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Harmful Help: The Costs of Backing-Up Behavior in Teams

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Prior research on backing-up behavior has indicated that it is beneficial to teams (C. O. L. H. Porter, 2005; C. O. L. H. Porter et al., 2003). This literature has focused on how backing-up behavior aids backup recipients in tasks in which workload is unevenly distributed among team members. The authors of the present study examined different contexts of workload distribution and found that, in addition to the initial benefits to backup recipients, there are initial and subsequent costs. Backing-up behavior leads backup providers to neglect their own taskwork, especially when workload is evenly distributed. Team members who receive high amounts of backing-up behavior decrease their taskwork in a subsequent task, especially when a team member can observe their workload. These findings indicate that it is important to consider both the benefits and costs of engaging in backing-up behavior.

Keywords: team performance, backing-up behavior, helping behavior, workload, dependence

Dickinson and McIntyre (1997, p. 19) noted that "a critical feature of teams is that individuals must coordinate their decisions and activities." Many team researchers have found that teamwork behaviors, such as coordination, communication, and information sharing, are beneficial for performance (e.g., Johnson et al., 2006; Marks, DeChurch, Mathieu, Panzer, & Alonso, 2005; Marks, Zaccaro, & Mathieu, 2000; Montoya-Weiss, Massey, & Song, 2001; Moon et al., 2004). One type of teamwork behavior that researchers have recently examined is backing-up behavior, which has been defined as "the discretionary provision of resources and task-related effort to another member of one's team that is intended to help that team member obtain the goals as defined by his or her role" (Porter et al., 2003, p. 391).

In two empirical studies, Porter (2005) and Porter et al. (2003) found that when teams had a member with a large amount of workload, backing-up behavior was positively related to team performance. This finding has led to the assumption that it is beneficial for teams to engage in backing-up behavior. We contend, however, that backing-up behavior has costs as well as benefits. Specifically, we contend that backing-up behavior utilizes the cognitive resources of backup providers and, thus, leaves them with fewer resources to conduct their own taskwork. This finding is consistent with contentions by Bowers, Braun, and Morgan (1997) and MacMillan, Entin, and Serfaty (2004) that communication and coordination represent an overhead cost for team members. We contend that, because of this effect, backing-up behavior can result in neglected taskwork on the part of the individual who provides the backup. In contrast to the assumption that backing-up behavior is always good for team performance, this view suggests that it can be harmful in some circumstances.

In addition to this initial cost, we contend, there are subsequent costs of backing-up behavior. Building from theory and research on dependence (Lee, 1997; Wells, Glickhauf-Hughes, & Jones, 1999) and social loafing (Erez & Somech, 1996; Karau & Williams, 1993), we contend that backup recipients can come to rely on backup provided by their team members, such that recipients will decrease their own taskwork. Thus, team members who provide backing-up behavior can enable the dependence of backup recipients. Moreover, because teams make decisions in a social context, we examine how this relationship is altered by the presence or absence of a team member who can observe help recipient workload.

Accordingly, our purpose in this paper is to further examine the relationship between backing-up behavior and team performance; our focus is on the initial and subsequent costs of backing-up behavior. Drawing from Porter et al.'s (2003) guidance, which indicates the importance of both backup recipients and backup providers, we examine costs of backing-up behavior to each of these roles. Specifically, we examine the initial cost of backup provider neglected taskwork and the subsequent cost of decreased backup recipient taskwork, as well as moderators of these effects. Additionally, we examine how help provider neglected taskwork and help recipient taskwork influence team performance.

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The Influence of Neglected Taskwork on Team Performance

Previous research examining backing-up behavior has focused on the benefits that are provided to backup recipients (Porter, 2005; Porter et al., 2003). This research has indicated that backing-up behavior can prevent backup recipients from becoming overloaded, to the point that they will fail in their role in the team. The logic presented by Porter and colleagues indicates that backing-up behavior aids backup recipients in the process of completing the taskwork assigned to them, which in turn aids team performance. Though Porter and colleagues did not directly test the contention that backup recipient completed taskwork is related to team performance, this contention is consistent with their finding that backing-up behavior is positively related to team performance.

As further noted by Porter et al. (2003), researchers who examine backing-up behavior should consider the roles of both backup recipients and backup providers. Following their own advice, Porter et al. examined the influence of backup provider personality on the provision of backing-up behavior, as well as the way that backing-up behavior given by providers influences team performance. However, Porter et al. did not consider how the way in which backup providers perform their own taskwork relates to team performance. This topic is important, because work teams tend to assign portions of the team task to all team members, including both backup recipients and backup providers. We contend that, in tasks high in team interdependence, defined by Saavedra, Earley, and Van Dyne (1993) as those in which group members jointly complete a task, the degree to which backup providers complete or neglect their own taskwork is an important determinant of team performance.

In summary, although previous research has indicated the importance of taskwork completed by both backup providers and backup recipients, researchers have not tested the hypotheses that backup provider taskwork and backup recipient taskwork are positively related to team performance. Building from the logic noted above, we examined these relationships with our first two hypotheses.

> *Hypothesis 1:* Backup provider neglected taskwork will be negatively related to team performance.

> *Hypothesis 2:* Backup recipient completed taskwork will be positively related to team performance.

Initial Costs of Backing-Up Behavior

Because backup provider neglected taskwork is an important determinant of team performance, it is important that we uncover antecedents to backup provider neglected taskwork in order to further theory on team performance and to aid organizations in their management of teams. In this section, we draw from theory on bounded rationality (March & Simon, 1958; Simon, 1945) and from Kanfer and Ackerman's (1989) model of cognitive resource allocation to contend that backing-up behavior is an important determinant of backup provider neglected taskwork.

Simon (1945) and March and Simon (1958) posited that members of organizations are subject to bounded rationality. Their theory that members of organizations have limits to their own cognitive processing capability has received strong empirical support across multiple disciplines (for a review, see Kahneman, 2003). This theory has important implications for team members engaged in tasks that utilize their cognitive resources. Once cognitive demands exceed the capacity of team members, at least some portion of their taskwork will not be completed. Indeed, a major purpose of backing-up behavior is to lend cognitive resources to a team member who is overwhelmed with taskwork.

Building in part on theory and research that examined bounded rationality, Kanfer and Ackerman (1989) generated a theory of cognitive resource allocation. According to their theory, performance is determined in large part by the amount of cognitive resources that are allocated to a task. The amount of resources allocated to a task is determined by the individual's overall level of resources, minus the portion of resources that are allocated off task. Therefore, if we assume a static level of overall cognitive resources, the dedication of a greater proportion of cognitive resources to the task will lead to better performance than will the allocation of a lower proportion of cognitive resources to the task. Similarly, as a greater proportion of cognitive resources is devoted away from the task, the individual's performance on the focal task will suffer. Although the Kanfer–Ackerman model was developed at the individual level of analysis, we believe that this model has important implications for teams. Teams have finite cognitive resources and can devote these resources to their assigned task or away from their assigned task. When teams allocate their cognitive resources away from the tasks for which they are responsible, their performance will suffer.

Consistent with this extension of the Kanfer and Ackerman (1989) model of resource allocation to the team level of analysis is the distinction between taskwork and teamwork made by Bowers et al. (1997). They define taskwork as a team's interaction with tasks, tools, machines, and systems, whereas they define teamwork as the interpersonal interactions among individuals that are necessary for exchanging information, developing and maintaining communication patterns, and coordinating actions. Both taskwork and teamwork occupy the finite resources of teams and their members. Therefore, under conditions of high levels of workload, devoting more resources to teamwork means that fewer resources are available for taskwork.

Backing-up behavior requires communication among team members, so that team members understand who needs backup and who is able to offer backup (Burke, Weir, & Duncan, 1976; Porter et al., 2003). To engage in backing-up behavior, teams must coordinate their behavior in order to provide backup at the right time, in the right manner, and in the right place. This evaluation requires the utilization of some amount of information processing resources by members of the team, who thereby consume information processing resources that could otherwise be allocated to taskwork behavior. Furthermore, communication processes, such as turn taking in team discussions regarding backup (Diehl & Stroebe, 1987, 1991) and conflict resolution regarding backup (De Dreu & Weingart, 2003), can utilize team resources. Information processing and coordination of efforts cause team members to expend their resources on teamwork and thereby reduce the amount of resources that are available for taskwork.

A major shortcoming of previous research on backing-up behavior is that past researchers have overlooked the negative ramifications of backing-up behavior for the taskwork of backup providers (Porter, 2005; Porter et al., 2003). Noting that team member resources are finite, we posit that, ceteris paribus, when backup providers engage in backing-up behavior designed to aid their team members, the help providers will have fewer resources to allocate toward their own taskwork. In other words, backup providers who devote resources toward backing-up behaviors will have fewer resources available with which to conduct their own taskwork, which will result in neglected taskwork for the backup provider. Therefore, we made the following hypothesis:

> *Hypothesis 3:* Backing-up behavior will be positively related to backup provider neglected taskwork.

Because backing-up behavior presents the initial cost of backup provider neglected taskwork, an important question arises as to how this cost can be minimized. We posit that an important determinant of help provider neglected taskwork as a result of backing-up behavior is the workload distribution within teams. Huey and Wickens (1993) noted that teams are often confronted with abnormal or emergency circumstances, in which they must respond rapidly. An example would be a fire response team that is notified of a forest fire outbreak. Its members face a transition from a low level of workload to a high level of workload, once they begin their response to the fire. This example indicates that team workload is dynamic, such that it may sometimes be low and sometimes be high.

Building from this logic, we contend that workload distributions are dynamic as well, such that members within a team may have low or high proportions of workload. For example, an Air Force midflight refueling crew contains members who are responsible for different tasks; it includes, among others, a pilot who controls the course of the refueling plane and a boom operator who controls the instrument that transfers fuel from the refueling plane to a receiving plane. At takeoff and landing, the pilot has high levels of workload. At those times, the boom operator has a relatively low level of workload. During the process of transferring fuel from one plane to another, the pilot's level of workload is lower than it is during takeoff and landing. However, at this time, the boom operator has a high level of workload. Thus, at some points in time, all team members may have relatively equivalent levels of workload, and, at other points in time, some team members may have a greater level of workload than do others.

As noted by Porter (2005), there has been little empirical research on backing-up behavior. The research that does exist on this topic has tended to focus on contexts of uneven workload distributions, in which one team member has a greater portion of the workload than have other team members (e.g., Porter, 2005; Porter et al., 2003). However, as noted above, workload distributions may be evenly distributed, such that each team member has approximately the same amount of workload. Indeed, teams may purposely assign taskwork in this manner, in hopes of preventing a team member from becoming overloaded. We contend that team workload distribution has important implications for neglected taskwork by backup providers.

In even workload distributions, each team member has an equivalent amount of workload. Providing backing-up behavior in such contexts requires that backup providers reallocate their resources away from their own workload, despite the fact that backup provider workloads are just as high as is that of the team member seeking help. Furthermore, resources devoted to teamwork behaviors, such as communication and coordination, detract from resources available for backup providers to conduct their own taskwork. Thus, the provision of backup behavior will come at the cost of the provider's own taskwork.

In contrast, in uneven workload distributions, one team member has more workload than do the others. As indicated by Porter et al. (2003), an uneven distribution generally results in team members with the greater portion of workload taking on the role of backup recipient and team members with the lesser portion of the workload taking on the role of backup provider. The lower level of workload held by backup providers in uneven workload distributions means that they can reallocate their resources to another team member with a lesser neglect of their own taskwork than can providers in even workload distributions. In other words, compared with backup providers in even workload distributions, backup providers in uneven workload distributions will have lower levels of neglected taskwork when they engage in backing-up behavior. Accordingly, we made the following hypothesis:

> *Hypothesis 4:* Workload distribution moderates the positive relationship between backing-up behavior and backup provider neglected taskwork, such that an even team workload distribution accentuates this relationship and an uneven team workload distribution attenuates this relationship.

Subsequent Costs of Backing-Up Behavior

To date, researchers have focused on how backing-up behavior benefits backup recipient performance in the task during which the backup occurs (e.g., Porter et al., 2003; Porter, 2005). However, this research has not considered longer term effects of the receipt of backup. This is an important oversight, because, as research on team norms (Ancona & Chong, 1996; Bettenhausen & Murnighan, 1985; Gersick & Hackman, 1990) indicates, behavior at one point in time can influence future behavior. Accordingly, in this section we consider the influence of the receipt of backing-up behavior on later recipient behaviors.

Although previous research has not directly examined how team backing-up behavior affects backup recipients, Lee (1997) has suggested that seeking help may imply incompetence and dependence. Furthermore, Fisher, Nadler, and Whitcheralagna (1982) contended that the receipt of aid can be threatening for help recipients. Research on dependency has indicated that dependent individuals suffer from low self-esteem (Wells et al., 1999), low self-confidence, and lost selfhood (Lindley, Giordano, & Hammer, 1999). Although the concept of dependency was originally applied to dysfunctional families, the term is now applied to a wide variety of relationships (Lindley et al., 1999). Building from this research, we propose that depriving a member of a work team of the opportunity to develop his or her skills by providing high levels of backup to that individual will lead to negative self-evaluations and lower feelings of self-worth. As indicated by Ilies and Judge (2005), such negative feedback results in lower goals for future tasks. Thus, individuals who receive high levels of backup from their teams will interpret their own abilities as inadequate, which will in turn lead to their decreased motivation in future tasks.

Complementing the research on dependence is theory and research on social loafing. Social loafing is defined as the reduction in individual motivation and effort by an individual who is working collectively, as compared with the motivation and effort the individual exerts when working individually (Karau & Williams, 1993). Research on social loafing suggests that individuals engage in such behavior because they lack a sense of accountability or personal responsibility (Erez & Somech, 1996). These individuals sense that, regardless of whether they substantively participate in working towards group goals, they will be able to enjoy the benefits of team performance.

As indicated by a meta-analysis conducted by Karau and Williams (1993), group environments that facilitate a lack of accountability will be especially prone to social loafing. As noted above, research on dependency indicates that receipt of help can lead to a sense of lost selfhood (Lindley et al., 1999). To the extent that individuals consistently and repeatedly receive help on their own work tasks, we expect that a sense of dependence will develop, such that backup recipients will no longer feel personally accountable. Rather, they will view their own taskwork as work that can be allocated to the group as a whole. This diminished sense of accountability will impact individual motivation and result in increased social loafing. In addition, meta-analytic evidence suggests, social loafing is fomented when individuals perceive that their contributions are not unique (Karau & Williams, 1993); this perception leads them to think that the exertion of effort will result merely in duplication of effort by another team member (George, 1992). On the basis of this research, we propose that team members who receive large amounts of backup will perceive low levels of unique contributions, a lack of accountability, and decreased instrumentality for their effort and will therefore engage in social loafing.

In summary, we build from research on team member dependence and social loafing to make the following hypothesis:

> *Hypothesis 5:* Team members who receive high levels of backup will engage in lower levels of taskwork in future tasks than will team members who receive low levels of backup.

As mentioned above, Porter et al. (2003) noted the importance of both backup providers and backup recipients. As Hypothesis 5 indicates, backup providers can enable backup recipients to become dependent upon backup given by providers. However, we contend that this effect depends on the decision process of backup providers. As noted by Porter et al., an important criterion that backup providers utilize in deciding whether to engage in backing-up behavior is the legitimacy of need for backup. Porter et al. defined legitimacy of need for backup as the ratio of resources to workload. Team members who have a high ratio of resources to workload have a low legitimacy of need and vice versa. Backup providers are most likely to provide backup when they perceive that backup recipients have a legitimate need. Porter et al. provided empirical support for their contention and found that legitimacy of need for backup was positively related to backing-up behavior.

Porter et al.'s (2003) research was an important first step in explaining how help providers decide to engage in backing-up behavior. However, their research focused on backing-up behavior, as provided by individual team members, and overlooked the social processes inherent in team contexts. We contend that backup providers do not reach their decisions regarding legitimacy of need in isolation. Rather, team members influence each other as they make their decisions regarding legitimacy of need. To enrich theory and research examining backing-up behavior, research must include these social influences.

In a series of studies investigating collective induction, Laughlin (1986, 1988, 1999) contended that the manner in which groups make decisions depends in part on the nature of the task. Specifically, the number of group members that is necessary and sufficient for the group to reach a correct decision is inversely proportional to the demonstrability of the solution (Laughlin, 1986; Laughlin & Hollingshead, 1995). In other words, the more that group members are able to demonstrate the correctness of a solution, the smaller the number of group members that will be necessary to convince the group to adopt the correct solution. For tasks that are high in demonstrability, such as an algebra problem, group members can demonstrate why their solution is the correct one. In the example of an algebra problem, the group member with the correct solution can unambiguously show the derivation step by step. Laughlin, Kerr, Munch, and Haggarty (1976) referred to high demonstrability tasks as "eureka" or "insight" tasks. In this type of task, the correct answer is immediately evident and is accepted when it is proposed by any group member (Laughlin et al., 1976). Laughlin (1986) and Laughlin and Shippy (1983) showed that a model they labeled "truth wins" best describes how groups adopt a solution in such tasks, such that if proposed by one member, correct solutions were typically recognized either on the trial on which they were proposed or on a subsequent trial.

On the low end of the demonstrability scale are judgmental tasks. Judgmental tasks are evaluative, behavioral, or aesthetic judgments for which no answer is immediately demonstrably correct (Laughlin, 1986; Laughlin & Adamopoulos, 1980). At the time the decision is made, the accuracy of the outcome of a judgmental task is not clearly demonstrable.

For tasks that are low in demonstrability, such as judging the quality of an ice skating competition, it is not possible for a team member to demonstrate unambiguously why his or her score is the correct solution. Therefore, in low demonstrability tasks, a single team member is not generally sufficient to convince the group to adopt a judgment. On such judgment tasks, the basic social combination process is one that Laughlin and Shippy (1983) labeled "majority wins," in which the group simply adopts the solution proposed by the majority of the group members.

According to Laughlin and Adamopoulos (1980), there is an additional type of task that is somewhat demonstrable but is too complex to be a eureka-type task. These tasks are still toward the high demonstrability end of the scale, where there is a correct solution that can be demonstrated to others. However, multiple solutions exist that initially may be considered viable, and the correct solution is not immediately accepted as evidence. Such tasks fit what Laughlin and Adamopoulos labeled the "truth supported wins" model, in which the individual who proposes the correct solution needs the support of at least one other group member in order to convince the group. In other words, in truth supported wins tasks, two correct members are generally necessary and sufficient for a correct group response (Laughlin & Shippy, 1983). Ellis, Hollenbeck, Ilgen, Porter, West, and Moon (2003) conducted a laboratory experiment that provided support for the truth supported wins model.

As Porter et al. (2003) have noted, the task of deciding whether a team member has a legitimate need for help involves a consideration of the amount of workload and resources held by potential backup recipients. We contend that this decision task fits best into the category of one that is somewhat demonstrable but too complex to be a eureka-type task. Team members can indicate how much workload and resources they have, but there may be multiple solutions that may initially be considered to be viable. A team member who requests help may initially receive the alternative proposition that there is not a legitimate need for help (e.g., “no, do your own work”) or perhaps even the proposition that the team member he or she is requesting help from has an even greater need (e.g., “no, you help me!”). Following collective induction theory, as indicated by Laughlin and Adamopoulos (1980), team members who request backup will be more likely to receive backup if a team member can support their contention that they have a legitimate need for backup. We refer to team members who can support this contention as backup advocates.

We contend that backup advocates will facilitate the dependence of backup recipients upon their team members. As noted by Hypothesis 5, team members who receive high levels of backing-up behavior in an initial task will engage in lower levels of taskwork in later tasks. When backup advocates observe a buildup in the backup recipient’s workload and support the request for backup, recipients will be more likely to rely on backup provided by their team members. In such contexts, the negative influence of the receipt of backup on recipient taskwork will be especially strong. In contrast, when there is no backup advocate to support recipient requests for backup, recipients will be less able to rely upon the backup of their team members and will therefore complete more of their own taskwork. Thus, we made the following hypothesis:

> *Hypothesis 6:* The presence of a backup advocate will moderate the influence of the receipt of backup on the backup recipient’s future taskwork, such that this relationship will be accentuated when a backup advocate is present and attenuated when there is no backup advocate.

Overview of Studies

To test our hypotheses, we conducted two studies. Study 1 examined the initial costs of backing-up behavior by investigating the influence of backing-up behavior on backup provider neglected taskwork during the task. Study 2 examined the subsequent costs of backing-up behavior by investigating the influence of backing-up behavior (Time 1) on the backup recipient (Time 2).

Study 1

Method

Participants

Participants were 272 undergraduate students in an upper level management course at a large midwestern university who were randomly assigned to 4-person teams ($N = 68$ teams). Participation in the study was voluntary; however, in exchange for their participation, these students received course credit. In addition, teams were eligible for cash prizes ($40 per team) on the basis of team performance.

Nature of the Task

Participants worked on a dynamic and networked computer simulation, which was a modified version of the distributed dynamic decision making (DDD) simulation developed for the Department of Defense for use in research and training. The version of the simulation we used was developed for teams whose members had little or no military experience. We provide a brief description of the simulation below (see Beersma, Hollenbeck, Humphrey, Moon, & Conlon, 2003, for further details).

All team members sat at networked computer terminals that were located in the same room. During the simulation, the team monitored a hypothetical geographic region, kept enemy forces from moving into the restricted areas, and allowed friendly forces to move about freely. Radar representations of the forces moving through the geographic space the team monitored were known as “tracks.” The overall objective was to disable enemy tracks as quickly as possible, if they entered the restricted airspace, and to avoid disabling friendly tracks. The task was structured such that the team operated in a divisional resource allocation structure, meaning that each team member was able to engage and disable any enemy track that encroached on his or her geographic region.

Procedure

Participants were randomly assigned to both a 4-person team and to one of four computer stations, each corresponding to one quadrant of the screen. Training consisted of declarative knowledge regarding all the various details involved in playing the simulation and hands-on training, during which the trainer explicitly walked the participants through the mechanics of the simulation. The teams were also allowed hands-on practice. Following this training, each team completed a 30-min iteration of the simulation.

Manipulations and Measures

Workload distribution. This study examined teams in the contexts of even and uneven workload distributions. Accordingly, we created two conditions. In the uneven workload distribution, 1 team member (whom we refer to as the backup recipient) was intentionally given a disproportionately heavier workload compared with other members of the team. Specifically, the backup recipients had 50% of the team’s workload (72 tracks), and the remaining 3 team members (whom we refer to as the backup providers) evenly split the other 50% of the team’s workload (24 tracks each). In the even workload distribution, each team member received an identical number of tracks (36 tracks each). Thus, the overall workload was the same for both conditions (144 tracks). Moreover, both conditions utilized identical types of tracks; they arrived at the same time in both conditions and moved in the same direction. The difference between the conditions was that track paths were simply reflected on their axes, so that 36 of the tracks that entered the quadrants of the backup providers in the even condition entered the quadrant of the backup receiver in the uneven condition.

Backing-up behavior. As discussed by Porter et al. (2003), backing-up behavior can generally be defined as the extent to which team members help each other perform their roles. In this task, each team member is individually responsible for protecting one of four quadrants of the restricted zone; however, all team members are collectively responsible for protecting the entire restricted zone as a team. As we noted, in the uneven condition, the backup receiver had the heaviest share of the team's workload. For this study, we calculated backing-up behaviors as the total number of times that team members other than the backup recipient engaged and cleared an enemy track found within the backup recipient's quadrant. This is a sound operationalization of backing-up behavior because it (a) exploits our ability to objectively measure actual helping behaviors and (b) measures only behaviors directed toward the backup recipient. Furthermore, this measure of backing-up behavior is identical to an objective measure previously established in the literature (Porter, 2005; Porter et al., 2003).

Backup provider neglected taskwork. Backup provider neglected taskwork was operationalized as an objective count of the number of times an enemy track appeared in the quadrant of any of the backup providers and was not disabled.

Backup recipient completed taskwork. Backup recipient completed taskwork was operationalized as an objective count of the number of times the backup recipient disabled an enemy track.

Team performance. Each team started the simulation with 50,000 points, lost 1 point for each second that any unfriendly track was in the restricted zone, and lost 2 points per second for each unfriendly track in the highly restricted zone. The teams lost 300 points for disabling any friendly track. This measure of team performance is identical to that used in prior research (Hollenbeck et al., 2002; Moon et al., 2004).

Results

Means, standard deviations, and between-team correlations are given in Table 1. Backing-up behavior was strongly correlated with workload distribution, which indicates that teams with uneven workloads were more likely to demonstrate backing-up behaviors. Furthermore, team performance was strongly (negatively) correlated with workload distribution, such that teams with uneven workloads performed worse than did teams with even workloads.

Hypothesis 1 stated the expectation that backup provider neglected taskwork would be negatively related to team performance, and Hypothesis 2 stated the expectation that backup recipient completed taskwork would be positively related to team performance. Table 2 indicates that, when we controlled for workload distribution, backup provider neglected taskwork significantly predicted team performance in the direction hypothesized ($\beta = -.51$, $p < .01$), as did backup recipient completed taskwork ($\beta = .34$, $p < .01$). Thus, Hypotheses 1 and 2 were supported.

Table 2
Study 1 Hierarchical Regression Analyses Regressing Team Performance on Backup Provider Neglected Taskwork and Backup Recipient Completed Taskwork

	Team performance	
Predictor	Step 1	Step 2
Workload distribution	$-.71^{**}$	$-.95^{**}$
Backup provider neglected taskwork		$-.51^{**}$
Backup recipient completed taskwork		$.34^{**}$
R^2	$.50^{**}$	$.83^{**}$
ΔR^2, Step 2		$.33^{**}$

Note. Values represent standardized regression coefficients. $N = 68$ teams.
** $p < .01$ (two-tailed).

Hypothesis 3 stated the expectation that backing-up behavior would be positively related to backup provider neglected taskwork. Table 1 indicates a significant negative correlation between backing-up behavior and backup provider neglected taskwork ($r = -.27$, $p < .05$). This correlation supports Hypothesis 3. Hypothesis 4 stated the expectation that workload distribution would moderate the relationship between backing-up behavior and neglected taskwork. Table 3 indicates that the interaction significantly predicted neglected taskwork ($B = -1.53$, $p < .05$). Moreover, the form of the interaction noted in Figure 1 matches that indicated by Hypothesis 4. Specifically, the positive relationship between backing-up behavior and backup provider neglected taskwork was stronger in the even workload distribution than in the uneven workload distribution. Indeed, the slope for the uneven workload distribution condition was not significantly different from zero ($p = .28$). This result provides empirical support for Hypothesis 4.

Study 2

Method

Procedure

To examine subsequent effects of backing-up behavior, we conducted a second laboratory experiment with the teams from

Table 1
Study 1 Means, Standard Deviations, and Interteam Correlations

Variable	*M*	*SD*	1	2	3	4	5
1. Team performance	40,103.81	3,130.74	—				
2. Backing-up behavior	12.60	11.95	$-.59^{**}$	—			
3. Workload distribution[a]	0.56	0.50	$-.71^{**}$	$.81^{**}$	—		
4. Backup provider neglected taskwork	28.37	5.49	$-.27^{*}$	$-.27^{*}$	$-.27^{*}$	—	
5. Backup recipient completed taskwork	31.29	8.52	.05	−.17	$.32^{*}$	−.04	—

Note. $N = 68$ teams.
[a] Dummy coded 0 = even, 1 = uneven.
* $p < .05$ (two-tailed). ** $p < .01$ (two-tailed).

Study 1. These teams engaged in the same DDD task as that utilized in Study 1. Following the first iteration of the simulation from Study 1, each team had 10 min to plan prior to a second iteration of the simulation. Following this planning session, each team engaged in the second iteration for 30 min.

Manipulations and Measures

Backup recipient completed taskwork. To examine the change in backup recipient completed taskwork, we measured backup recipient completed taskwork in both iterations of the simulation. Task 1 backup recipient completed taskwork was operationalized as the number of times the backup recipient had successfully disabled an enemy track in the first iteration of the simulation. Task 2 backup recipient completed taskwork was operationalized in the same manner but for the second iteration of the simulation.

Backing-up behavior. We utilized the same measure for backing-up behavior in this study as that used in Study 1. Specifically, we calculated backing-up behavior as the total number of times that team members other than the backup recipient had engaged and cleared an enemy track found within the backup recipient's quadrant.

Workload distribution. Workload distribution was manipulated in the same manner as in Study 1, such that teams were randomly placed into either an even workload distribution or an uneven workload distribution.

Backup advocate. This variable was manipulated, such that teams were randomly placed into one of two conditions: backup advocate present or no backup advocate present. This variable was manipulated through the placement of tracks in the help recipient quadrant. In both conditions, the team members responsible for the southwestern and southeastern quadrants could not see the tracks placed in the backup recipient's quadrant without sending one of their assets to that region to investigate. However, depending on the condition, the team member responsible for the northeastern quadrant was or was not able to see the tracks placed in the backup recipient's quadrant.

In the backup advocate present condition, tracks in this quadrant were placed in a location in which the team member responsible for the northeastern quadrant could automatically see the tracks without taking any action. In the no backup advocate present condition, these tracks were placed in a location in which the team member responsible for the northeastern quadrant could not see the tracks, unless he or she specifically took the time to send an asset to that location to gather information. In other words, a backup provider (the backup advocate) could passively see the amount of recipient workload in the backup advocate present condition, but no backup providers could passively see the amount of recipient workload in the no backup advocate condition.

Table 3
Study 1 Hierarchical Regression Analyses Regressing Team Performance on Backing-Up Behavior and Workload Distribution

Predictor	Backup provider neglected taskwork	
	Step 1	Step 2
Workload distribution	−0.15	−1.11*
Backing-up behavior	−0.15	2.04*
Backing-Up Behavior × Workload Distribution		−1.53*
R^2	0.08	0.15*
ΔR^2, Step 2		.07*

Note. Values represent unstandardized regression coefficients. $N = 68$ teams.
* $p < .05$ (two-tailed).

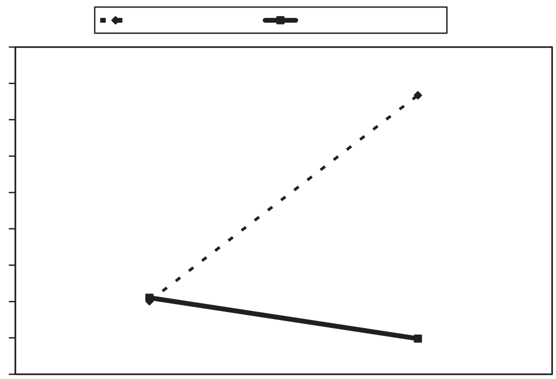

Figure 1. The moderating role of workload distribution on the relationship between backing-up behavior and backup provider neglected taskwork.

Team performance. Team performance was measured in Study 2 in the same manner as in Study 1. Each team started the simulation with 50,000 points and lost 1 point for each second that any unfriendly track was in the restricted zone, 2 points per second for each unfriendly track in the highly restricted zone, and 300 points for disabling any friendly track.

Results

Means, standard deviations, and between-team correlations are given in Table 4. Similar to Study 1, backing-up behavior was strongly correlated with workload distribution in Study 2, which indicates that teams with uneven workloads were more likely to demonstrate backing-up behaviors. Also similar to Study 1 was the strong negative correlation between workload distribution and team performance.

Hypothesis 5 stated that backing-up behavior conducted early in a team's life span would be negatively related to backup recipient completed taskwork in a later task. As indicated by Table 5, backing-up behavior at Time 1 significantly predicts backup recipient completed taskwork at Time 2 (standardized $\beta = -.25$, $p < .05$). This finding supports Hypothesis 5.

Hypothesis 6 states that the presence of a backup advocate would moderate the relationship between backing-up behavior conducted early in a team's life span and backup recipient completed taskwork in a later task. Results indicated that the presence (or absence) of a backup advocate significantly interacted with backup received at Time 1 in predicting backup recipient completed taskwork at Time 2 (standardized $\beta = -.27$, $p < .05$; see Table 5). Figure 2, which indicates the form of the interaction, shows that the presence of a backup advocate magnified the

Table 4
Study 2 Means, Standard Deviations, and Interteam Correlations

Variable	*M*	*SD*	1	2	3	4	5	6
1. Team performance	43,130.3	2,162.97	—					
2. Study 1 backing-up behavior	12.60	11.95	.21	—				
3. Study 2 workload distribution[a]	0.63	0.49	−.57**	−.36**	—			
4. Presence of backup advocate[b]	0.31	0.47	−.16	−.10	.51**	—		
5. Study 1 backup recipient completed taskwork	31.29	8.52	.20	−.17	.03	−.10	—	
6. Study 2 backup recipient completed taskwork	36.00	9.89	−.26*	−.48**	.55**	.22	.45**	—

Note. $N = 68$ teams.
[a] Dummy coded 0 = even, 1 = uneven.
[b] Dummy coded 0 = no backup advocate present, 1 = backup advocate present.
* $p < .05$ (two-tailed). ** $p < .01$ (two-tailed).

negative effect of backing-up behavior on subsequent backup recipient completed taskwork, as shown by the large negative slope, whereas the absence of a backup advocate nullified any effect of backing-up behavior at Time 1 on backup recipient completed taskwork at Time 2. These findings are consistent with our predictions and thus support Hypothesis 6.

General Discussion

As the results indicate, all six of the hypothesized relationships were supported. Taskwork completed by backup providers and taskwork completed by backup recipients were both significantly related to team performance, a finding that indicates the importance of taskwork completed by both of these roles. Our results indicate that backing-up behavior leads to both initial and subsequent costs to taskwork. Specifically, backing-up behavior was positively related to backup provider neglected taskwork. However, this negative relationship was moderated by workload distribution, such that backing-up behavior had an especially strong relationship with backup provider neglected taskwork when team workload was evenly distributed. Additionally, backing-up behavior at Time 1 was negatively related to backup recipient completed taskwork at Time 2, and this relationship was especially strong when a backup advocate was present.

Table 5
Study 2 Hierarchical Regression Analyses Regressing Backup Recipient Completed Taskwork (Time 2) on Backing-Up Behavior (Time 1) and Backup Advocate (Time 2)

	Study 2 backup recipient completed taskwork		
Predictor	Step 1	Step 2	Step 3
Study 1 backup recipient completed taskwork	.44**	.40**	.38**
Study 2 workload distribution[a]	.54**	.44**	.52**
Presence of backup advocate[b]		.01	−.04
Study 1 backing-up behavior		−.25*	−.07
Study 1 Backing-Up Behavior × Presence of Backup Advocate			−.27*
R^2	.50*	.55*	.59*
ΔR^2, Step 2		.05*	
ΔR^2, Step 3			.04*

Note. Values represent standardized regression coefficients. $N = 68$ teams.
[a] Dummy coded 0 = even, 1 = uneven.
[b] Dummy coded 0 = no backup advocate present, 1 = backup advocate present.
* $p < .05$ (two-tailed). ** $p < .01$ (two-tailed).

Implications for Theory and Practice

This study further enriches theory on the topic of backing-up behavior by including a more nuanced depiction of backing-up behavior over the course of time. Mitchell and James (2001) and Ancona, Goodman, Lawrence, and Tushman (2001) have made explicit calls for researchers to give greater consideration to time in their theory and research. We heed this advice by examining both the initial and subsequent costs of backing-up behavior. Previous research has indicated that backing-up behavior has the initial benefit of aiding backup recipients (Porter et al., 2003). As a result, team researchers and managers of teams were left with the assumption that teams should be encouraged to engage in backing-up behavior. However, there are initial costs that can occur from engaging in backing-up behaviors. Backup providers who allocate their resources toward backing up other team members may neglect their own taskwork. This cost is minimized when teams have uneven workload distributions, which indicates that

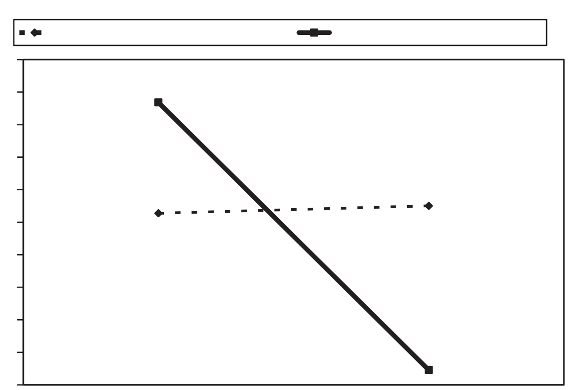

Figure 2. The moderating role of a backup advocate on the relationship between backing-up behavior and change in backup recipient completed taskwork.

teams may benefit overall from engaging in backing-up behavior in such contexts. In contrast, the costs of backup provider neglected taskwork are especially high when teams have even workload distributions, which indicates that teams may suffer overall if they engage in backing-up behavior when team members have equivalent workloads. Thus, theory considering backing-up behavior must be updated to include this important contextual influence.

Moreover, our study contributes to this literature by examining how backing-up behavior provided early in a team's life span influences taskwork in later tasks. This effect is perhaps more insidious and thus more difficult for teams to anticipate. Even if backing-up behavior is provided in legitimate contexts that minimize the costs to providers and maximize initial benefit to the team, it can come at the subsequent cost of decreased backup recipient motivation and taskwork. Thus, it is clear that researchers who examine the topic of backing-up behavior should consider both initial and subsequent effects of this behavior.

Researchers and managers of teams should keep these findings in mind when training teams. Our data suggest that teams should not be trained to unconditionally engage in backing-up behavior. We suggest that an important part of this training is that teams should be trained to recognize different types of workload distributions, such that they can provide backup only when it is warranted. Teams with such training can engage in backing-up behavior only when the situation calls for it.

Similarly, managers of teams should keep these findings in mind when they conduct performance appraisals. Research indicates that managers take into account extrarole behaviors—such as helping behavior—in performance appraisals, such that individuals who engage in greater levels of helping are generally rated higher than are those who perform fewer extrarole behaviors. To the extent to which performance appraisals reinforce past positive behavior, we expect that positively rated behaviors would become more likely in the future. This reinforcing effect suggests that if managers rate team members in part on the basis of backing-up behavior, they may encourage team members to engage in backing-up behavior, even when such actions may be detrimental to team performance.

Strengths and Limitations

There are two primary strengths to the design of this study. First, all of our variables were objectively measured. This design element stands in contrast to much of the literature on helping behavior, which generally relies upon supervisor ratings or self-reports. Objective measurement of the variables involved helped us to avoid methodological problems associated with self-report data. Second, we were able to objectively manipulate workload distributions in a manner that is nearly impossible to do in a field setting.

The fact that this study was conducted in a laboratory context may evoke questions regarding the external validity of the findings. Participants in this study were not randomly selected from any definable population but rather were college students who volunteered for the study. A second limitation that concerns the external validity of our findings relates to the task used in the current study. Although we believe that this task is representative of many kinds of interdependent team tasks that have a speed–accuracy trade-off (including the tasks that manufacturing teams, emergency medical teams, pit crews, air traffic controllers, and weapons directors need to perform), we technically cannot generalize the parameter estimates found in this study to all other tasks, because we did not select the task randomly from the entire population of team tasks. However, prior research has suggested that participants who engage in the task used in the current study do find it psychologically engaging (Hollenbeck et al., 2002). Moreover, participants were aware of the financial bonus that could be achieved by performing well on the task and were interested in winning the bonus money.

When assessing the relevance of external validity, Mook (1983) noted that one needs to keep the nature of the research question in mind. In this particular study, we were less interested in actual command and control situations than we were in developing and testing a model of backing-up behavior in teams. There are no boundary conditions or formal aspects of our conceptual model that would imply that the predicted relationships would not work in this specific context. Therefore, this context provides a legitimate venue within which to test theory. If the theory failed to work in this context, we would need to revise the theory to reflect unique aspects of this context. Moreover, Anderson, Lindsay, and Bushman (1999) noted that the correlation between effect sizes obtained in laboratory settings and field settings generally exceeds .70, a finding that indicates the similarity between hypothesis tests using field and laboratory studies.

Implications for Future Research

Future research should examine other conditions that alter the cost and benefit of engaging in backing-up behavior. Other contextual influences may be relevant to the cost and benefit of engaging in backing-up behavior. For example, it is likely that type of task is relevant, such that teams performing conjunctive tasks would benefit when the least capable member received backup, and teams performing disjunctive tasks would likely suffer when the most capable member engaged in backing-up behavior. Additionally, we suspect that individual differences may be relevant. For example, individuals high in ability may be better able to provide backup without a significant increase in their neglected taskwork.

Another important avenue for future research is the examination of other factors that can influence the strength of the influence of backing-up behavior on backup recipient taskwork conducted in future tasks. This is an especially important topic, because it is often necessary for teams to be able to engage in backing-up behavior when a legitimate need arises. As our study indicates, such teams will need to trade initial benefits for subsequent costs. However, researchers may find that characteristics of either the context or the team can mitigate this negative subsequent cost. Researchers may be able to draw further from research that examines dependency to determine how teams can provide backup without leading backup recipients to become dependent upon this aid.

Our study indicates that backup advocates can facilitate the dependence of backup recipients; thus, it highlights the contribution of backup advocates to a negative outcome associated with backing-up behavior. However, future research may reveal that having a backup advocate can also be associated with positive outcomes. For example, it may be that backup advocates can provide the benefit of ensuring that those who legitimately need backup are able to convince the rest of the team to allocate resources to them. In other words, in addition to finding, as we did, that the presence of a backup advocate can magnify the negative effects of receipt of backup, future researchers may find that the presence of a backup advocate can magnify other effects that are positive rather than negative.

Finally, just as our research has examined both initial and subsequent costs of backing-up behavior, future research should add to current theory, which examines the initial benefits of backing-up behavior by examining subsequent benefits of backing-up behavior. It may be that backing-up behavior provided early in a team's life span aids in the development of trust and cohesion at later points in time. It is clear from our study that time is an important factor in determining the effects of backing-up behavior. This knowledge should be applied both to recipients and providers and to benefits and costs, and it should be applied over initial and subsequent tasks.

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