

## An Inter- and Intraindividual Perspective of the Substitutability of Fairness Rules for Trust Within Teams

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The present study longitudinally assesses fairness allocation rule importance and equity allocation preference under conditions of evolving team trust. We predicted an interchangeable relationship between trust and allocation rules using an uncertainty management theory framework (Lind & Van den Bos, 2002; Van den Bos & Lind, 2002). From an interindividual perspective, lower initial trust toward team members predicted a higher degree of importance for the use of preferred allocation rules and greater use of the equity heuristic. An intraindividual change in trust predicted an inverse change in use of the equity heuristic, but not the expected change in allocation rule importance. Implications of these results for future research and practice are discussed.

Contemporary organizations increasingly base rewards on collective performance to encourage employee cooperation and team effectiveness. For example, the number of Fortune 1000 companies using group- or team-based incentives increased from 59% in 1990 to 85% in 2005 (O'Toole & Lawler, 2006). Yet, from the perspective of team members, pay based on collective performance can carry too much uncertainty, particularly if confidence in one's team members is lacking. For, in contrast to traditional individual-based incentives, team-based incentives force members to rely on the performance of others, a situation that, by definition, introduces greater uncertainty into members' subjective calculation of potential pay outcomes. The undesirability of this uncertainty is evidenced by an experiment in which participants chose a fixed-pay position significantly more often than a potentially higher paying, incented position when incentives were tied to group performance, but not

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when incentives were tied to individual performance (Kuhn & Yockey, 2003). Within organizations, employees are not typically given this choice, and must instead seek other ways to manage the uncertainty.

One approach—uncertainty management theory (UMT)—contends that individuals use fairness judgments (i.e., evaluations of interpersonal treatment, procedures, and outcomes against some standard of justice) to mitigate uncertainty (Lind & Van den Bos, 2002; Van den Bos & Lind, 2002). A key way in which this manifests is when fairness judgments serve as a heuristic substitute for trust (Lind, 2001). We use this framework to predict reward fairness expectations of team members at the point of team formation and at team project completion. In particular, we examine the importance individuals attach to the use of reward allocation rules, such as equity (rewards allocated proportionate to group member input) to ensure fairness; and the degree of preference held for an equity allocation rule as trust varies across team members at one given point in time.

We also examine these questions as trust beliefs change within individuals over time. In doing so, we extend the UMT framework more solidly to the domain of outcome fairness, answering the call for research to consider whether concern for future outcomes explains how fairness helps people manage uncertainty (Diekmann, Barsness, & Sondak, 2004). By applying UMT to a context of team member trust, we also test whether the fairness–trust relationship, previously found in studies of authority relationships (Lind, Kray, & Thompson, 2001; Van den Bos, Wilke, & Lind, 1998), extends to relationships in general.

Finally, the present study is the first to analyze intraindividual change specifically from a UMT perspective and speaks to Mitchell and James' (2001) call for better specification of time to support causal inferences and address changes that occur over time. Covariation across individuals between trust and reliance on fairness do not speak to continuity or change in these relationships (Chan, 1998), and such knowledge is a necessary prerequisite for building more complete theories (George & Jones, 2000). This is especially true for “young” theories (e.g., UMT) that have had little research aimed at delineating bounds for its predictions. In this study, we examine intraindividual relationships of interest as a baseline that informs our understanding of how the use of fairness heuristics changes as team-member trust changes over time, for the same individual. Thus, our analysis expands current understanding of the substitutability of fairness for trust by focusing on outcome fairness, non-authority relationships, and both interindividual and intraindividual variance.

### Conceptual Background

Prior to the development of UMT, fairness heuristic theory posited that judgments regarding fairness serve as a proxy for trust when trust is uncertain

because fairness is more observable and easier to assess (Lind, 2001). This is because assessments of trustworthiness depend on characteristics inherent in another (i.e., integrity, benevolence, ability), whereas fairness judgments are derived from one's own met expectations, explicit standards, and interpersonal treatment received (see Colquitt, Scott, Judge, & Shaw, 2006). UMT extended this reasoning and cast fairness as a tool to also manage more generalized situations of uncertainty. Empirical support for UMT covers a wide breadth of uncertainty types, including external performance standards (Diekmann et al., 2004), self-uncertainty (Thau, Aquino, & Wittek, 2007), and even simply asking people to think about uncertainties in their lives (Van den Bos, 2001).

Further, whereas fairness heuristic theory emphasizes fairness as a means to assess the potential for exploitation within groups, UMT also points to the instrumental value of fairness in improving the likelihood of positive outcomes and making the possibility of undesirable outcomes more tolerable. For these reasons—according to UMT—fairness concerns are greater, and information pertaining to fair treatment is more important when uncertainty exists. A number of studies support UMT's assumptions (e.g., Diekmann et al., 2004; Tangirala & Alge, 2006; Thau et al., 2007; for an overview of earlier related studies, see Lind & Van den Bos, 2002), demonstrating generally consistent results across various types of uncertainty for procedural fairness (perceived fairness of the process used to make decisions regarding outcomes).

However, the only study to test UMT assumptions empirically in relation to distributive (outcome) fairness found no support (Diekmann et al., 2004). In contrast to Diekmann et al.'s post-allocation assessment of distributive fairness judgments, we consider pre-allocation expectations for distributive fairness, what we later define as allocation rules. Fairness should logically be seen as more instrumental in improving the likelihood of positive outcomes before outcomes are received (pre-allocation) than after (post-allocation). Thus, UMT assumptions should be more evident in a pre-allocation context. Further, we explore the relationship between distributive fairness and uncertainty using a team context, rather than the authority relationship used in Diekmann et al.'s study. The team context may invoke a broader interpretation of uncertainty.

### Trust and Uncertainty Within Teams

While all forms of uncertainty are relevant under UMT theory, uncertainty pertaining to trust has been identified as critical within interdependent group settings (Lind, 2001). Therefore, we use trust as our focus of uncer-

tainty. Mayer, Davis, and Schoorman (1995) suggested that trust in others develops based on perceptions of their trustworthiness in three areas: capability (sets of skills, competencies, and characteristics that enable a party to have influence within some specific domain), integrity (honesty and dependability), and benevolence.

Empirical research has shown that the first two factors (i.e., capability, integrity) are most relied on by coworkers when task performance, rather than socioemotional support, is the primary goal (Dirks & Skarlicki, 2009). For this reason, we focus on capability and integrity as our measures of trust in the context of project teams. Although trust beliefs at the group level can be more complicated, as a result of multiple trustees with potentially differing levels of trust influencing attributes, trust can still be measured effectively at this level since, according to Jarvenpaa, Knoll, and Leidner (1998), "Trust in a collective entity is possible, even if one particular individual is deemed less capable, benevolent, or honest than the others" (p. 37).

In terms of uncertainty, studies of fairness effects that focus on trust in authority relationships equate a lack of information regarding an authority's trustworthiness to uncertainty, and equate positive and negative trust information to certainty (see Van den Bos et al., 1998). Implied is that untrustworthy authorities will, with relative certainty, make decisions that result in negative outcomes for the subordinate. But with respect to a group level of analysis, low trustworthiness does not equate to certainty of negative outcomes.

If members have a vested interest in the team outcome, even members deemed low in capability and integrity may support the accomplishment of a positive team outcome since there is a self-serving incentive to do so (Kim, Cooper, Ferrin, & Dirks, 2004). However, untrustworthy team members may also serve their self-interests through exploitation (i.e., free-riding) if a positive team outcome can be obtained without their cooperation. Thus, low trust of team members reflects high uncertainty regarding team outcomes or exploitation. High trust in team member capabilities and integrity, on the other hand, provides relatively more certainty that the team outcome, and any outcome-dependent reward, will be positive and members will refrain from free-riding.

### Allocation Rules

Since we focus on pre-allocation expectations for outcome fairness in the present study, our fairness construct of interest is the allocation standards or rules that individuals consider in advance of an outcome to ultimately determine outcome fairness. The organizational justice literature has delineated three general standards used in evaluating the fairness of outcomes: equity

(i.e., allocation proportionate to input), equality (i.e., allocation equal, regardless of input), and need (i.e., allocation based on individual circumstances; Sheppard, Lewicki, & Minton, 1992). Psychologically, individuals evaluate allocations through an integrated or weighted use of multiple allocation standards, rather than reliance on any one standard exclusively or consideration of each standard on a standalone basis (Colquitt & Jackson, 2006; Leventhal, 1980). Therefore, implicit in an increased preference for one standard is a decrease in preference for the other standards.

In the present study context, this tradeoff will be between equity and equality standards, since use of the need-allocation standard in work- or task-based settings is limited (Giacobbe-Miller, Miller, & Zhang, 1997; Giacobbe-Miller, Miller, & Victorov, 1998; Meindl, 1989). Thus, while we discuss both equity and equality standards, we have chosen to anchor our subsequent predictions in terms of equity since, as we will describe, it is the drive toward equity, rather than the drive away from equality, that serves as a tool to manage uncertainty in the study context.

## Hypotheses

### *Interindividual Differences in Allocation Rule Importance and Preference*

If the subjective salience of outcome fairness is increased by uncertainty, individuals within teams should express greater importance for the use of allocation rules to ensure fairness when trust toward team members is limited, since low trust creates uncertainty pertaining to team outcomes and exploitation. We will subsequently make an argument for which allocation standard may be preferred, but regardless of which rule is preferred, the use of allocation rules should take on more importance for individuals reporting lower trust as a means to mitigate uncertainty over outcomes. In other words, if I don't trust my team members, then I will feel a greater need to control the reward outcome through the use of preferred allocation rules. This prediction is also consistent with the view that trust and control systems are alternate mechanisms for dealing with risk in relationships (Schoorman, Mayer, & Davis, 2007). Trust is considered an informal means of managing relationship uncertainty, while contracts or control systems provide an external, formal means to do so (Malhotra & Murnighan, 2002).

*Hypothesis 1.* The importance individuals hold for the use of preferred allocation rules will be negatively related to the trust beliefs they hold toward team members.

While research on fairness importance predictions has been undertaken from an uncertainty standpoint, little attention has been given to the cogni-

tive shortcuts used to form fairness judgments under uncertainty. Van den Bos and Lind (2002) stated "Not only does uncertainty stimulate an interest in fairness, but it also drives some specific cognitive processes in the construction of fairness judgments" (p. 21). Cognitive shortcuts are used in the evaluation of fairness as an efficient way to judge and overcome uncertainty about fairness prior to using fairness judgments to manage broader uncertainty. Furthermore, the heuristics applied in the formation of fairness judgments are guided by utility in terms of what will be most instrumental in reducing the specific uncertainty at hand (Van den Bos & Lind, 2002).

Van den Bos and Lind (2002) extended this reasoning to explain the established equality heuristic used by resource allocators (Messick, 1993; Messick & Schell, 1992), pointing to this as a cognitive shortcut for allocation fairness when allocators are faced with uncertainty regarding optimal resource allocation (i.e., when lacking specific information, allocators tend to distribute resources equally across individuals). From the receiver's perspective, though, equality does not reduce the potential for a negative allocation, as everyone may receive the same undesirable allocation, nor does it help manage the potential of exploitation by team free-riders. Rather, it may actually encourage free-riders, since an expectation of an equality allocation is cited as a motivation for withholding effort on the part of group members (Kidwell & Bennett, 1993). An equity allocation rule, on the other hand, provides greater individual control over one's own reward and is a disincentive to free-riders. Furthermore, experimental results (Kuhn & Yockey, 2003) have shown that individuals will even forgo a potentially higher payout in order to avoid incentives tied to unproven team members and to maintain individual responsibility for compensation.

Therefore, we propose that within teams, an equity heuristic will be used as a cognitive shortcut for reward allocation fairness when trust is low regarding other team members' potential contributions. In turn, this standard of allocation fairness helps individuals reduce the broader uncertainty surrounding their own potential reward and exploitation by the team. Of course, this assumes an environment in which individual contribution is perceived as discernible.

*Hypothesis 2.* The preference individuals hold for an equity allocation standard will be negatively related to the trust beliefs they hold toward team members.

### Intraindividual Changes Over Time

Trust regarding team members is likely to change between group formation and project completion since group norms, which tend to be established

in the early stages of team development (Tuckman & Jensen, 1977), serve an uncertainty-reduction function. When individuals join teams, their feelings of uncertainty regarding expected actions are eased as subsequent communication with the team clarifies appropriate behavior (Colman & Carron, 2001). The resulting norms provide regularity and predictability in behaviors expected from other team members and, therefore, help members anticipate the actions of others, a concept often linked to definitions of trust (see Mayer et al., 1995).

Our prior Time 1 predictions are static hypotheses that do not address this change in trust-related uncertainty over time. However, UMT does point to changing uncertainty over time as a potential determinant of changes in fairness importance. For instance, in interpreting fairness primacy effects (the established finding that greater weight is placed on initial fairness judgments; e.g., Van den Bos, Vermunt, & Wilke, 1997), UMT suggests that it is not the order of distributive or procedural fairness information specifically that causes one form of fairness to take on greater weight than the other, but rather the presence of uncertainty, which is generally highest at the time of initial fairness evaluations. If changes in the level of uncertainty are responsible for the difference in salience between initial and subsequent fairness information, then a change in an individual's perceived level of uncertainty over time within any given situation, even when fairness considerations do not directly follow one another, should be accompanied by a relative change in the importance that individual places on fairness.

We propose that if individuals build trust related to team members' ability and integrity between project inception and completion, they will experience less uncertainty about team outcomes and related rewards, and thus feel less need for allocation rules to manage this uncertainty. Also, this relationship should hold in the opposite direction. Trust and related certainty may decrease over time, leading to a greater need for allocation rules to manage uncertainty.

*Hypothesis 3.* An increase (decrease) in individual trust beliefs toward team members between Time 1 and Time 2 will correspond with a decrease (increase) in importance held for the use of preferred allocation rules between Time 1 and Time 2.

We argued previously that allocation rules become less useful and thus less important as trust and its related certainty over outcomes increases. If allocation rules are needed less as trust increases, then use of cognitive shortcuts to select these rules are also relatively less needed. A utilitarian perspective, a logical extension of UMT's functional view of fairness, suggests that the benefit gained from use of an allocation rule should exceed the

cost expended to apply the allocation rule in order for an allocation standard to be preferred. Application of an equity allocation standard has identifiable costs similar to transaction costs in formal contracting (for a current overview of contracting and related costs, see Carson, Madhok, & Wu, 2006).

Use of an equity standard requires formalization of what constitutes appropriate contribution, and requires evaluation of each member's role under these guidelines in order to allocate rewards appropriately. Transaction costs in this case may include the time and effort involved in establishing these standards (i.e., coordination costs) and the effort required to come to an acceptable agreement with the parties involved (i.e., bargaining costs). Normative pressures that develop as teams evolve may add an additional psychological cost to maintaining an equity standard, stemming from peer pressure to be perceived as a team player (Sarin & Mahajan, 2001). If the costs, both tangible and intangible, of applying an equity allocation standard exceed the benefit, implementation of an equity standard becomes a negative. In the context of increased trust, the uncertainty management benefits of an equity allocation standard are reduced; its usefulness in managing outcome uncertainty has been supplanted by trust. Thus, the cost of applying an equity standard in higher trust situations is likely to exceed the benefit because of diminishing benefits combined with fixed, or potentially increasing, costs.

An equality allocation standard, on the other hand, reduces the cognitive work needed to make an allocation and is generally accepted as fair in the absence of optimum (or, it may be reasonable to say, cost-efficient) resource-allocation information (Messick, 1993; Messick & Schell, 1992). At increased trust levels, it is likely that individual team members are perceived as having contributed more equally in the responsibilities required to complete the project. Thus, an equality allocation would, indeed, be seen as a reasonable proxy for fairness, even if contributions are not precisely determined to be equal.

In summary, as trust increases and related certainty increases, there is less need for the use of an equity decision rule to manage uncertainty. Under these conditions, there is also a declining net benefit of applying an equity allocation standard: The costs of applying the standard are potentially increasing in the face of a declining benefit. As the cost exceeds the benefits, individuals will shift away from application of the equity heuristic. As previously described, a shift away from equity implies a shift toward equality, based on what research has determined regarding the psychological evaluation of allocations (Colquitt & Jackson, 2006; Leventhal, 1980). The shift in this case is also facilitated by the relatively low cost associated with the application of an equality allocation standard.

In brief, these arguments suggest that individuals will shift their preference away from an equity standard and toward another standard, particularly equality, as trust increases. This prediction is in keeping with experimental findings of an equality preference for hypothetical work groups, which is defined as highly interdependent, well established over time, and cohesive (Colquitt & Jackson, 2006).

*Hypothesis 4.* An increase (decrease) in individual trust beliefs toward team members between Time 1 and Time 2 will correspond with a decrease (increase) in preference for an equity-allocation standard.

## Method

### *Sample and Procedure*

We collected nonexperimental data in a student environment in order to balance the realism of actual work with a certain degree of control over the team context. Students in six business classes at a midwestern university were asked to participate in a survey of their in-class team project experience during the course of a semester. The campus is primarily nonresidential and is located in an urban setting. The business school program enrolls approximately 2,400 students, 80% to 90% of whom are *nontraditional* in that they hold jobs, largely full-time, concurrent with their studies or have returned to school after holding full-time jobs and are part-time students attending mostly evening classes. In this older, more experienced student population, it typically takes 6 to 7 years to complete an undergraduate degree and 3 to 4 years for a Master of Business Administration (MBA) degree. Neither degree program uses a cohort approach, nor does the commuter status of the student body support informal cohort experiences.

Two of the classes were at the MBA level (60 students), and four were senior-level undergraduate classes (162 students). Professors teaching the classes where data were collected were blind to the study's purpose. All course requirements included multiphase, semester-long group projects that involved similarly intensive, high-involvement, interdependent tasks. These tasks include an empirical research project involving a research proposal, data collection, analysis and report generation; a three-phase simulation building a compensation system for a hypothetical company; and multiphase strategic management simulations.

Interdependence among team members on these tasks was verified by students' responses to the question "Other members of my team depend on

me for information or materials needed to perform their tasks.” By class, the means ranged from 3.59 to 4.10 on a 5-point scale. A one-way ANOVA reveals no differences between classes,  $F(5, 192) = 1.61, ns$ . All project teams received feedback regarding team performance as the semester progressed, and all project assignments utilized a peer-evaluation component for determining final grades on the project. In two of the six classes, students formed their own teams; while in the remaining classes, teams were formed based on instructor-enforced constraints related to representation of different business disciplines or competencies.

Initial data collection occurred within the first 10 days of class (Time 1) and before project teams were formally formed. Participation was voluntary, and no extra credit was offered. As a result of absences and late arrivals to class on the day of administration, 202 of 222 enrolled students (91%) completed the surveys. Data were also collected from 198 participants in the last week of class, following the completion and submission of the group’s final project (Time 2), but before final project grades were reported. These two specific points in time were chosen to increase the likelihood of within-subject variance.

A total of 180 participants (81.1% of enrolled students) completed both surveys (89.1% of Time 1 respondents). Based on responses gathered at Time 1, the sample was an average of 27.3 years old ( $SD = 7.4$ ); consisted of 77 males (43%), 87 females (48%), and 16 missing or not reporting (9%); and had an average of 7.5 years ( $SD = 7.6$  years) of full-time work experience. Project teams ranged in size from four to seven members.

### *Measures*

Trust, allocation standard preferences (equity, equality, and need), and the importance attached to the use of allocation rules were measured at both time periods. Control variables, which included equity sensitivity and demographic characteristics, were collected at Time 1. Unless indicated otherwise, responses were measured using a 5-point Likert-type scale.

*Trust in team members.* We adapted the four-item team trust scale developed by Sarker, Valacich, and Sarker (2003) to assess trust as a result of its integrated emphasis on ability and integrity. The items are “Team members (will) tell the truth about the limits of their knowledge,” “Team members can be counted on to do what they say they will do,” “Team members are (will be) honest in describing their experience and abilities,” and “Team members have high academic skills/ability.” Internal consistency (Cronbach’s alpha) for the four items was .74 at Time 1, and .88 at Time 2.

*Allocation standard preference.* In research on allocation decisions, such decisions are often measured through an integrated or weighted use of

multiple allocation standards, rather than reliance on any one standard exclusively. This is done in order to mimic the actual psychological process that individuals use (Colquitt & Jackson, 2006; Leventhal, 1980). Accordingly, each member distributed 100% of their preference based on the root statement "Group member grades should be based on . . ." with choices of "*contribution*: each member's grade should reflect their individual contribution to the project," "*equality*: each member should receive the same grade, regardless of their individual contribution to the project," and "*need*: each member's personal circumstances, such as personal difficulties or the need for a good grade to pass, should be considered, regardless of their individual contribution."

In keeping with limited use of the need allocation standard in work- or task-based contexts (Giacobbe-Miller et al., 1997, 1998; Meindl, 1989), need represented a relatively small percentage of the average preferred allocation for members (Time 1: 9%; Time 2: 11%) and over 70% of members allocated between 0% and 10% toward need both time periods. The relatively limited role of need is also suggested by a strong, inverse correlation between equity and equality (Time 1,  $r = -.93$ ; Time 2,  $r = -.86$ ).

*Allocation rule importance.* Following completion of the allocation preference, the group members were asked how important it is to them that their allocation standard preferences be upheld in determining allocation of group project credit. The measure was comprised of four items that were written for this study. Sample items include "It is very important to me that these standards are considered when determining team member grades," and "Team member grades will not be appropriate unless these standards are applied." Internal consistency alphas for these items were .68 and .70 for Times 1 and 2, respectively.

*Control variables.* Colquitt and Greenberg (2003) noted past effects in organizational fairness research for gender. Therefore, gender, along with age, full-time work experience, and educational status (dummy-coded for undergraduate vs. graduate) were included in our analyses as control variables. Additionally, sensitivity to inequitable allocations is an established individual-difference variable (King & Miles, 1994) that can potentially influence allocation fairness judgments (Colquitt & Greenberg, 2003), so we assessed it with a five-item measure adopted from King and Miles. Respondents allocated 10 points between two choices over a set of five questions. The responses to one category from each item were summed to result in a score that could range from 0 to 50, with higher scores representing greater benevolence.

Tangirala and Alge (2006) found that degree of familiarity with team members underlies uncertainty toward team members. Given the size and nature of the business program; the part-time, commuter nature of the

students; and the extended length of time to complete the program, we consider the likelihood of team formation among familiar classmates to be very small. However, it is still possible that in the two classes in which students formed their own teams, they chose fellow members based on familiarity and, more importantly for the present research, expectations of trust. Although this would not impact Time 1 hypotheses, since teams were not yet formed at this point, pre-formed trust beliefs could influence the degree of change reflected between Time 1 and Time 2. This is not to say that the predicted inverse relationship between changing trust and fairness would necessarily differ, but in order to strengthen support for our account, we included a dummy-coded variable reflective of the team assignment method (constrained formation vs. student-formed groups).

### *Analytic Strategy*

Hypotheses 1 and 2 concern between-person relationships between trust and both allocation rule importance and equity allocation rule preferences at a point prior to group formation. Since there is no change element or group context to account for at this point in time, we used ordinary least squares (OLS) regression to test these relationships.

Hypotheses 3 and 4 concern how changes in trust were related to changes in these outcomes between group inception and project completion. These hypotheses concern how changes in individuals over time and group membership (i.e., group-level effects) could affect these results. To account for these different sources of variance, we tested the hypotheses using random coefficient modeling with the hierarchical linear model (HLM) software package (Raudenbush & Bryk, 2002).

We modeled three sources, or levels, of variance. Time-dependent (within-person) variation was modeled at Level 1, Level 2 represented between-person variation, and Level 3 represented groups as sources of variance. To understand the relationship between changes in trust and changes in outcomes, the stable component of trust should be disaggregated from the time-varying component (Singer & Willett, 2003). To isolate the time-varying portion of trust from the time-invariant aspect, we decomposed trust into two variables: average trust for each individual across the two time periods (time-invariant), and deviations of each individual's trust score from this average at each time period (Barnett & Brennan, 1997; Singer & Willett, 2003). This latter variable reflects trust changes, and so is the appropriate predictor for testing the two change hypotheses. These two variables, along with the two outcomes (allocation rule importance and equity allocation preferences) were measured at both Time 1 and Time 2 and were included at Level 1. Gender,

age, work experience, educational level, and equity sensitivity were included as person-level (Level 2) controls for initial status and change rate for the outcomes between time periods.

A potential source of variance in the present study is group-level variation in the two outcomes and trust at Time 2. We calculated intraclass correlation or ICC(1) values for each, indicating the percentage of variance; that is, between-person versus between-group. Values of ICC(1) were quite low for the two outcomes, with group-level variance accounting for only 2.3% and 1.4% of the total variance for allocation preferences and rule importance, respectively. However, there was a substantial amount of group variation in trust at Time 2: ICC(1) = .28. Therefore, we included group mean trust at Time 2 as a Level 3 control variable for the change rate outcome.

The control variable of group assignment method actually represents a fourth level of nesting (responses over time within individuals within groups within assignment types), but we are not aware of any technique that can appropriately account for a fourth level of variation with a sample size of 2 (i.e., random assignment or student assignment), so the effects of this variable on change rate were modeled at the group level (Level 3). We were interested in the fixed effects of the controls, so random effects were only modeled for initial outcome status to allow appropriate parameterization of the models. All between-person variables were grand-mean centered (Hofmann & Gavin, 1998), as were group mean trust, average trust, and group assignment method, while trust change was person-mean centered (Raudenbush & Bryk, 2002).

## Results

Descriptives and correlations for all person-level variables are shown in Table 1. Mean levels of equity preference and allocation rule importance decreased from Time 1 to Time 2, while trust increased. A *t* test indicates that the decrease was not significant for equity preference,  $t(179) = 1.56, p > .05$ . Allocation rule importance did decrease significantly,  $t(179) = 18.73, p < .01$ ; while the trust increase was also significant,  $t(179) = -10.10, p < .01$ . These results indicate degree of variance between Time 1 and Time 2 for each variable of interest, but do not speak specifically to the covariance between trust and the fairness variables over time (the focus of our study), which is addressed in the subsequent within-level analysis. Group mean trust at Time 2 and group assignment method (not included in the table, as they are group-level variables) were not significantly related ( $r = .17, p > .05$ ).

Table 2 reports the results of OLS regressions used to test Hypotheses 1 and 2. In both analyses, we entered control variables in the first step, followed

Table 1  
*Descriptives and Correlations for Study Variables*

Variable	M	SD	1	2	3	4	5	6	7	8	9	10
Equity allocation preference: Time 1	58.78	26.38	—									
Equity allocation preference: Time 2	54.92	27.64	.48**	—								
Allocation rule importance: Time 1	3.21	0.63	.39**	.23**	—							
Allocation rule importance: Time 2	2.42	0.51	.24**	.27**	.49**	—						
Trust: Time 1	3.18	0.64	-.32**	-.15*	-.24**	-.15*	—					
Trust: Time 2	3.94	0.80	-.16*	-.29**	-.08	-.21**	.14	—				
Equity sensitivity	29.04	6.27	-.22**	-.12	-.17*	-.05	.32**	.15*	—			
Age	27.76	7.76	.01	-.01	.06	.09	-.01	.10	.15*	—		
Gender (1 = male, 2 = female)	1.55	0.50	.23**	.13	.23**	.06	-.10	.17*	-.15*	.01	—	
Work experience (in months)	91.03	95.25	.06	.09	.10	.12	-.08	.12	.12	.88**	.02	—
Educational level	1.36	0.53	-.26**	-.15*	-.22**	-.04	.13	.09	.05	.20	-.17*	-.01

Note. After listwise deletion, N = 162. Educational level: 1 = undergraduate, 2 = graduate. \*p < .05. \*\*p < .01.

Table 2

*Regression Analyses for Time 1 Outcomes on Time 1 Trust*

Variable	Allocation rule importance		Equity allocation preference	
	Step 1	Step 2	Step 1	Step 2
Equity sensitivity	-.17*	-.10	-.24**	-.16*
Age	.14	.14	.00	.01
Gender	-.16	.16*	.16	.15*
Work experience	.00	-.04	.10	.06
Educational level	-.18*	-.16*	-.17*	-.14*
Trust		-.21**		-.26**
<i>F</i>	4.40**	5.12**	5.67**	7.03**
<i>F</i> <sub>change</sub>		7.89**		12.25**
<i>R</i> <sup>2</sup>	.11	.15	.14	.20
$\Delta R^2$		.04		.06
Adjusted <i>R</i> <sup>2</sup>	.09	.12	.11	.17

Note. After listwise deletion,  $N = 162$ . Beta weights for the OLS regressions are reported at each step.

\* $p < .05$ . \*\* $p < .01$ .

by initial trust in a second step. Taken as a block, the controls variables accounted for 11% of the variance in allocation rule importance,  $F_{\text{change}}(5, 177) = 4.40, p < .01$ . Trust was significantly and inversely related to allocation rule importance, as expected, and accounted for an additional 4% of incremental variance,  $F_{\text{change}}(1, 176) = 7.89, p < .01$  ( $\beta = -0.21, p < .01$ ). Thus, Hypothesis 1 was supported.

Table 2 also shows that the control variables, as a block, explained 14% of the variance in equity allocation preference,  $F(5, 178) = 5.67, p < .01$ . Entered in the second step, trust was a significant negative predictor of equity allocation preference ( $\beta = -0.26, p < .01$ ), explaining an additional 6% of variance beyond the controls,  $F_{\text{change}}(1, 177) = 12.25, p < .01$ . This indicates support for Hypothesis 2.

Table 3 shows the final-step, three-level equations we used to test Hypothesis 3, the first intraindividual hypothesis. As indicated in the table, Hypothesis 3 was not supported. The table also reports deviance statistics (Singer & Willett, 2003). The symbols  $\pi$ ,  $\beta$ , and  $\lambda$  refer to Level 1, Level 2, and Level 3 variable coefficients, respectively, and their subscripts refer to the specific

Table 3

*Regression Analyses for Changes in Allocation Rule Preference*

Variable	Allocation rule importance							
	Step 1				Step 2			
	Initial status ( $\pi_0$ )	SE	Change rate ( $\pi_1$ )	SE	Initial status ( $\pi_0$ )	SE	Change rate ( $\pi_1$ )	SE
Intercept	3.23**	0.05	-0.80**	0.04	3.20**	0.06	-0.75**	0.06
Equity sensitivity ( $\beta_{01}$ )	-0.02*	0.01	-0.01	0.01	-0.02*	0.01	0.00	0.01
Age ( $\beta_{02}$ )	0.00	0.01	-0.01	0.01	0.00	0.01	-0.01	0.01
Gender ( $\beta_{03}$ )	0.20*	0.09	-0.16	0.10	0.21*	0.09	-0.14	0.10
Work experience ( $\beta_{04}$ )	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Educational level ( $\beta_{05}$ )	-0.15	0.14	0.23*	0.05	-0.13	0.13	0.23*	0.11
Group mean trust ( $\lambda_{101}$ )			-0.15**	0.05			-0.06	0.07
Group assignment method ( $\lambda_{102}$ )			0.08	0.08			0.07	0.08
Trust average ( $\pi_2$ )							-0.17*	0.07
Trust change ( $\pi_3$ )							-0.07	0.06
Temporal (within-person) variance		.16				.15		
Change in temporal variance						.01		
Proportion of explained temporal variance						0.2%		
Deviance (parameters)		448.16 (17)				440.99 (19)		
Deviance change (as $\chi^2$ )						7.17 (2 df)**		

Note. After listwise deletion,  $N = 312$  observations, 157 individuals, and 49 groups. Unstandardized coefficients are reported at each step. Final step equations allocation rule importance are as follows:

Level 1: Outcome =  $\pi_0 + \pi_1$  (Time) +  $\pi_2$  (Trust average) +  $\pi_3$  (Trust change) +  $e$

Level 2:  $\pi_0 = \beta_{00} + \beta_{01}$  (Equity sensitivity) +  $\beta_{02}$  (Age) +  $\beta_{03}$  (Gender) +  $\beta_{04}$  (Work experience) +  $\beta_{05}$  (Education) +  $r_{00}$

$\pi_1 = \beta_{10} + \beta_{01}$  (Equity sensitivity) +  $\beta_{12}$  (Age) +  $\beta_{13}$  (Gender) +  $\beta_{14}$  (Work experience) +  $\beta_{15}$  (Education)

$\pi_2 = \beta_{20}$

$\pi_3 = \beta_{30}$

Level 3:  $\beta_{00} = \lambda_{000} + u_{000}$

$\beta_{01} = \lambda_{010}$

$\beta_{02} = \lambda_{020}$

$\beta_{03} = \lambda_{030}$

$\beta_{04} = \lambda_{040}$

$\beta_{05} = \lambda_{050}$

$\beta_{10} = \lambda_{100} + \lambda_{101}$  (Group mean trust) +  $\lambda_{102}$  (Group assignment method)

$\beta_{11} = \lambda_{110}$

$\beta_{12} = \lambda_{120}$

$\beta_{13} = \lambda_{130}$

$\beta_{14} = \lambda_{140}$

$\beta_{15} = \lambda_{150}$

$\beta_{20} = \lambda_{200}$

$\beta_{30} = \lambda_{300}$

\* $p < .05$ . \*\* $p < .01$ .

equation terms used to test this hypothesis, as shown at the bottom of the table.

In the first step of the analysis for allocation rule importance (Hypothesis 3), equity sensitives ( $\beta_{01} = -0.02, p < .05$ ) and females ( $\beta_{03} = 0.20, p < .05$ ) reported higher importance at Time 1. The slope of changes in importance across time periods was significant and negative ( $\pi_1 = -0.80, p < .01$ ), with graduate students showing smaller decreases in allocation rule importance ( $\beta_{05} = 0.23, p < .01$ ).

In the second step, the relationships of equity sensitivity ( $\beta_{01} = -0.02, p < .05$ ) and gender ( $\beta_{03} = 0.21, p < .05$ ) with initial status held, as did the relationship between educational level and change rate ( $\beta_{05} = 0.23, p < .01$ ). At Step 2, higher average trust for individuals across time periods was associated with a lower average level of rule importance ( $\pi_2 = -0.17, p < .01$ ). However, trust changes were not a significant predictor of allocation rule importance changes ( $\pi_3 = -0.07, p > .05$ ). Deviance change between steps was significant,  $\chi^2\Delta(2) = 7.17, p < .01$ ; but trust changes explained only 0.2% of within-person variance relative to the controls-only model. Thus, Hypothesis 3 was not supported.

Table 4 reports the test of Hypothesis 4. For equity allocation preference (Hypothesis 4), benevolents ( $\beta_{01} = -0.74, p < .01$ ), males ( $\beta_{03} = 10.33, p < .05$ ), and graduate students ( $\beta_{05} = -6.67, p < .01$ ) had lower equity preferences at Time 1. Change rate was negative, indicating a decline in equity preference across time ( $\pi_1 = -4.33, p < .01$ ). This decline in equity preferences was associated with group mean trust ( $\lambda_{101} = 8.37, p < .01$ ). Groups whose trust levels were higher at project endpoint showed greater decreases in equity preferences.

In the second step, the control variables showed a similar pattern, with gender ( $\beta_{03} = 10.77, p < .05$ ) and educational level ( $\beta_{05} = -5.35, p < .05$ ) predicting initial status. However, equity sensitivity and group mean trust were no longer significant at this step. Added at this step were average trust and trust changes. Individuals with higher average trust over time tended to report lower average equity preference ( $\pi_2 = -13.06, p < .01$ ). As predicted, changes in trust were significantly and inversely related to changes in equity preference ( $\pi_3 = -6.78, p < .01$ ). The addition of trust at this step explained just over 4% of the variance in preference change relative to the controls-only model in Step 1. The deviance change between steps is significant, indicating that the addition of average trust and trust change in Step 2 improved model fit,  $\chi^2\Delta(2) = 19.67, p < .01$ . The results for trust change support Hypothesis 4.

## Discussion

The purpose of the present study was to examine the impact of evolving trust on allocation rule importance and preference for individuals within

Table 4

*Regression Analyses for Changes in Equity Allocation Preference*

Variable	Equity allocation preference							
	Step 1				Step 2			
	Initial status ( $\pi_0$ )	SE	Change rate ( $\pi_1$ )	SE	Initial status ( $\pi_0$ )	SE	Change rate ( $\pi_1$ )	SE
Intercept	60.00**	1.63	-4.33*	1.75	57.45**	1.88	0.65	2.44
Equity sensitivity ( $\beta_{01}$ )	-0.74*	0.37	0.37	0.38	-0.35	0.37	0.22	0.38
Age ( $\beta_{02}$ )	-0.17	0.54	-1.26	0.87	-0.09	0.54	-1.38	0.92
Gender ( $\beta_{03}$ )	10.33*	4.51	-4.52	4.89	10.77*	4.47	-2.60	4.78
Work experience ( $\beta_{04}$ )	0.04	0.05	0.10	0.07	0.02	0.04	0.12	0.07
Educational level ( $\beta_{05}$ )	-6.67*	3.13	5.28	5.90	-5.35*	3.21	5.16	5.96
Group mean trust ( $\lambda_{101}$ )			-8.37**	2.30			-0.30	3.05
Group assignment method ( $\lambda_{102}$ )			1.87	4.51			1.92	4.22
Trust average ( $\pi_2$ )							-13.06**	2.88
Trust change ( $\pi_3$ )							-6.78**	2.31
Temporal (within-person) variance		364.14				349.19		
Change in temporal variance						14.95		
Proportion of explained temporal variance		2865.38 (17)				4.1%		
Deviance (parameters)						2845.95 (19)		
Deviance change (as $\chi^2$ )						19.67 (2 df)**		

Note. After listwise deletion,  $N = 312$  observations, 157 individuals, and 49 groups. Hierarchical linear modeling unstandardized coefficients are reported at each step. Final step equations for equity allocation preference are as follows:

- Level 1: Outcome =  $\pi_0 + \pi_1$  (Time) +  $\pi_2$  (Trust average) +  $\pi_3$  (Trust change) +  $e$
- Level 2:  $\pi_0 = \beta_{00} + \beta_{01}$  (Equity sensitivity) +  $\beta_{02}$  (Age) +  $\beta_{03}$  (Gender) +  $\beta_{04}$  (Work experience) +  $\beta_{05}$  (Education) +  $r_0$   
 $\pi_1 = \beta_{10} + \beta_{01}$  (Equity sensitivity) +  $\beta_{12}$  (Age) +  $\beta_{13}$  (Gender) +  $\beta_{14}$  (Work experience) +  $\beta_{15}$  (Education)  
 $\pi_2 = \beta_{20}$   
 $\pi_3 = \beta_{30}$
- Level 3:  $\beta_{00} = \lambda_{000} + u_{000}$   
 $\beta_{01} = \lambda_{010}$   
 $\beta_{02} = \lambda_{020}$   
 $\beta_{03} = \lambda_{030}$   
 $\beta_{04} = \lambda_{040}$   
 $\beta_{05} = \lambda_{050}$   
 $\beta_{10} = \lambda_{100} + \lambda_{101}$  (Group mean trust) +  $\lambda_{102}$  (Group assignment method)  
 $\beta_{11} = \lambda_{110}$   
 $\beta_{12} = \lambda_{120}$   
 $\beta_{13} = \lambda_{130}$   
 $\beta_{14} = \lambda_{140}$   
 $\beta_{15} = \lambda_{150}$   
 $\beta_{20} = \lambda_{200}$   
 $\beta_{30} = \lambda_{300}$

\* $p < .05$ . \*\* $p < .01$ .

work teams. Our study extends current understanding of the substitutability of fairness for trust through our focus on outcome fairness, nonauthority relationships, and both interindividual and intraindividual variance. We proposed two ways in which fairness may substitute for trust within teams: (a) reliance on allocation rules, regardless of which rule is preferred, since allocation rules provide some degree of certainty and control over individual outcomes; and (b) preference for an equity allocation standard, based on the assumption that an equity standard will be seen as more instrumental in managing uncertainty. Accordingly, our interindividual results indicate that individuals with lower initial trust beliefs regarding team members placed greater importance on the use of allocation rules and preferred an equity allocation standard.

Our intraindividual findings provided mixed support for a relationship between changes in trust and changes in allocation rule importance and preference within individuals over time. A change in trust toward team members was significantly and negatively associated with a corresponding change in equity allocation preference. However, change in individual trust toward team members was not significantly associated with a corresponding change in importance attached to the use of allocation rules. The lack of support has implications for UMT since the theory's assumptions imply a parsimonious, negatively linear relationship between uncertainty (operationalized in the present study as low trust) and fairness importance.

One potential methodological explanation is a limitation in the longitudinal design. With only two time periods, power to detect changes is reduced, as observed changes are subject to measurement error (Willett, 1988), especially if changes are nonlinear. Another explanation, from a conceptual point of view, is that the starting level of trust for our sample was relatively high, and a more contrasting shift in trust (e.g., low to high, rather than high to higher) may be needed to prompt a significant corresponding change in the importance placed on fairness from baseline levels. If so, fairness and uncertainty are not as fluidly substitutable, as UMT suggests. Further research pertaining to sensitivity toward changing uncertainty is recommended. This requires analysis over time, whereas the focus of existing UMT studies is largely cross-sectional or, in one case, longitudinal but with time used to contrast changes between two types of teams, rather than within individuals (Tangirala & Alge, 2006).

Our study demonstrates the limited generalizability of interindividual findings to intraindividual predictions. Allocation rule importance significantly covaried with trust at Time 1, but the relationship did not hold within individuals over time. It is interesting to note that mean values of allocation rule importance and trust did change significantly over time, as noted at the start of the Results section. If it is not explored intraindividually, one may

erroneously infer from these results a covarying relationship that does not exist.

There were several limitations concerning the nature of our data and subsequent analysis that must also be considered. First, as is common with longitudinal research, there was some participant attrition from the standpoint that not all participants provided data at both time periods (though attrition was slight). Further, as noted previously, with only two time periods, observed changes are subject to measurement error (Willett, 1988), suggesting some circumspection. Also, although it was not central to our theorizing, we could not model intraindividual variability in the relationships over time with only two time points. Such analysis would require at least three or possibly more measurements over time, depending on the number of random effects at Level 2 one wishes to assess. However, a strength of our analytic design is that we were able to disaggregate the stable and temporal relationships between trust and the two outcomes, providing a more detailed assessment of the fairness–trust exchange than reported in prior work in this area.

Our use of actual work groups formed to complete tasks of real value (project grades) has advantages over experimental designs in terms of generalizability to a larger population (McGrath, 1984). Despite the strength of this sample, including relatively high age and work experience of the student participants, generalizability of this study's findings to organizational samples must be tested. Future research may also consider the fairness–trust relationship in other types of teams beyond project teams.

It should be noted that project teams—the focus of our study—differ from other forms of teams in that they are time-limited and produce one-time outputs (Cohen & Bailey, 1997). In contrast, teams of a longer term have the potential for deferred reciprocity, which may alleviate immediate concerns for outcome fairness. Further, the development of trust among team members may have more limited, as opposed to universal effects. This may be particularly true in project teams in which there is a known timeframe, and the opportunity for the development of factors related to interpersonal group dynamics (e.g., cohesiveness: Bagarozzi, 1982; team-member exchange: Seers, Petty, & Cashman, 1995) is also limited.

In terms of practical implications, team-based work structures dominate today's organizations (Harrison, Mohammed, McGrath, Florey, & Vanderstoep, 2003). As management considers ways to facilitate and reward work at this collective level, there is increasing need to understand how distributive fairness operates in the context of work groups. The present study sheds light on when the use of allocation rules is most and least important in teams, and how allocation standard preferences among team members change in relation to changes in trust. For instance, our findings point to a need for explicit

attention to allocation rules and individual contributions at team formation, when trust is often relatively low. This is counter to prescriptive approaches, which call for minimal attention to rewards and individual achievement in an effort to unite team members and encourage cooperation. Organizations that fail to understand and meet distributive fairness expectations of teams, particularly at times when fairness is perceived by members to be most important, run the risk of reducing organizational commitment, organizational citizenship behaviors, and job satisfaction, and increasing withdrawal intentions (Colquitt, Conlon, Wesson, Porter, & Ng, 2001).

In conclusion, our study provides empirical support for the use of fairness heuristics by team members as a way to manage trust-related uncertainty. Through our intraindividual focus, however, we found that individuals may be less responsive to changes in trust-related uncertainty over time than UMT assumptions imply. These findings have important relevance for both theory and practice.

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