
Team Performance

The Relationship between Interdependence and the Outcome of Decision Making

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Interdependence is considered to be one of the defining team characteristics that influence group performance. Existing studies show that the relationship between both task and outcome interdependence and performance is influenced by the interaction among group members. This study adds to the literature by testing the hypothesis that three process-related variables (cohesion, decision making behavior and team coping style) mediate the relationship between task and outcome interdependence and group decision making. Using data of 302 individuals organized into 47 teams, multilevel regression analysis shows that cohesion, integrative behavior and the problem-solving team coping style act as mediators. The results of this study suggest that the relationship between perceived team effectiveness and task interdependence is only mediated by effective (and, consequently, not by ineffective) team attitudes and behavior.

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1. Introduction

The fact that work groups and teams are taking an increasingly prominent place in organizations (Sundstrom, De Meuse & Futrell, 1990), resulted in more scientific attention for the role of groups in organizations, especially with regard to team effectiveness (e.g., Campion, Medsker & Higgs, 1993; Campion, Papper & Medsker, 1996; Cohen & Bailey, 1997; Farmer & Roth, 1998; Mathieu, Maynard, Rapp & Gilson, 2008). The interaction between group members is vital to organizational work (Van der Vegt, Emans & Van de Vliert, 1999), as it could have a significant impact on individual and/or team performance (e.g. Guzzo & Dickson, 1996). A prominent characteristic of teams that relates to this interaction, and that influences team outcomes, is interdependence; theory and research suggest that both task and outcome interdependence are positively related to various team or organizational outcomes, such as performance, effectiveness or decision-making outcomes (e.g., Allen, Sargent & Bradley, 2003; Campion et al., 1993; Campion et al., 1996; Gully, Incalcaterra, Joshi & Beaubien, 2002; Janssen, Van de Vliert & Veenstra, 1999; Saavedra, Earley & Van Dyne, 1993; Shaw, Duffy & Stark, 2000; Van der Vegt, Emans & Van de Vliert, 1996, 1999; Wageman, 1995; Wageman & Baker, 1997).

Yet, despite the scientific evidence for this well established relationship between interdependence and team outcomes, there is still a lot unknown about the *interaction process* between group members, even though evidence exists of process-related behavior playing a crucial role in the relationship between interdependence and team effectiveness (e.g. Janssen et al., 1999). Hence, to further explore the influence of other variables in the interdependence-performance relationship, this article investigates three team-level characteristics that might mediate the relationship between the two types of interdependence (task and outcome) and team effectiveness: the *feelings* of belonging of individual team members to the team (*cohesion*), the way employees *behave* within groups (*integrative* and *distributive behavior*) and the way team members as a group *cope* when the team encounters problematic situations (*team coping style*). Using multilevel regression analysis, we try to add to the literature of interdependence and provide additional insights into the influence of the proposed mediator variables on the relationship between interdependence and team performance. Given the fact that performance can be assessed in multiple ways since there is no uniform measure (Guzzo & Dickson, 1996; Mathieu et al., 2008), a performance indicator was chosen that reflected the outcomes of the interaction process within teams. Since performance data is relatively hard to obtain (see e.g., Alper, Tjosvold & Law, 2000; Somech, 2008) and decision making is a

prominent activity within teams (e.g., Cohen & Bailey, 1998), team effectiveness was therefore operationalized in this study as the perceived *outcomes of decision making*, measured in terms of quality, acceptance, understanding and commitment (see Janssen, Veenstra & Van de Vliert, 1996).

2. Theoretical background and hypotheses

2.1. Interdependence: task and outcome

Although different definitions and operationalizations exist (Van der Vegt & Van de Vliert, 2001), the concept of interdependence can be described as the extent to which the input of several individuals is required to complete a certain task, reach a specific goal or obtain a certain output, i.e. to “complete work” (Wageman, 1995). It can be considered a “defining characteristic of a group” (Allen, Sargent & Bradley, 2003, p. 717). Members of work groups that are interdependent are expected to “facilitate others’ task performances by providing each other with information, advice, help and resources” (Van der Vegt et al., 1999, p. 202). The level of interdependence among individuals organized in teams originate from a number of sources (Wageman, 1995): task inputs (e.g., the distribution of skills), work processes (i.e. how is work organized: interdependent or independent), goal definition and achievement, and, lastly, the way performance is rewarded. Although more forms are acknowledged (Campion et al., 1993), two different types of interdependence are generally distinguished (Van der Vegt & Van de Vliert, 2001; Wageman, 1995): task interdependence and outcome interdependence.

Task interdependence can be defined as the level in which “group members interact and depend on one another to accomplish the[ir] work” (Campion et al., 1993). Typically, task interdependence increases when work itself becomes more difficult and employees require a higher level of assistance from each other in terms of, for instance, materials, information or expertise (Van der Vegt, Emans & Van de Vliert, 2001). It describes the degree to which a task requires collective action (Wageman, 1995), and has reported effects on individual motivation and group effectiveness (Campion et al., 1993). In summary, task interdependence can be seen as a “structural feature of the instrumental relations that exist between team members” (Van der Vegt & Van de Vliert, 2001).

Outcome interdependence can be described as the extent to which team members “are dependent on each other at work” (Schippers, Den Hartog, Koopman & Wienk, 2003) and are provided group goals or receive group feedback (Van der Vegt & Van de Vliert, 2001; Wageman, 1995). The level of outcome interdependence within a team is determined by the degree to which the significant outcomes that an individual within a group receives, depend on the performance of other group members (Wageman, 1995). The term significant outcome can be defined in a number of ways, for example in terms of goal achievement (Wageman, 1995) or feedback and rewards (e.g., Campion et al., 1993; Shaw et al., 2000). As with task

interdependence, different levels of outcome interdependence can be observed within teams and between teams. For instance, the overall level of outcome interdependence between sales representatives is low, while that of blue collar workers at an assembly line is relatively high.

Interdependence is considered to be a concept that can be used to “accurately predict interactions among and effectiveness of team members” (Van der Vegt et al., 1999, p. 202). Within teams, employees depend on each other for the successful completion of their tasks. Both task and outcome interdependence influence the personal work outcomes of employees who contribute to the work of the team (Van der Vegt, Emans & Van de Vliert, 1998). Furthermore, the two forms of interdependence relate positively to (direct antecedents of) team effectiveness and performance (e.g., Campion et al., 1993; Molleman, 2009; Saavedra et al., 1993; Shaw, Duffy & Stark, 2000; Van der Vegt & Van de Vliert, 2001, 2005; Van der Vegt et al., 1999, 2000). It follows from the results of these studies that both task and outcome interdependence are positively associated with performance. It is therefore hypothesized that:

Hypotheses 1a and b: *There is a positive relationship between task (H1a) and outcome (H1b) interdependence and decision making.*

Although the two concepts are mutually independent (Wageman, 1995), there is a profound relationship between outcome and task interdependence. Authors have repeatedly found the different forms of interdependence to interact with one another. While there are some exceptions (e.g., Allen et al., 2003), most studies show that the positive and/or detrimental effects of one type of interdependence can be moderated by the other type (e.g., Saavedra et al., 1993; Wageman & Baker, 1997; Van der Vegt et al., 1996, 1999, 2001, 2003). For instance, Wageman and Baker (1997) found that groups performed better when both types of interdependence were either high or low; in turn, hybrid or mixed groups, with low task and high outcome interdependence or vice versa, had a detrimental result on performance. Similar results are reported by Saavedra et al. (1993), who tested the interaction between three types of interdependence. Therefore, it is postulated that the relationship between interdependence and perceived team performance is influenced by the interaction effect of task and outcome interdependence.

Hypothesis 1c: *The interaction effect between task and outcome interdependence is related to decision making; high-high and low-low combinations of task and outcome interdependence are more positively related than are high-low and low-high combinations.*

2.2. Interdependence, performance and the process in-between: mediation

Group performance, however, depends on more than work organization alone. Although interdependence affects team effectiveness (e.g. Van der Vegt et al., 1996), the processes by which group members interact have an impact on the outcomes of the decision making process as well (Alper, Tjosvold & Law, 1998). Moreover, previous research continuously showed process-related variables, such as task strategy (Saavedra et al., 1993), team conflict management (Somech et al., 2009) or behavioral processes of decision making (Janssen et al., 1999), to interfere in the interdependence-performance relationship. In other words, the organization of work, in terms of task and outcome interdependence, determines the behavior and attitudes in groups, which in turn determine the perceived group outcomes in terms of decision making effectiveness.

In this study, attention will be given to three such process-related variables that are proposed to mediate the relationship between interdependence and team effectiveness in decision making contexts: (1) cohesion, accounting for a group member's sense of belonging to his/her team, (2) integrative and distributive behavior, accounting for the behavioral interaction among individuals within a group, and (3) the team coping style, referring to the behavioral strategy of the team when team problems emerge.

Cohesion

The relationship between interdependence and cohesion has long been established, as cohesion positively relates to the level of interdependence (e.g., Barrick et al., 2007; Beal et al., 2003; Gully, Devine & Whitney, 1995). The concept of cohesion is defined in this study as team members' feelings of belonging to and being part of the team. It is considered as "an indicator of an individual's desire to remain a group member" (Evans & Dion, 1991, p. 175). Bollen and Hoyle (1990) state that cohesion consists of two components: (1) a sense of belonging and (2) feelings of morale, as a consequence of being part of a group (Bollen & Hoyle, 1990, p. 484). The extent to which team members sense comfort and a feeling of belonging relates positively to team effectiveness or the level of (team) performance (Beal et al., 2003; Evans & Dion, 1991; Gully et al., 1995; Mullen & Copper, 1994; Tekleab, Quigley & Tesluk, 2009; Wech, Mossholder, Steel & Bennett, 1998). Some authors described cohesion as an antecedent of performance (e.g., Chang & Bordia, 2001). Higher cohesion involves, for instance, friendship, trust and cooperation between group members (Andrews, Kacmar, Blakely & Bucklew, 2008), as well as increased individual helping behavior (Ng & Van Dyne,

2005) and higher collective responsibility for performance outcomes (Tjosvold & Deemer, 1980).

It is proposed that cohesion mediates the relationship between interdependence and the outcome of decision making. Beal et al. (2003), for instance, found that when the team workflow increased (i.e. more work and activities came into the team and members had to increasingly cooperate with each other as a team), the relationship between cohesion and performance became stronger. As been stretched by Wageman (1995), highly interdependent groups exhibit processes and behavior associated with cohesion, such as a high degree of high-quality social processes. Cohesion involves personal engagement in tasks and pleasure from working together (Wech et al., 1998). In other words, the organization of work in terms of interdependence is a premise for group members' sense of belonging, which in turn leads to a certain level of team effectiveness. Hence, it was hypothesized that:

Hypotheses 2: *The relationship between task (H2a) and outcome (H2b) interdependence and decision making is mediated by the cohesion of the team.*

Process of Behavior

Within a work group or team, the individual members interact with each other, thereby demonstrating specific types of behavior (or: behavioral strategies). The behavior between group members can be described as either integrative or distributive (Prein, 1976; Van de Vliert, 1990). *Integrative* behavior relates to the degree to which outcomes for all parties involved in decision making are maximized. It is associated with good team decisions (e.g., Janssen et al., 1999), is likely to produce positive outcomes for individuals and teams (Somech, 2008), and is positively related to performance (Somech, Desivilya & Lidogoster, 2009). Given the fact that both the interest of the individual team members and the interest of the team in general (in terms of their goals) are being provided for (Rahim & Magner, 1995), integrative behavior is considered to be effective. Conversely, *distributive* behavior is aimed at maximizing *unequal* outcomes; low distributive behavior is associated with avoiding and giving in to others (Janssen et al., 1999), while high distributive behavior is aimed at uncooperative 'competing' behavior (e.g., Somech et al., 2009), frustrating the interaction between group members, such as the decision making process. Distributive behavior is therefore ineffective, since this type of behavior forces some to conform themselves to the opinion of others, thus decreasing the likelihood of considering other options (see also Janssen et al., 1996; Janssen et al., 1999). This has a detrimental effect on team effectiveness (e.g., Alper et al., 1998).

Previous authors have found evidence for the mediation by integrative and/or distributive behavior of the relationship between forms of interdependence and (measures of) team performance (e.g., Janssen et al., 1999; Somech, 2008; Somech et al., 2009). The type of elicited behavior (i.e., integrative or distributive) will affect team effectiveness: integrative behavior (i.e., working together) will show a positive influence on performance, while the display of distributive behavior (i.e., working independently in a non-cooperative way) will negatively affect perceived team effectiveness in decision making contexts (e.g., Blake & Mouton, 1964, 1970; Janssen et al., 1996; Janssen et al., 1999; Thomas, 1992; Tjosvold & Deemer, 1980; Van de Vliert, Euwema & Huismans, 1995). It was therefore hypothesized that:

Hypotheses 3: *The relationship between task (H3a) and outcome (H3b) interdependence and decision making is mediated by integrative behavior within a team.*

Hypotheses 4: *The relationship between task (H4a) and outcome (H4b) interdependence and decision making is mediated by distributive behavior within a team.*

Coping style

Where the behavioral strategies discussed in the previous paragraph focused on behavior between team members under more or less 'neutral' (i.e. non-stressful) circumstances, the coping style refers to the behavioral strategies of the whole team when the team and its members are faced with problematic situations. Coping can be defined as the 'cognitive and behavioral efforts made to master, tolerate, or reduce external and internal conflicts among them' (Folkman & Lazarus, 1980). Specifically, it is about the use of strategies handling potentially stressful situations (problem-focused coping), and dealing with the (negative) emotions that accompany these situations (see Aldwin & Revenson, 1987; Carver, Scheier & Weintraub, 1989). An example of such a stressful situation could, for instance, be the occurrence of conflict with another individual. In general, individuals have a number of possibilities to 'cope' with unwanted situations. It could be argued that the same applies at a higher level, as teams can come across similar team-related situations as well, such as the dysfunctioning of the whole team or one of its members, or the reorganization or even dissolution of the team. The team coping style is, in other words, about the team strategies used when team members collectively solve team-related problems.

Based on the literature on individual coping (e.g., Folkman & Lazarus, 1980; Latack & Havlovic, 1992), two general coping styles are identified that relate to group behavior in problem situations: to confront and to avoid. The *confronting* coping style relates to direct

problem-solving behavior: the team devotes all its resources to solving the problem. By creating a plan, identifying possible solutions and gradually working towards a solution, the problem is being handled. Previous research has shown that this rational, problem-focused style is the most effective, if there are sufficient possibilities to control the situation (Terry, Tonge & Callan, 1995). In contrast to the confronting coping style, in which team members try to actively solve the problem at hand, a second style can be identified in which the opposite behavior can be observed: the *avoiding coping style*. This dimension is characterized by the solitary attitude of team members, and detachment or keeping at distance of the problematic situation (e.g., Latack & Havlovic, 1992). The team stops operating as a whole when problems arise and will turn its attention elsewhere, while individual team members focus their attention on other work, or engage in problem-solving behavior. Therefore, it was hypothesized that:

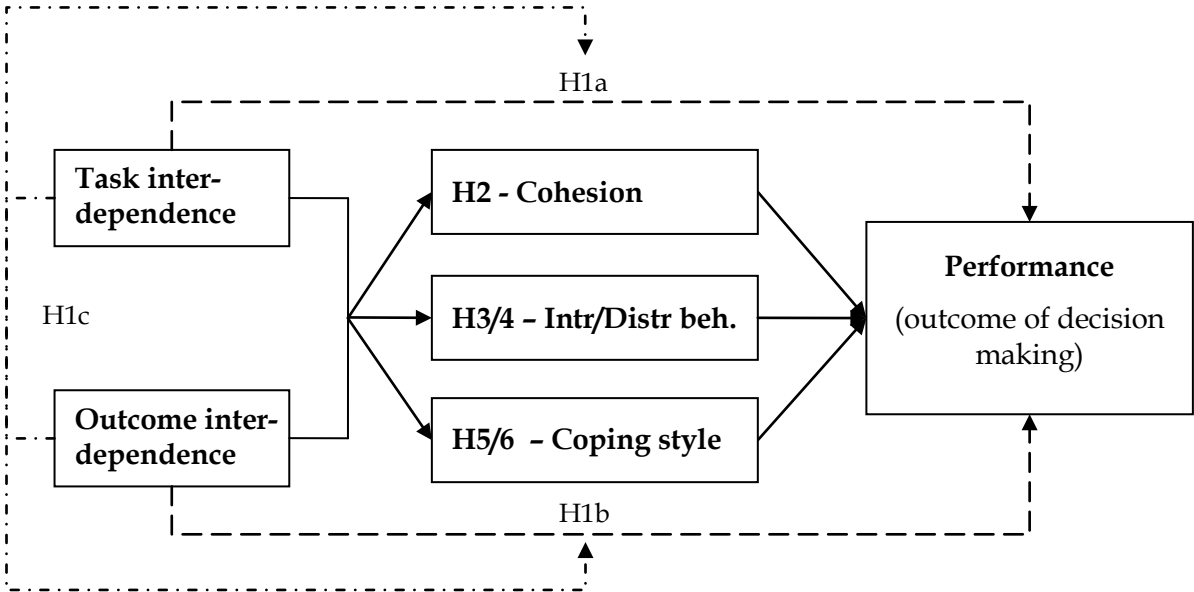
Hypotheses 5: *The relationship between task (H5a) and outcome (H5b) interdependence and decision making is mediated by the confronting coping style.*

Hypotheses 6: *The relationship between task (H6a) and outcome (H6b) interdependence and decision making is mediated by the avoiding coping style.*

2.3. The research model

Based on the extensive theoretic elaborations in the previous paragraphs, the expectations that have been presented are summarized in the following model.

Figure 1
Theoretical Model



3. Method

3.1. Sampling: participants and procedure

A total of 32 public-, hybrid- and private-sector organizations based in the Netherlands participated in this study, including (but not limited to) manufacturing organizations (e.g., electronics), construction firms, government agencies and service organizations, such as insurance, telecommunications or health care. Data were collected from 302 randomly chosen, full-time employees from 47 teams; the types of teams under study comprised work teams, management teams, project teams and participation councils. Teams ranged in size from 3 to 16 employees; on average, a group contained 6.43 members (SD = 2.92). Each team was asked by management to complete the survey; respondents were assured confidentiality and anonymity by the researchers. The sample comprised of 47.2% males, with respondents' mean age being 39.31 (SD = 9.49). Individual members had been part of their current team for an average of 3.25 years (SD = 3.19) and had an average work experience of 14.92 years (SD = 9.14).

3.2. Measures

Considering the sample size, separate factor analyses were run for all variables, with the conventional .30 loading used as the cut-off point. All items were rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Predictors – Task interdependence (four items) and outcome interdependence (three items) was assessed using measures developed by Van der Vegt et al. (1996). Factor analysis with varimax rotation and principal component of the seven items revealed the expected two-factor structure. For task interdependence, participants were asked to report the extent to which they needed information, material and other resources from team members to perform their tasks. An example of one of the selected items for task interdependence is: “We need each other in order to achieve our goals”. For outcome interdependence, participants were asked to report the extent to which getting team results was dependent on the joint efforts of the individual team members. For example, “If my colleagues do their work properly, I will benefit greatly from their efforts.” Cronbach's alpha for task interdependence was .76; for outcome interdependence it was .72.

Cohesion – For cohesion, participants were asked to report their feelings of belonging to and being part of the team. Respondents' perception of cohesion was measured with four items adapted from the Perceived Cohesion Scale developed by Bollen and Hoyle (1990). An

example of an item used is “I’m satisfied that I am part of this team.” Cronbach’s alpha for cohesion was .92.

Integrative and distributive behavior – Integrative (six items) and distributive (four items) decision-making behavior was assessed using measures derived from Janssen et al. (1996). Factor analysis with varimax rotation and principal component of the ten items of conflict behavior revealed the expected two-factor structure. Examples of items that were used for the conflict behavior scales are “we collect various ideas and integrate these in the best solution possible” (integrative) and “we try to force our own opinion on others” (distributive). Cronbach’s alpha for integrative behavior was .76, for distributive behavior it was .77.

Coping style – To assess the preferred coping style that was used by a team, participants were presented a scenario and were asked to report how their team would deal with situations like the one that was described in the scenario. In order to select a scenario team members could identify with, a pilot study was conducted in which four scenarios simulating four team-related problems¹ were presented. In this pilot, 28 team members from four different teams were asked to evaluate the four scenarios in terms of recognisability, intensity and impact if the prescribed situations were to become reality. Based on the results, one scenario was selected and then used in the questionnaire that was provided to the members of all the teams incorporated in this study. In order to measure the team’s coping style, 12 new items were developed that were derived from measures on individual coping (e.g., Folkman & Lazarus, 1980; Latack & Havlovic, 1992). The items encompassed two different coping styles: to confront (i.e. to solve the problem) and to avoid (i.e. to evade or ignore the problem as a team, or to solve the problem on an individual basis). The confronting style (four items) was measured using items like “the team focuses all its attention on solving the problem” and “the team will try to change the situation step by step.” The tendency to avoid problems (eight items) was measured using items like “as soon as the problem is brought up, the team will talk about something else” and “most team members will try to change the situation on their own.” Cronbach’s alpha for the confronting coping style was .87, for the avoiding coping style it was .85.

Dependent variable – The outcome of decision making (11 items) was assessed using a scale that is adapted from Janssen et al. (1996). Examples of the selected items were “the

¹ The four scenarios that were used encompassed (1) a dysfunctioning team member, (2) a new team member spilling the beans to outsiders, (3) the team’s struggle to formulate goals and strategy, and (4) an image problem within the company due to the team’s dysfunctioning.

quality of the decisions is of the highest level this team can ever possibly reach” and “team members are fully behind the decisions that have been taken.” Cronbach’s alpha for this measure was .89.

3.3. Analyses

Hierarchical multilevel regression analysis was used to test the all hypotheses. In the first model, the two types of interdependence were entered. Subsequently, the two-way interaction term of both forms of interdependence was added in the second model. As suggested by Cohen, Cohen, West and Aiken (2003), the conventional method of ‘mean centering’ was applied in order to avoid problems concerning multicollinearity (Cohen, Cohen, West & Aiken, 2003). In the third model, one of five mediators was entered each time: cohesion (M3a), integrative (M3b) and distributive (M3c) behavior, and the confronting (M3d) and the avoiding (M3e) coping style respectively. In assessing the proposed mediator effects, the three-step procedure proposed by Baron and Kenny (1986) was followed. The first step prescribes that the predictor variables (task and outcome interdependence) should be significantly related to the mediator variable (e.g. cohesion). In the second step, the predictors should be related to the dependent variable (outcome of decision making). The third step stipulates that the mediator should be related to the dependent variable, under the condition that the predictor is included in the equation. For mediation to occur, however, the relationship between the predictor and the dependent variable in the third step should be (1) significantly reduced (for partial mediation) or should be (2) zero (for complete or perfect mediation). In order to assess whether the indirect effect decreases significantly in the case of partial mediation, a method suggested by Sobel (1982) was conducted.

To assess whether it was valuable or not to give attention to the group level, the intraclass correlations (ICC, Bliese, 1998, 2000; Bliese & Halverson, 1998) were calculated in order to determine which part of the total variance could be explained by differences within teams compared to differences between teams. ICC(1) for all variables revealed scores between .22 (cohesion) and .35 (outcomes of decision making)², indicating that roughly 20-35 percent of the total variance of every single variable could be explained due to team membership. These results justify the use of multilevel regression analysis.

² The exact ICC(1)’s are as follows: task interdependence (.33), outcome interdependence (.30), cohesion (.22), integrative behavior (.29), distributive behavior (.34), confronting coping style (.28), avoiding coping style (.29), outcome of decision making (.35).

4. Results

4.1. Common Method Variance

Since all variables are self-reports and collected from single respondents, results can be potentially influenced by the occurrence of common method variance. To diminish or control the extent to which the common method can occur, a number of statistical procedures were implemented: (1) Harman's single-factor test, (2) confirmatory factor analysis and (3) what is referred to as the *single-latent-method-factor approach* (Podsakoff, MacKenzie, Lee & Podsakoff, 2003).

Harman's single-factor test revealed ten factors when factor analyses with an eigenvalue greater than 1 cut-off criterion and a variety of both extraction methods and rotation options were conducted on all items (cf. Podsakoff & Organ, 1986; Podsakoff, Todor, Grover & Huber, 1984; Schriesheim, 1979). These results indicate that common method bias has limited influence on the data used in this study, since no general factor was apparent. Subsequently, a confirmatory factor analysis (CFA) was conducted in order to determine whether or not each of the proposed factors fitted their associated questionnaire items. The results of this CFA showed a good fit of the proposed model to the data: $\chi^2(874) = 2677.66$, RMSEA = .085, CFI = .94, SRMR = .066, GFI = .70. Cut-off criteria for these fit indexes are (with a preferable sample size of ≥ 250): a value close to .08 for SRMR; a value close to .06 for RMSEA and a value close to .95 for CFI (Hu & Bentler, 1999). A single-latent-method-factor approach revealed a good fit to the data as well: $\chi^2(822) = 2332.93$, RMSEA = .080, CFI = .95, SRMR = .063, GFI = .67. In both analyses, all items retained significant loadings on their associated factors. The results of the three analyses conducted showed that the influence of common method variance is statistically not substantial, and that the answers respondents gave on the items reflected the underlying constructs these items were intended to measure.

4.2. Descriptive statistics

Means, standard deviations, and correlations among the variables are reported in Table 1. In accordance with the hypotheses, there is a relationship between both forms of interdependence and the proposed mediator variables of cohesion, integrative behavior and the confronting coping style. Additionally, task interdependence relates negatively with the avoiding coping style ($r = -.13, p < .05$). All mediators show a significant relationship with the dependent variable, the outcome of decision making. As can be seen in Table 1, however, some results are not in accordance with the predictions: distributive behavior does not

significantly relate with either task interdependence ($r = -.06$, n.s.) or outcome interdependence ($r = -.07$, n.s.), while the relationship between outcome interdependence and the avoiding coping style is not significant either ($r = -.07$, n.s.).

Table 1
Means, Standard Deviations, and Correlations – Individual-Level Data ($n = 302$)^{a b}

Variable	<i>M</i>	<i>SD</i>	1	2	3	4a	4b	5a	5b	6
1. Task interdependence	3.76	.85	(.76)							
2. Outcome interdependence	3.34	.91	.58**	(.72)						
3. Cohesion	4.04	.87	.45**	.35**	(.92)					
4a. Integrative behavior	3.34	.72	.23**	.12*	.30**	(.76)				
4b. Distributive behavior	2.29	.85	-.06	-.07	-.30**	-.40**	(.77)			
5a. Confronting coping style	3.59	.89	.20**	.17**	.43**	.42**	-.41**	(.87)		
5b. Avoiding coping style	2.21	.72	-.13*	-.07	-.44**	-.38**	.51**	-.69**	(.85)	
6. Decision making outcomes	3.34	.70	.21**	.21**	.52**	.51**	-.50**	.61**	-.52**	(.89)

* $p < .05$. ** $p < 0.01$.

^a The reliabilities of the scales are reported on the diagonals between brackets.

^b Problems concerning multicollinearity are avoided given the fact that all correlation coefficients are below .70.

4.3. Tests of Hypotheses

The results of the multilevel regression analysis are presented in Table 2 (step 2 and 3 of Baron and Kenny); Table 3 gives an overview of the *b* values of task and outcome interdependence when regressed on each of the mediators (step 1 of Baron and Kenny). The first column (M0) shows the null model, indicating that 24 percent of the total variance of the dependent variable is explained at the higher level and 76 percent at the employee level.

In the second column (M1), attention is given to the first set of hypotheses, which related to the positive relationship between interdependence and decision making. When the two forms were entered in the first step of the regression equation (see Table 2, Model 1), both task interdependence ($b = .141$, $p < .01$) and outcome interdependence ($b = .102$, $p < .05$) related significantly to the outcome of decision making. Therefore, both H1a and H1b are supported. Furthermore, it was proposed that outcome interdependence was a possible interaction of the relationship between task interdependence and the dependent variable, or vice versa (H1c). As can be seen in Table 2, this proposition was tested by entering the main effects in the first model and adding the interaction effect in the second model. The proposed interaction effect could not be confirmed, however, since the interaction term of both types of interdependence was not significant when added into the equation ($b = .087$, n.s.).

The second set of hypotheses postulated that the relationship between the outcome of decision making and task (H2a) and outcome (H2b) interdependence is mediated by cohesion. For task interdependence, the first two steps of Baron and Kenny are confirmed:

task interdependence relates significantly to both cohesion (see Table 3; $b = .456, p < .001$) and the outcome of decision making (see Table 2: $b = .141, p < .01$). Step 3 is also satisfied (see Table 2, Model 3a): after cohesion ($b = .349, p < .001$) is entered into the equation, task interdependence becomes non-significant ($b = -.024, n.s.$). Therefore, complete mediation is in order, and H2a was accepted. For outcome interdependence only steps 2 and 3 can be fulfilled: outcome interdependence relates significantly to the dependent variable ($b = .102, p < .05$) and this effect becomes non-significant when controlled for cohesion ($b = .069, n.s.$). As can be seen in Table 3, step 1 is not satisfied, however, since the b value of outcome interdependence when regressed on cohesion is not significant ($b = .114, n.s.$). Therefore, H2b was not accepted. Given these results, cohesion only fully mediates the relationship between task interdependence and decision making.

Table 2
Multilevel Regression Analysis (fixed effects) - Individual-Level Data ($n = 302$)

Variables	M ₀	M ₁	M ₂	M _{3a}	M _{3b}	M _{3c}	M _{3d}	M _{3e}	M _{all}
Step 1									
Intercept	3.384***	2.524***	2.517***	1.771***	1.278***	3.334***	1.469***	3.492***	.939
Task interdependence		.141**	.146**	-.024	.074	.107**	.056	.096*	-.047
Outcome interdependence		.102*	.089	.069	.094*	.096*	.048	.113**	.069*
Step 2									
Task x Outcome interdep.			.087	.139***	.075	.071	.144***	.109**	.097***
Step 3									
Cohesion				.348***					.189***
Integrative behavior					.441***				.219***
Distributive behavior						-.315***			-.117**
Confronting coping style							.408***		.294***
Avoiding coping style								-.403***	.009
Between team variance	.122	.090	.031	.030	.033	.039	.028	.032	.008
Within team variance	.379	.249	.215	.062	.061	.107	.063	.102	.013
Model fit (-2 Restricted Log Likelihood)	617.3	657.8	674.5	965.9	926.1	704.8	781.9	717.7	1591

* $p < .05$. ** $p < 0.01$. *** $p < 0.001$

The third set of hypotheses postulated integrative behavior as a mediator between task (H3a) or outcome (H3b) interdependence and the outcome of decision making. Also in this instance, complete mediation is in order for task interdependence (see Table 2, Model 3b): task interdependence significantly relates to both integrative behavior (see Table 3; $b = .149, p < .05$) and the outcome of decision making (steps 1 and 2), while the b value of task interdependence is non-significant ($b = .074, n.s.$) when controlled for integrative behavior ($b = .441, p < .001$), thus satisfying step 3. Therefore, hypothesis 3a is accepted. Conversely,

hypothesis 3b was not accepted, as (1) step 1 was not fulfilled, because outcome interdependence did not significantly relate to integrative behavior (see Table 3; $b = .003$, n.s.) and (2) the b value of outcome interdependence stayed significant ($b = .094$, $p < .05$), while the indirect effect turned out not to be significant according to Sobel's (1982) test, thus not satisfying step 3. Therefore, it can be concluded that integrative behavior only mediates the relationship between task interdependence and the outcome of decision making.

Hypotheses 4a and 4b proposed that distributive behavior would mediate the relationship between task or outcome interdependence and the outcome of decision making. Table 1 already showed the non-significant zero-order correlation between task and outcome interdependence and distributive behavior ($r_{Ti} = -.06$, n.s.; $r_{Oi} = -.07$, n.s.). Table 3 furthermore shows the non-significant b values of task and outcome interdependence when regressed on distributive behavior ($b_{Ti} = -.051$, n.s.; $b_{Oi} = -.059$, n.s.), therefore failing to satisfy step 1. In Table 2, significant values are moreover reported when controlling for distributive behavior (see Table 2: $b_{Ti} = .107$, $p < .01$; $b_{Oi} = .096$, $p < .05$), thus not fulfilling the requirements for step 3. Therefore, neither hypothesis was accepted.

Table 3
Interdependence Regressed on Mediators (b values) - Individual-Level Data (n = 302)

<i>Variables</i>	cohesion	integrative	distributive	confronting	avoiding
Task interdependence	.456***	.149*	-.051	.188**	-.105
Outcome interdependence	.114	.003	-.059	.075	-.042

* $p < .05$. ** $p < 0.01$. *** $p < 0.001$

In hypotheses 5a and 5b it was suggested that the relationship between the outcome of decision making and task and outcome interdependence was mediated by the confronting coping style. As can be seen in Table 3, the b value of task interdependence is significant when regressed on the confronting coping style ($b = .188$, $p < .01$), thus fulfilling the requirements for step 1. Furthermore, the results in Table 2 demonstrate that task interdependence is significantly related to the outcome of decision making, while the b value of task interdependence is non-significant ($b = .056$, n.s.) when controlled for the confronting coping style ($b = .408$, $p < .001$), thus satisfying steps 2 and 3. Hypothesis 5a was therefore accepted. Hypothesis 5b on the other hand was not accepted, considering the non-significant b value of outcome interdependence when regressed on the confronting coping style ($b = .075$, n.s.), failing to meet the requirements for step 1. Given these results, the confronting coping style does completely mediate the relationship between task interdependence and the outcome of decision making.

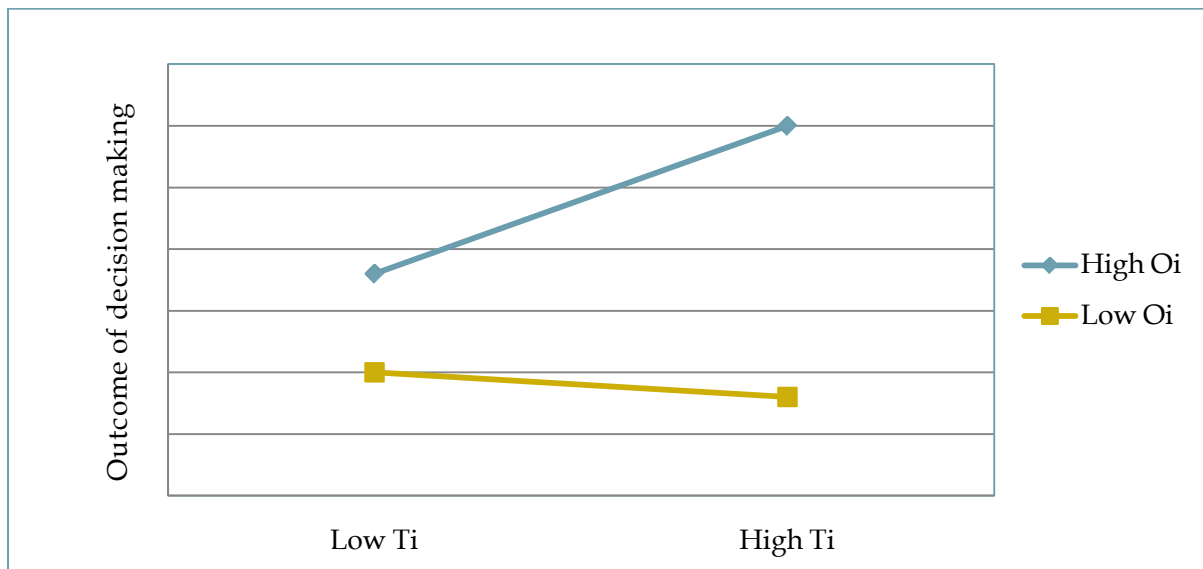
Hypotheses 6a and 6b postulated a mediating effect of the avoiding coping style in the relationship between task and outcome interdependence and the outcome of decision making. Table 3 demonstrates that the b values of task and outcome interdependence are not significant when regressed on the avoiding coping style ($b_{Ti} = -.105$, n.s.; $b_{Oi} = -.042$, n.s.); hence, step 1 is not fulfilled. Furthermore, as can be seen in Table 2 (Model 3e), multilevel regression analysis revealed that both task and outcome interdependence still significantly related to the outcome of decision making ($b_{Ti} = .096$, $p < .05$; $b_{Oi} = .113$, $p < .01$) after controlling for the avoiding coping style ($b = -.403$, $p < .001$); Sobel's (1982) test revealed that the indirect effect was not significant, therefore not satisfying step 3. Hence, both hypotheses 6a and 6b were not accepted. Overall, these results show that the relationship between either form of interdependence and decision making is not mediated by the avoiding coping style.

When all mediators were entered into the third equation (see Table 2), 62 percent of the variance in the outcomes of decision making can be explained through the proposed model at the individual level, and 38 percent at the group level. This can be compared to the null model, in which 24 percent of the total variance of the dependent variable is explained at the higher level and 76 percent at the lower, employee level. Also, the intercept became insignificant in the last model, indicating that the variables in the proposed model account for a solid explanation of the performance indicator. It should be noted however that the -2 Restricted Log Likelihood increased, indicating less fit compared to the initial model.

4.4. The interaction effect of task and outcome interdependence

Although the two-way interaction term was initially not significant (Table 2, Model 2), it developed into a significant interaction effect in three instances (four when the total model is taken into account). Table 2 demonstrates that the interaction effect turns out to be significant when cohesion or a team coping style is entered into the equation. This effect is also known as a suppressor variable (MacKinnon, Krull & Lockwood, 2000), which is a variable "which increases the predictive validity of another [set of] variable[s] ... by its inclusion in a regression equation" (Tzelgov & Henik, 1991, as cited by MacKinnon et al., 2000). Since the avoiding coping style turned out not to be a mediator in the relationship between both forms of interdependence and the outcome of decision making, attention will subsequently be given to the two cases in which mediation *was* found: cohesion and the confronting coping style (see Table 2, Model 3a and 3d).

Figure 2
Interaction Effect (Task Interdependence x Outcome Interdependence)



The interaction effect in the case of cohesion as a mediator is depicted above; in both cases of mediation the effect developed a similar pattern. As can be seen in Figure 2, there is no difference between combinations of low outcome interdependence with either high or low task interdependence on the performance indicator. There is, however, an increased effect on the outcome of decision making under the condition of high task and high outcome interdependence; combinations of both high task and outcome interdependence yield the best results on perceived team performance in terms of the outcome of decision making.

5. Discussion

5.1. Findings

Building on the extensive theory of interdependence, it was hypothesized in this study that the relationship between task and outcome interdependence and performance – in terms of the outcomes of decision making – was mediated by several characteristics that would be involved in the interaction process between employees: cohesion, integrative and distributive behavior, and team coping style. Although prior research has given attention to some of these interaction-related variables in relation to performance, this study is the first that combined these variables into one research design, and subsequently tested them using multilevel regression analysis. The results indicate that the propositions regarding the extent to which the relationship between different forms of interdependence and the outcomes of decision making is mediated by the three team-level attributes, are partially confirmed.

Support was found for the proposition that the relationship between task interdependence and the outcomes of decision making is completely mediated by cohesion (H2a), integrative behavior (H3a) and the confronting coping style (H5a). Based on the results that have been found in this study regarding task interdependence, one could conclude that within groups, the outcomes of decision making are largely based on the way effective or constructive behavior is shown. Feelings of belonging to the team, integrative behavior and the confronting coping style aimed at solving collective team problems all appear to be of primary importance in the extent to which these outcomes are perceived as being positive (i.e. to what extent more commitment, perceived quality, understanding and acceptance are observed by the respondents). The mediating influence of cohesion is particularly conspicuous, since earlier studies primarily identified high levels of task interdependence to *moderate* the relationship between cohesion and performance (see e.g. Gully et al., 1995). A high level of task interdependence led to a stronger relationship between cohesiveness and performance (Beal et al., 2003). This effect can be partially located in the significant two-way interaction term of interdependence: high task and high outcome interdependence leads to higher performance. The results in this study indicate, however, that the feeling of belonging to and being part of a team in decision making contexts are also determined by the level of task interdependence.

No support was found that distributive behavior (H4a and H4b) or the avoiding coping style (H6a and H6b) mediated the relationship between interdependence and the perceived effectiveness of decision making. Both variables were perceived by respondents as

relatively absent, considering the reasonably low ratings they received in this study, with a mean score close to two (i.e., 'disagree'). Task interdependence did correlate somewhat substantially with the avoiding coping style, but the zero-order correlations between task interdependence and distributive behavior, and between outcome interdependence and both distributive behavior and the avoiding coping style, moreover, revealed no significant relationship. Ineffective behaviors and attitudes do affect performance (as the analyses in this study have shown), but interdependence is not their antecedent in decision making contexts. Interdependence can possibly moderate the relationship between these ineffective behaviors and attitudes, and decision making outcomes. For instance, earlier studies have established such a relationship between integrative and/or distributive behavior and interdependence (see e.g. Janssen et al., 1999; Somech, 2008); these are effects that have not been tested for in this study.

Furthermore, no support was found for the thesis that the relationship between outcome interdependence and the outcomes of decision making is mediated by either cohesion (H2b), integrative behavior (H3b), or the confronting coping style (H5b). Outcome interdependence does, however, significantly relate to the outcome of decision making. Besides this direct effect on team decision making effectiveness, outcome interdependence does play a role (albeit minor) in the interaction effect between task and outcome interdependence. The significant two-way interaction term of interdependence acts as a suppressor variable when cohesion and the confronting coping style were entered into the regression equation. The perceived effectiveness of decision making is in that case the highest under the condition of high task and high outcome interdependence. This result is not very surprising, given the fact that this level of interdependence implies that team members are forced upon each other. Therefore, frustrating the decision making process or each other, or avoiding team related problems altogether, is not an option given the effects this has on team performance.

Some authors already pointed out the close relationship between both forms of interdependence, where the relationship of one form of interdependence with another variable is influenced by the other (e.g., Saavedra, 1993; Van der Vegt et al., 1999, 2000). These studies report that congruent task and outcome interdependence (i.e., high-high and low-low combinations) lead to positive team outcomes. Detrimental effects are observed when incongruent combinations of interdependence (i.e., low-high or high-low) are attained (Van der Vegt & Van de Vliert, 2001). In this case, however, there was only found evidence for the high-high interaction effect; compared to this reported high-high effect, the low-low

interaction condition did not lead to higher perceived performance. In fact, it made no difference if low outcome interdependence was combined with either high or low task interdependence; high outcome interdependence turned out to have a positive effect on performance nonetheless, even in the low task interdependence condition. Somech (2008) reported the same interaction effect between high task and high goal interdependence when studying school teams: high-high combinations elicited higher team performance, while low-low or high-low did not lead to higher performance. It seems as if the interaction effect is dependent on the context in which it is studied, considering the varying number of theoretical models (and variables) that are being tested, as well as the relatively large variety in performance indicators (e.g., job satisfaction (Van der Vegt et al., 2001); supervisory effectiveness ratings (Alper, Tjosvold & Law, 2000; Somech, 2008); decision quality (Janssen et al., 1999); self reports on team effectiveness (Van der Vegt et al., 1999); measuring actual output (Campion et al., 1993); etc.). Task interdependence moderates the relationship between outcome interdependence and another variable under some conditions, while the effect is reversed in other instances. For decision making, under the condition of effective team behaviors and attitudes, high-high combinations of interdependence yield the best results.

5.2. Strengths & Limitations

This study has several strengths, as well as a few minor limitations. In the first place, this study contributed significantly to the literature concerning interdependence and performance in decision-making contexts. The model proposed in this study explained up to 62 percent of the variance at the individual and 38 percent of the variance at the group level, and made the interdependence-performance relationship more sophisticated by identifying crucial mediators that affect this relationship. Second, this study provided additional insights into the possible relationship between the two forms of interdependence with regard to decision making, since primarily high outcome interdependence in combination with high task interdependence proved to be beneficial for perceived team effectiveness in terms of decision making outcomes. The limitations include the use of self-reports, which could potentially result in common method bias. Although numerous statistical procedures (cf. Podsakoff et al., 2003) were applied to test for the effects of common method variance, it is advisable to collect data from different sources nonetheless. Future studies could, for instance, include performance measures of other referents (e.g. team managers) instead to further minimize statistical anomalies. A second limitation concerns the use of the scenario

specifically used in this study to assess the different coping styles. Although the selected scenario was carefully chosen based on a pilot-study procedure, it is not unimaginable that other scenarios (e.g., involving internal rather than external team related problems) would elicit different responses, thus resulting in slightly different outcomes, for example with regards to the selected team coping style or the perceived decision making effectiveness.

5.3. Theoretical implications and future research directions

The finding that the relationship between task interdependence and the perceived effectiveness of decision making is mediated by cohesion, integrative behavior and the way team members cope with difficult situations, has important theoretical implications. The relationship between interdependence and decision making has been further unraveled, thereby further sophisticating the empirical evidence. As the results in this study have shown, the process and circumstances in which team members engage in decision making explain a lot more variance at the group level than a mere work characteristic, such as interdependence, does by itself. Although work organization and dependability are important predictors of perceived team effectiveness in decision making contexts, this causal relationship is inferior to the more sophisticated model introduced in this study. This implies the use of an integral perspective, thereby including team dynamics in future research when looking at perceived team effectiveness in decision making contexts.

The results of this study further demonstrate that less effective behavior (in terms of distributive behavior and avoiding the problem as a team) plays no role in the relationship between interdependence and the outcome of decision making. This is a remarkable finding, given the fact that there is much conflict oriented evidence pointing at what could be labeled unconstructive or ineffective behavior (e.g., specific conflict-related behaviors) that either positively or negatively affect performance (e.g., Jehn, 1995, 1997; Amason & Schweiger, 1997; Janssen et al., 1999; Jehn & Mannix, 2001; Somech, 2008). A feasible explanation for the absence of the influence of those 'ineffective' behaviors and attitudes in this study would be the *frequency* of occurrence of problematic situations and related behaviors within the team. These are effects that have not been incorporated into this study. Potentially, different patterns emerge when groups with a high frequency of difficult situations are compared with low-frequency groups. It is possible that teams who encounter problems on a regular basis adopt different coping styles or different decision-making behaviors. Future scholars might explore this line of research further to provide additional insights into the interdependence-performance relationship.

With regard to effective attitudes and behavior, it is only the relationship between task interdependence and decision making that is mediated. In this study, outcome interdependence only plays a minor role; in two instances (i.e. with cohesion and the confronting coping style) the combination of high task and high outcome interdependence leads to better outcomes of decision making in terms of increased efficiency, commitment and quality. An explanation for these findings could be that the selected process-related mediators in decision making contexts are mainly based on *task* organization (i.e. the level of task interdependence). The two-way interaction term already revealed that outcome interdependence only affects the outcome of decision making under some conditions, indicating that outcome interdependence seems of secondary importance in those work processes. An explanation for this could be that outcome interdependence is more affected by individual input and not so much by team-related processes. For instance, Wageman (1995) reported that task interdependence influenced variables related to (team) cooperation, while outcome interdependence related to effort. Future research could further address the relationship between perceived team effectiveness and outcome interdependence.

To sum up, this study's results show that multiple process-related factors influence perceived team performance in decision making contexts. Although interdependence may still be considered an important and defining characteristic of groups (that is moreover closely related with performance), cooperative interaction and behaviors of team members play a crucial mediating role, as this study has shown.

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