not transfer to dysfunctional team outcomes, the finding that teams lacking in knowledge as to how to work effectively in a team may create a working environment characterized by perceptions of unfairness, lack of support, distrust and conflict is an important insight.

Implications for Practice

First, our identification of the central role of toxic team climate in the creation of dysfunctional work teams may be useful to practitioners because it identified a key team process variable that immediately precedes dysfunctional outcomes. It helps describe the shared perceptions that illustrate the teams are on a dysfunctional path, perhaps in time to remedy the problem before the dysfunctional outcomes result. Our model may also help practitioners understand the causes of dysfunctional work teams, so they begin to take steps to prevent or mitigate their toxic effects.

Second, this research suggests that the selection of employees for work teams could be enhanced by using measures of dysfunctional personality traits. Aside from personality tests, interviews, situational judgment tests, assessment centers, or indirect measures of personality, could also be used to measure these traits in a manner less susceptible to faking.

Third, this study recommends that practitioners involved in the staffing of work teams should consider aptitude (e.g., knowledge) as well as interpersonal skills and personality traits. This confirms the finding by Morgeson et al. (2005) that teamwork knowledge, along with social skills measured in an interview and personality characteristics, all uniquely predicted job performance in work teams in an organization.

Limitations

Several limitations should be noted. First, common method variance is always a concern with studies using self-report surveys. However, to reduce this concern, all tests of hypotheses used measures that were temporally separated across four time periods (i.e., predictors at Time 1, mediators at Times 2 and 3, and outcomes at Time 4). Second, social desirability is a salient issue when asking respondents to report on the behavior of team members. To address this, surveys were collected independently from each team member and anonymity was emphasized so respondents understood that neither their instructors nor their teammates would ever see their ratings. Also, much of the data used a team-referent rather than an individual-referent; consequently, participants may have been less reticent to report their teammates' negative behavior (e.g., deviance) than themselves. Moreover, we used a mix of negatively worded and positively worded items to reduce the effects of social desirability and capture the breadth of the construct. However, that means we interpreted the lack of endorsement of positive items as negative indicators. Third, the study used a heterogeneous sample of graduate and undergraduate business students. On the one hand, the use of a student sample may raise concerns about the generalizability of study findings to other organizational settings. However, this concern was mitigated by several factors: (1) this was a genuine teamwork context where members were assigned to teams working interdependently over extended periods of time, (2) the teams had important, real-life consequences for the team members (i.e., course grades), and (3) the teams were similar to project teams in organizations.

Conclusion

As most everybody who has worked in team settings has observed, sometimes the team climate is toxic. This study finds that this may be partly due to working in teams with higher average levels of psychopathy-related traits. As team psychopathy increases, so too does the toxicity of the team climate, which may have cascading effects resulting in greater levels of team loafing and team deviance and lower levels of team satisfaction and team performance. This study also finds that the likelihood of a toxic climate forming is also influenced by the teamwork knowledge of the members. If they are knowledgeable about how to work in teams, the formation of toxic climates is less likely and such knowledge may mitigate (i.e., moderate) the negative effects of team psychopathy on the formation of a toxic climate. Together, this study provides potential insight into this common form of team dysfunction and sheds some light on possible causes and solutions.

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Supplemental material

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Notes

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