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## SOCIAL PSYCHOLOGY | SHORT COMMUNICATION

# The dynamic interplay of trustworthiness and state suspicion in teams over time: A panel analysis

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**Abstract:** We investigated the relationship between perceptions of trustworthiness and state suspicion over time. A total of 195 participants composing 39 teams completed an interdependent computer-mediated team task. Assessments of trustworthiness and state suspicion were taken at three points of time. A panel analysis allowed us to assess perceived trustworthiness and state suspicion over time to determine whether these processes develop independently or if they influence one another. Our analyses indicated separate but related processes. Ratings of trustworthiness did not appear to influence ratings of state suspicion over time. However, initial ratings of state suspicion (Session 0) appeared to influence ratings of trustworthiness in the subsequent session (Session 1), although it was only marginally significant. In addition, the constructs were modestly related at each point in time considered.

**Subjects:** Social Psychology; Group Processes; Intergroup Behavior

**Keywords:** trust; suspicion; structural equation modeling; panel analysis

Trust has long been a subject of interest for psychological research (Colquitt, Scott, & LePine, 2007; Mayer, Davis, & Schoorman, 1995), as it constitutes a key component of social perceptions and interaction (Fiske, 2009). Trust represents an intention to accept vulnerability, reliance on another, and positive expectation of outcomes (Mayer et al., 1995). Ratings of trustworthiness, in turn, are perceptions of a referent by the trustor that serve as antecedents to trust and subsequent behavior (Lee & See, 2004; Mayer et al., 1995). State suspicion, a relatively new construct in social science, has some conceptual overlap with trustworthiness (Bobko, Barelka, & Hirshfield, 2014). Suspicion has been explored sporadically, without much regard to theory (Bobko et al., 2014, p. 493). Recently, Bobko and colleagues (Bobko et al., 2014; Bobko, Barelka, Hirshfield, & Lyons,

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### PUBLIC INTEREST STATEMENT

Trust is considered a core social motive which enables relationships, such as friendships and intimate partnerships. A new construct in the literature, suspicion, has been theorized to be related but distinct from trust. Understanding how trust and suspicion relate to each other can help to build stronger teams, better relationships, and make the aforementioned relationships last longer. The current paper examined the relationship between the two constructs over time, and how one influences the other.

2014) developed a conceptual model of suspicion, identifying its key features and theoretical underpinnings. Although the model portrays trustworthiness and suspicion perceptions as different constructs and postulates that trust inhibits subsequent suspicion, no research to date has empirically tested the relationship between perceptions of trustworthiness and state suspicion over time. It is important to delineate the trustworthiness and state suspicion constructs, as behaviors which result from their interplay are complex and may be viewed differently depending on context (Faulkner, 2014). Additionally, trust behaviors may appear identical, yet the process by which their emergence occurs may differ depending on the development of state antecedents such as trustworthiness and suspicion. Trust is a general good from a moral point of view (Baier, 1992); thus, investigating antecedents of trust sheds light on how trust emerges, degrades, and potentially recovers. The research reported herein addressed whether trustworthiness and state suspicion exert mutual influence, or develop independently. We used panel analysis to uncover how ratings of trustworthiness and suspicion covary and thereby influence one another across different points in time during the performance of a computer-mediated, team-based task.

### 1. Trustworthiness

Trust refers to “the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party” (Mayer et al., 1995, p. 712). Meta-analytic data have shown trust in supervisors is positively related to organizational citizenship behavior, job satisfaction, and performance, and is inversely related to turnover (Dirks & Ferrin, 2002). In response, researchers have developed theoretical models to enhance understanding of the process of trust formation (Mayer et al., 1995), and have examined various antecedents to, and outcomes of, trust (Colquitt et al., 2007; Dirks & Ferrin, 2002; Lyons, Stokes, Eschleman, Alarcon, & Barelka, 2011; Mayer & Davis, 1999; Mayer & Gavin, 2005).

The trust process comprises intentions, actions, and beliefs (Jones & Shah, 2016). Trust intentions characterize a trustor’s willingness to be vulnerable to the referent (e.g., person or team). Examples include the willingness to allow the referent to play a role in one’s career or to perform a task without oversight. Increased trust reportedly leads to a greater likelihood of performing trust actions (Lee & See, 2004), which represent the behavior that makes one vulnerable to the referent (e.g., reducing oversight of a trustee and relying on team members). Trust beliefs are views a trustor holds and include a trustor’s state-dependent assessments of the referent, as well as his or her predisposition to trust in general. That is, trust beliefs comprise both states as well as traits. The latter, typically called trust propensity, constitutes a stable trait characterizing an individual’s disposition to trust others (Mayer et al., 1995). The former, typically referred to as trustworthiness, involves a trustor’s perceptions of a referent’s ability, benevolence, and integrity (Mayer et al., 1995). *Ability* represents the trustor’s perception that the referent can competently perform situation-specific actions in a given domain. *Benevolence* refers to the trustor’s perception that the referent has some intrinsic motivation to do well by the trustor, which suggests an attachment between the trustor and referent. *Integrity* is the trustor’s perception that the referent follows some set of principles, such as honesty and accountability, which are acceptable to the trustor with respect to the situation-specific domain. Thus, perceptions of trustworthiness towards teammates are particularly relevant in cooperative teams. Although propensity to trust is a relevant antecedent to trust and predictive of relevant occupational outcomes such as organizational citizenship behaviors and counter-productive work behaviors (for a meta-analysis, see Colquitt et al., 2007), our research focused on the development of perceptions of trustworthiness over time.

A team comprises members who rely on one another to achieve shared goals (Kozlowski & Bell, 2003). Given the interdependence of team members, perceptions of trustworthiness are important for allowing teammates to achieve shared goals effectively. Perceived trustworthiness contributes to team members focusing on their own work activities rather than monitoring one another (Mayer & Gavin, 2005). Trustworthiness may be especially relevant in computer-mediated teams, in which

traditional monitoring of performance (Jarvenpaa & Leidner, 1999) and nonverbal cues (Wilson, Straus, & McEvily, 2006) are unavailable. Computer-mediated teams are subject to increased risk because the platform lends itself to more misunderstanding and agreements are more difficult to enforce (Riegelsberger, Sasse, & McCarthy, 2003). In this context, trust assists in the alleviation of the perception of risk (Adams & Sasse, 2001). Perceptions of trustworthiness among team members may be particularly important antecedents of the subsequent development of trust intentions and consequent behavior in computer-mediated contexts.

Some research has indicated perceptions of trustworthiness are differentially influenced over time (Alarcon, Lyons, & Christensen, 2016; Jones & Shah, 2016). Initial judgments of trustworthiness are predictable from stable traits in the trust process, such as one's propensity to trust (Alarcon et al., 2016). As more information about the referent becomes salient, the focus of trustworthiness shifts from the trustor to the referent (Jones & Shah, 2016), such that context-dependent features of the referent influence the trustor's perceptions of trustworthiness more so than his or her propensity to trust. However, other characteristics associated with the referent may also influence perceptions of trustworthiness, namely state suspicion.

### **1.1. State suspicion**

Suspicion is a more recent concept growing out of scholarly studies of trust. Bobko et al. (2014) defined state suspicion as "a person's simultaneous state of uncertainty, cognitive activity, and perceived mal-intent about underlying information" (p. 336). State suspicion has to do with the evaluation of a referent as having questionable motives, coupled with uncertainty as to the maliciousness of those motives (Bobko et al., 2014). We focused on state suspicion as a state variable as it is influenced by context. In our study, we investigated the development and influence of state suspicion in teams over time.

As previously noted, state suspicion comprises three facets. *Uncertainty* refers to the perceived ambiguity of the outcome from making oneself vulnerable to the referent (Bobko et al., 2014). Uncertainty arises when the trustor cannot determine the outcome of the referent's behavior or actions. Individuals in a state of suspicion "suspend their judgements until they are able to determine" a specific appraisal (Hilton, Fein, & Miller, 1993, p. 504). The ambiguity of the outcome leads to the suspension of judgment, as increased expectations (good or bad) would lead to a decision instead of increased time consumed in processing. Uncertainty is not the sole criterion for state suspicion but rather leads to information-seeking, or cognitive activity (Lyons et al., 2011). *Cognitive activity* involves an increased cognitive arousal attributable to one's assessment of the referent (Bobko et al., 2014; Hilton et al., 1993). When state suspicion is active, it leads to additional inspection of the referent, via competing hypotheses having the aim of explaining the behavior of said referent. State suspicion reportedly contributes to reduced confidence in decision-making and increased information seeking strategies (Lyons et al., 2011). Additionally, individuals also think longer about the information they already have available. Finally, state suspicion entails perceptions of *mal-intent*, or an assumption that making oneself vulnerable to the referent may result in harm due to his or her maliciousness (Bobko et al., 2014). Mal-intent comprises questioning reasons and possible-concealed motives of the referent. In their review, Bobko et al. (2014) found almost every report involving suspicion that they uncovered mentioned inferred possible harm stemming from the respective interaction. The perceived characteristics of the referent are a crucial part of state suspicion. At minimum, there is a perceived possibility of harm from the referent. If there is no perceived vulnerability, state suspicion does not arise (Bobko et al., 2014).

### **1.2. Trustworthiness and state suspicion**

Previous research has assumed trait trust and suspicion compose the same construct (Costa & McCrae, 1992; Costa Jr, McCrae, & Dye, 1991). In light of the definitions described above, trustworthiness and state suspicion represent theoretically unique constructs. First, perceptions of trustworthiness are antecedents to the development of trust, and trust involves an expectation of a positive outcome. Mayer et al. (1995) stated that trust is "the expectation that the other will perform a particular action important to the trustor" (p. 712). This

expectation is in part influenced by the trustor's perception of the ability, benevolence, and integrity of the trustee. In contrast, state suspicion involves actively processing information from the environment, as a result of uncertainty concerning the outcome (Bobko et al., 2014). State suspicion does not involve any expectation because the outcome of making oneself vulnerable to the other is still unclear. Second, perceptions of trustworthiness influence intentions to trust, and those intentions moreover entail an expectation that trusting the referent will result in a positive outcome (Mayer et al., 1995; Schoorman, Mayer, & Davis, 2007). Meta-analytic data have shown trustworthiness perceptions predict subsequent behaviors directly (see Colquitt et al., 2007). State suspicion ascribes negativity to the referent because of his/her possible mal-intent (Bobko et al., 2014). The mal-intent aspect of suspicion aligns with the integrity assigned to the referent in the trust process. However, state suspicion is not simply a matter of distrust, as the former includes uncertainty (Bobko et al., 2014), whereas the latter entails the expectation of a negative outcome, or distrustful behavior (Mayer et al., 1995). Third, perceptions of trustworthiness influence an individual's decision to be vulnerable (Mayer et al., 1995). In contrast, state suspicion is characterized by postponement of judgment (Bobko et al., 2014). When individuals are suspicious, they refrain from making a judgment as a result of the uncertainty associated with being vulnerable to the referent (Hilton et al., 1993).

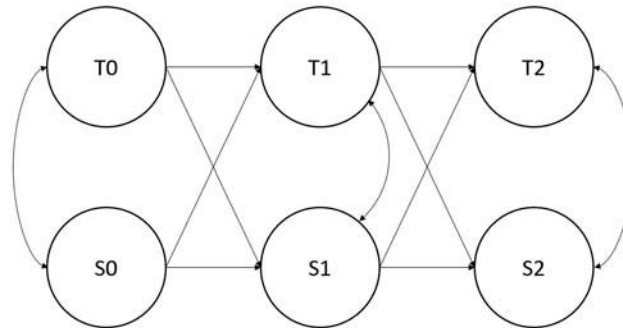
### **1.3. Trustworthiness and state suspicion over time**

Although trustworthiness and state suspicion represent distinct constructs, Bobko et al. (2014) postulated that trust and suspicion are nonetheless related and may reciprocally influence one another. As trustworthiness is an antecedent to the development of trust, trustworthiness may act as an inhibitor of state suspicion over time. Previous perceptions of trustworthiness establish an expectancy, much like a heuristic (Bobko et al., 2014), which reduces perceptions of uncertainty (McKnight, Choudhury, & Kacmar, 2002). In contrast, state suspicion is characterized, at least in part, by active processing of information resulting from uncertainty (Bobko et al., 2014), and the perceiver will weigh the merits of competing reasons why a given behavior or action has occurred. When there is a discrepancy between what one observes and expects, state suspicion arises. Perceptions of trustworthiness may enhance trust and, thereby, reduce uncertainty, which in turn can lead to a reduction in state suspicion (Buller & Burgoon, 1996).

Bobko et al. (2014) postulated trust serves as an inhibitor of state suspicion; however, they made no mention as to whether this interplay occurs between perceptions of trustworthiness and state suspicion, let alone whether suspicion (state or trait) is an inhibitor of trustworthiness. State suspicion ostensibly impedes trust because the uncertainty and mal-intent aspects contrast with the evidence from antecedents to the formation of trust, namely perceptions of trustworthiness. Perceiving ambiguity concerning a referent's motives is counter-productive to the development of trust. Trust is most notably a heuristic process (Kramer, 1999), whereas state suspicion is more an effortful cognitive process (Kim & Levine, 2011; Millar & Millar, 1997). In a state of suspicion, the trustor continues performing cognitive evaluations about the referent and determining whether or not to trust him or her. As such, suspicion should inhibit the trust-building process, most notably those components involving the antecedents to trust. We, therefore, hypothesized that state suspicion should negatively influence perceptions of trustworthiness at successive points in time.

The purpose of the current study was to explore the relationship between perceptions of trustworthiness and the activation of state suspicion. Specifically, we hypothesized that previous perceptions of trustworthiness and previous state suspicion assessments are predictive of subsequent perceptions of trustworthiness. Similarly, we hypothesized that previous perceptions of trustworthiness and previous state suspicion assessments are predictive of subsequent state suspicion. For our analysis, we tested a cross-lagged model of perceptions of trustworthiness and state suspicion over time using panel analysis (see Figure 1).

**Figure 1. Cross-lagged panel analysis model. Note: T = Trustworthiness Construct, S = Suspicion Construct; Number is the Session number for each construct.**



## 2. Method

### 2.1. Participants

A total of 200 participants (40 teams of five members each) from a Midwestern university ( $n = 170$ ; age:  $M = 19.55$ ,  $SD = 2.93$ ) and the surrounding local area ( $n = 30$ ;  $M = 22.04$ ,  $SD = 1.59$ ) either volunteered in exchange for course credit or received financial remuneration. As a result of a computer malfunction, data from one team were lost, and the resulting sample size was 39 teams, 195 participants in total (60% male; age range of 18 to 45 years,  $M = 20$  years,  $SD = 2.91$ ).

### 2.2. Task apparatus

We chose an experimental, computer-mediated setting to test our hypotheses. The participants were recruited from an undergraduate psychology department participant pool. As such, at least some of the participants may have had previous interactions with each other that influenced their perceptions of trustworthiness or suspicion. The task described below was novel; hence, previous perceptions in the performance of a specific task (e.g., game playing ability) were not relevant. In addition, the complete computer mediation hid (1) which participant had a specific job (as described below) and (2) the computer station at which each was located.

The computer aerial port simulation (CAPS; see Lyons et al., 2008) testbed is a java-based application. In CAPS, teams of five must communicate via computer-mediated instant-messaging and collaborate as a cohesive unit to manage inbound and outbound aircraft in a computer-simulated airbase. Each team member is randomly assigned one of five jobs: (1) passenger services is charged with unloading, organizing, and in-processing passengers from inbound aircraft, as well as loading passengers onto outbound aircraft; (2) fleet services must clean and restock inbound aircraft with needed supplies (e.g., blankets and pillows) and must also order and deliver meals for the passengers on departing aircraft; (3) ramp services is in charge of loading and unloading cargo from aircraft; (4) cargo services is tasked with organizing cargo unloaded by ramp services into bays and prioritizing cargo for ramp services to load onto outbound aircraft; (5) air terminal operations flight (ATOF) is the aerial port operations administrator whose primary directive is the coordination and oversight of the other four team members; ATOF is also in charge of departing aircraft from the terminal once all jobs are completed.

Several tasks must be performed sequentially by participants. For example, fleet services cannot clean the aircraft until passenger services has removed passengers from the inbound aircraft. Other tasks require that information be passed between participants with different jobs. For example, fleet services must order the correct number of meals for passengers departing on a given aircraft, as well as request the number of passenger meals to prepare from passenger services. Team members, therefore, must effectively communicate with one another using the provided text-based instant messaging application to perform their tasks accurately and in the proper order. The participants in each team were encouraged to provide regular updates to one another and to ATOF on their progress,

as well as to indicate any questions or issues they may have had. Members of the teams were separated into cubicles and communicated only through the messaging application.

The CAPS testbed-required team members to rely on one another. Constant surveillance and verification is simply not practical in the task as participants must maintain primary focus on their jobs and communicate through the messaging application. Therefore, team members must develop a sense of trust for one another, in relying on one another to perform their tasks proficiently, as well as communicate effectively.

### **2.3. Measures**

We used panel analysis to explore the current hypotheses, as described below. We were interested in the trustworthiness and state suspicion latent constructs, but we were not particularly interested in each scale-item composing the facets of trustworthiness and state suspicion. As such, we chose single-item measures of each trustworthiness and state suspicion facets and modeled trustworthiness and state suspicion as latent constructs. The single-item measures were chosen based on past practices and theory (see below). Using the full scales would have required hundreds more participants to obtain adequate power to model 17 items for trustworthiness and 20 items for state suspicion. Additionally, the total items in the final model for all three-time points would have been 111 items. Structural equation modeling typically has difficulty establishing fit with many items (Marsh, Lüdtke, Nagengast, Morin, & Von Davier, 2013). The complexity of such a model is beyond the scope of the present research. One way to reduce modeling parameters of all items from each scale would be to create item parcels of each facet. However, creating parcel values for each facet of trustworthiness and state suspicion constrains the variance at the latent construct level (see Marsh et al., 2013). Modeling latent constructs from single items for each facet of trustworthiness and state suspicion allowed us to reduce the necessary sample size while avoiding the caveats of parceling. For these practical and statistical reasons, we used single-item measures of the facets of trustworthiness and state suspicion. Additionally, research has demonstrated single-item measures are appropriate an item is not ambiguous (Wanous, Reichers, & Hudy, 1997). This is the case with both trustworthiness and state suspicion facets.

#### **2.3.1. Trustworthiness**

We used a shortened version of the Mayer and Davis (1999) scale to assess perceptions of trustworthiness, as indexed by three single items, one from each subscale. The items “The team would have knowledge about the work that needs to be done,” “The team would go out of its way to help me,” and “Sound principles seem to guide the team’s behavior” represented ability, benevolence, and integrity, respectively. The participants indicated their agreement with each item on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*). Although each subscale comprises more items, we chose the ones Jones and Shah (2016) used as our single-item measures.

#### **2.3.2. Suspicion**

We used Bobko et al.’s (2014) scale to assess state suspicion (Calhoun et al., 2017). We contacted Bobko for the three best items representing the facets of suspicion (P. Bobko, personal communication, 17 May 2015). Three items pertained to individual beliefs concerning the levels of suspicion within the team. “During the encounter, I was uncertain as to what was really going on,” “There were many times when I found myself wondering about the information being provided,” and “I felt my team would be up-front about their tasks (reverse scored)” represented uncertainty, cognitive activity, and mal-intent, respectively. The participants responded to each item on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*).

### **2.4. Procedure**

After obtaining consent from the participants, the members of each team completed background surveys, followed by a slideshow with training material containing information about the team-level goals, as well as other information tailored to a given participant’s job. The team then took

part in a practice session, involving of a single aircraft and lasting roughly 15 min. The next round of surveys followed, in which the first assessments of team trustworthiness and state suspicion were collected (Session 0). The team then completed its first full session during which a total of five aircraft landed in consistent 5-min intervals. Complete sessions ended after 30 min, regardless of whether aircraft had departed. The next round of surveys followed the first session (Session 1). A second full session then commenced and involved five aircraft landing at inconsistent and unpredictable intervals. In this session, once the preparation of the third aircraft was completed and selected for departure, the team was informed that the aircraft was to be repurposed and reassigned to a new destination. This involved unloading all passengers and cargo currently aboard and reloading the passengers and cargo assigned to the new destination. Roughly 20 min into the second full session, a communication breakdown was introduced, such that the messaging application cut off communications between certain participants. Thus, team members had to relay messages across multiple persons to share necessary information and provide instructions and updates, in addition to discovering which routes of communication were operable and effective in meeting their communication goals. Once the second session finished, the participants completed the final round of surveys (Session 2), after which they were then debriefed, thanked, and compensated for their time.

### 2.5. Data analysis

To test our hypotheses, we conducted a panel analysis using structural equation modeling (SEM). In identifying the models, we chose the effects coding method (Little, 2013). The effects coding method identifies a model by constraining a path to be a unique solution, which is the number of items minus the loadings of the other items. We chose this method because the latent variables of trustworthiness and state suspicion are not adequately represented in the marker method, as no single facet measures capture the composite construct perfectly. Constraining any of the items to one would indicate the latent variable is perfectly measured by that facet (e.g., ability, uncertainty, etc.), which is not the case theoretically (Bobko et al., 2014; Mayer et al., 1995).

We followed the steps Little (2013) outlined to conduct our analyses. First, we conducted a confirmatory factor analysis (CFA) of the two constructs at each point in time involved. Next, we conducted a longitudinal CFA. The longitudinal CFA revealed whether or not the measures of the constructs (1) were factorially the same (configural invariance), (2) loaded onto the construct similarly (weak invariance), and (3) the intercepts were the same across time (strong invariance). After establishing the appropriate level of invariance, we tested the models for multilevel aspects, as the data were nested within groups. We assessed the ICC(1) and the ICC(2) for the constructs across the points in time covered.

After establishing the appropriate level of invariance across time, we conducted the panel models. The panel models were derived from the established confirmatory models. In our study, we tested a cross-lagged model. The cross-lagged model is a regression path in which the construct is predictive of the next ordered measurement of both itself and the other construct being measured at each point of time involved. In other words, a construct at each successive point is predicted by both constructs. Figure 1 illustrates the cross-lagged model.

To judge the relative fit of each model to the previous one, we chose three changes in fit statistics. First, the chi-square ( $\chi^2$ ) fit index was utilized to reveal the degree of fit between nested models, as it has a testable significance assessment (Vandenberg & Lance, 2000). However, the  $\chi^2$  fit index can be affected by sample size. Cheung and Rensvold (2002) have, therefore, suggested using the change in comparative fit index (CFI) and Tucker-Lewis index (TLI). Specifically, they recommended a guideline of a change of less than .01 for both indices to indicate the adequate invariance assumption. However, there are no steadfast rules for the CFI and TLI measures. As a result, all three measures (the  $\Delta\chi^2$ ,  $\Delta$ CFI, and  $\Delta$ TLI) were used in assessment of the relative fit of the models.

### 3. Results

The means, standard deviations, and zero-order correlations for the variables in the study appear in Table 1. We conducted several confirmatory factor analyses to determine whether or not the single item measures would replicate the factor structure for trustworthiness and state suspicion at each point in time considered, both separately and with both constructs at each time point. The models all fit the data well.<sup>1</sup>

#### 3.1. Longitudinal confirmatory factor analysis

First, we conducted a longitudinal CFA of the two factors over time. The results appear in Table 2. The configural invariance model fits the data moderately well,  $\chi^2(102, N = 195) = 188.215, p < .001$ , CFI = .920, TLI = .879, RMSEA = .066; the CFI was above .90 and the RMSEA was between .05 and .10 (Hu & Bentler, 1999). Any further modifications were not justified theoretically; as such, the configural model was retained. Next, we tested for weak invariance by constraining the slopes across time to be equal. The weak invariance model fits the data well,  $\chi^2(110, N = 195) = 198.707, p < .001$ , CFI = .917, TLI = .885, RMSEA = .064. The weak invariance model fits the data as well as the configural model, in that the fit indices did not indicate a significant change in fit ( $\Delta\chi^2(8, 195) = 10.492, p = .232, \Delta\text{CFI} = .003, \Delta\text{TLI} = +.006$ ); in fact, the model increased the fit of the TLI index. This indicates the constructs had the same meaning across time to participants.

We tested the strong invariance model against the weak invariance model by constraining the intercepts to be equal. The strong invariance model fits the data well,  $\chi^2(118, N = 195) = 214.121, p < .001$ , CFI = .910, TLI = .884, RMSEA = .065. The strong invariance model fits the data as well as the weak invariance model, as the fit indices did not indicate a significant change in fit ( $\Delta\chi^2(8, 195) = 15.414, p = .052; \Delta\text{CFI} = .003, \Delta\text{TLI} = -.006$ ). The strong invariance indicates that all time points have the same probability of endorsing an item, for each given item. The strong invariance model was used as the comparison model for all panel analysis models. Table 3 shows the means and variances for the latent constructs from the strong invariance model.

#### 3.2. Multilevel model

Next, we attempted to fit the confirmatory models to a multilevel framework. First, we tested the ICC(1) and the ICC(2) for each construct at each time of interest to determine whether or not the construct exhibited significant between-group variance and warranted being modeled as a second level construct. The results indicated significant between-group variance in trustworthiness at Session 0 [ICC(1) = .183] and Session 2 [ICC(1) = .132]. However, Session 1 [ICC(1) = .069] did not reveal significant between-group variance. In addition, none of the trustworthiness latent constructs warranted being modeled at the between-group level, in as much as the ICC(2)s were not significant [Session 0 ICC(2) = .528, Session 1 ICC(2) = .270, Session 2 ICC(2) = .433]. State suspicion revealed marginal between group variance at Session 0 [ICC(1) = .097], significant between-group variance at Session 1 [ICC(1) = .144], and no significant between-group variance at Session 2 [ICC(1) = .030]. In addition, the state suspicion construct demonstrated low ICC(2)s [Session 0 ICC(2) = .350, Session 1 ICC(2) = .457, Session 2 ICC(2) = .135].

We attempted to fit the configural model to a multilevel framework. The multilevel model served to establish any between-group variance as a nuisance variable. The model was unidentified, in that there were more parameters than number of clusters (teams). As a result of the inconsistent ICC(1)s across time for each construct, the ICC(2)s not demonstrating the constructs should be modeled at the between-group level, and the model as not being identified, we chose to run the panel analyses on a single-level model.

#### 3.3. Panel analysis models

To determine whether trustworthiness and suspicion developed separately or in combination over time, we tested the cross-lagged model. The model allowed perceptions of trustworthiness at each time point to influence state suspicion at the following point in time, as well as state suspicion to influence trustworthiness at the following point in time. The cross-lagged model had adequate fit,



**Table 1. Means, standard deviations, and intercorrelations of observed study variables for each point involving assessments of trustworthiness and state suspicion.**

	M	SD	1	2	3	4	5	6	7	8	9	10	11
1. A-0	3.62	0.86	-										
2. B-0	3.60	0.71	.32**	-									
3. I-0	3.54	0.74	.31**	.37**	-								
4. U-0	3.42	1.04	-.19*	-.20*	-.25*	-							
5. CA-0	3.21	1.12	-.19*	-.19*	-.17*	.46**	-						
6. MI-0	2.18	0.76	-.24*	-.34**	-.44**	.14	.18*	-					
7. A-1	3.73	0.88	.33**	.09	.15*	-.17*	-.20*	-.14	-				
8. B-1	3.59	0.80	.18*	.36**	.32**	-.25*	-.24*	-.26**	.42**	-			
9. I-1	3.60	0.76	.22*	.20*	.44**	-.16*	-.21*	-.20*	.42**	.56**	-		
10. U-1	3.18	1.08	-.12	-.07	-.01	.33*	.35**	-.03	-.27**	-.20*	-.29**	-	
11. CA-1	3.07	1.15	-.18*	-.12	.01	.26**	.55**	.07	-.31**	-.22*	-.25*	.54**	-
12. MI-1	2.26	0.86	-.15*	-.07	-.13	.10	.24*	.22*	-.39**	-.37**	-.42**	.26**	.25
13. A-2	3.86	0.82	.24*	.15*	.19*	-.22*	-.15*	-.17*	.31**	.23*	.23*	-.11	-.10
14. B-2	3.72	0.82	.23*	.28*	.29**	-.28**	-.18*	-.16*	.34**	.57**	.51**	-.18*	-.16
15. I-2	3.70	0.78	.18*	.19*	.34**	-.14	-.14	-.20*	.27**	.41**	.50**	-.14*	-.17
16. U-2	3.22	1.19	-.07	-.13	-.11	.20*	.27**	.08	-.10	-.13	-.07	.44**	.36
17. CA-2	2.87	1.18	-.15*	-.17*	-.06	.22*	.46**	.18*	-.29**	-.20*	-.16*	.40**	.60
18. MI-2	2.24	0.88	-.15*	-.12	-.17*	.11	.14*	.17*	-.28**	-.34**	-.31**	.22*	.21

	12	13	14	15	16	17	18
1. A-0							
2. B-0							
3. I-0							
4. U-0							
5. CA-0							
6. MI-0							
7. A-1							
8. B-1							
9. I-1							
10. U-1							
11. CA-1							
12. MI-1	-						
13. A-2	-.29**	-					
14. B-2	-.40**	.35**	-				
15. I-2	-.27**	.32**	.43**	-			
16. U-2	.10	-.18*	-.23*	-.14*	-		
17. CA-2	.33**	-.23*	-.26**	-.26**	.58**	-	
18. MI-2	.45**	-.38**	-.42**	-.34**	.24*	.43**	-

Note. A = Ability, B = Benevolence, I = Integrity, U = Uncertainty, CA = Cognitive Activity, MI = Mal-Intent; M = mean; SD = standard deviation  
 \*  $p < .05$ , \*\*  $p < .001$ .

**Table 2. Fit indices for models**

Model	$\chi^2$	df	CFI	TLI	RMSEA	RMSEA 90% CI	$\Delta\chi^2$	$\Delta df$	$\Delta CFI$	$\Delta TLI$
Longitudinal CFA										
Single Level										
Configural Invariance	188.215	102	.920	.879	.066	[.051, .080]				
Weak Invariance	198.707	110	.917	.885	.064	[.050, .078]	10.492	8	.003	+.006
Strong Invariance	214.121	118	.910	.884	.065	[.051, .078]	15.414	8	.007	.001
Cross-lagged Panel Model	221.543	122	.907	.884	.065	[.051, .078]	7.422	4	.003	.000

Note.  $\chi^2$  = chi-square; df = degrees of freedom; CFI = comparative fit index; TLI = Tucker-Lewis Index; RMSEA = root-mean-square error of approximation; CFA = Confirmatory Factor Analysis.

**Table 3. Means and variances of latent constructs from strong invariance model**

Latent Construct	Mean	Variance
Trustworthiness-0	3.597	0.193
Trustworthiness-1	3.643	0.286
Trustworthiness-2	3.780	0.227
Suspicion-0	2.950	0.294
Suspicion-1	2.811	0.391
Suspicion-2	2.716	0.537

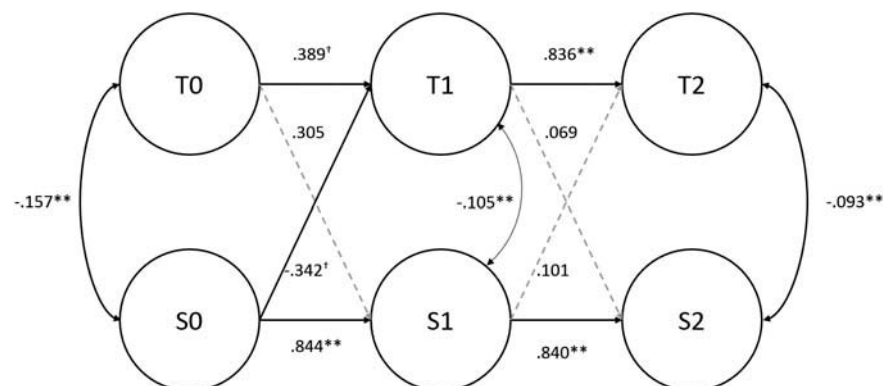
Note. All values are significant,  $p < .001$ .

$\chi^2(118, N = 195) = 221.543, p < .001, CFI = .907, TLI = .885, RMSEA = .065$ . The model fits the data as well as the strong invariance model, in that the model fits indices failed to reveal significant change [ $\Delta\chi^2(4, 195) = 7.422, p = .115; \Delta CFI = .003, \Delta TLI = .000$ ]. The results pertaining to the cross-lagged model are illustrated in Figure 2.

Previous perceptions of team trustworthiness influenced the next consecutive perception. Similarly, the previous perceptions of suspicion influenced the subsequent consecutive perceptions of suspicion, as expected. Initial state suspicion assessments were marginally related to perceptions of trustworthiness in Session 1. Once state suspicion was accounted for, initial perceptions of trustworthiness were also only marginally related to perceptions of trustworthiness in Session 1, which indicated that both accounted for conceptual variance in perceptions of trustworthiness in Session 1. However, the cross-lags for the later assessments were not a significant part of the model, as indicated in Figure 2. Perceptions of state suspicion from Session 1 did not appear to influence perceptions of trustworthiness in Session 2. In addition, previous perceptions of trustworthiness were not significantly predictive of subsequent state suspicion across the entire model. The two constructs covaried at each point in time considered. The trustworthiness and state suspicion latent variables were significantly (and negatively) related at each point in time considered. This suggests that when participants perceived their team as more trustworthy, perceptions of suspicion in the team declined. Interestingly, the negative covariances decreased in strength across time from  $\mu_{T0-S0} = -.0157, p < .001$ , in Session 0, to  $\mu_{T2-S2} = -.093, p < .001$ , in Session 2.

In summary, the results indicate these constructs reflect correlated processes. In situations of uncertainty, suspicion perceptions influence later trustworthiness assessments, but as cognitive assessments of trustworthiness become salient, state suspicion no longer influences trustworthiness. In addition, the relationship between trustworthiness perceptions and state suspicion was

**Figure 2. Cross-lagged panel analysis model results of unstandardized values. Note: T = Trustworthiness Construct, S = Suspicion Construct; Number is the Session number for each construct, <sup>†</sup> $p < .10, *p < .05, **p < .01$ .**



not consistent over time. That is, the construct covariances waned over time, and state suspicion influenced trustworthiness perceptions but only in the early parts of the model.

### **3.4. Discussion**

The current study drew on panel analysis to explore the relationship between perceived trustworthiness and state suspicion over time. The results indicated that perceptions of trustworthiness by and large failed to influence later perceptions of state suspicion. In contrast, state suspicion did marginally influence later perceptions of trustworthiness between training (Session 0) and implementation of training in the task (Session 1), but no significant cross-lags for state suspicion on trustworthiness between Session 1 and Session 2 surfaced. The constructs covaried modestly at each time point. Our findings are relevant in materializing the postulates put forth by Bobko et al. (2014) and Bobko et al. (2014): perceptions of trustworthiness and state suspicion are separate, but related, constructs. However, trustworthiness does not appear to influence subsequent state suspicion. Instead, state suspicion influenced subsequent perceptions of trustworthiness from baseline (Session 0) to initial task performance (Session 1).

### **3.5. Trustworthiness**

Perceptions of trustworthiness steadily increased over time. Past research has shown that as people become more familiar with a referent, perceptions of trustworthiness typically increase, given a trust-related action from the referent (Alarcon et al., 2016). Interestingly, ratings of trustworthiness were highest in Session 2, which had the communications breakdown. In Session 1, all team members were able to communicate and (to a degree) monitor each other's performance, and may not have relied on their assessments of trustworthiness. In Session 2, the participants had to rely on their teammates and communicate through others. The unstable situation necessitated reliance and cooperation, which once presented, increased ratings of trustworthiness (see Wilson et al., 2006). Additionally, trustworthiness may have been a buffer against negative outcomes or perceptions (see Lewicki, McAllister, & Bies, 1998) from the communications breakdown. The increased information concerning the team, gained through members' experience with one another, maybe another driving force of the buffer, as teammates become willing to accept more risk.

### **3.6. State suspicion**

Self-reported perceptions of state suspicion decreased over time. This decrease supports the hypotheses put forth by Bobko et al. (2014). State suspicion occurs when there is a discrepancy between one's observations and expectations. For the current task, the training session provided little information concerning how the team would perform in executing the overall task, as evidenced by higher state suspicion ratings immediately following the training session. However, as participants became more familiar with their team, members' perceptions of state suspicion diminished. State suspicion is induced by missing information (Bobko et al., 2014; Ebenbach & Moore, 2000). At the beginning of our experiment, participants' ratings of state suspicion were highest. As more information became available to the participants about their team and teammate's functioning, state suspicion dissipated. However, the reduction in ratings of suspicion does not necessarily imply that participants trusted their teammates. The salient information may have been the team was performing poorly or in a manner perceived as untrustworthy and, therefore, lead to distrust, which is a separate construct from state suspicion (Bobko et al., 2014; Lyons et al., 2011).

### **3.7. Trustworthiness and state suspicion**

Trustworthiness did not influence state suspicion over time. This contrasts with our hypothesized model. Bobko et al. (2014) stated that trust may act as an inhibitor of state suspicion. However, when previous assessments of suspicion were accounted for, assessments of trustworthiness were not a significant predictor of suspicion. In comparison, we found suspicion became a marginal predictor of trustworthiness at a later points in time. Trustworthiness may have not been predictive of state suspicion overall but could be for facets of state suspicion. For example, trustworthiness

might reduce a trustor's perceived mal-intent toward his or her team but not reduce cognitive activity or uncertainty. Complex situations, such as the CAPS scenario, may exhibit enough variability that participants remain suspicious of their team as a consequence of poor performance or other stimuli than mal-intent (Marr, Thau, Aquino, & Barclay, 2012). Similarly, assessments of state suspicion may be related to certain aspects of trustworthiness but not others. Future research should focus on the influence of different facets of trustworthiness on state suspicion (and vice versa) over time.

State suspicion showed a marginal influence on perceptions of trustworthiness from training (Session 0) to Session 1 but did not influence perceptions of trustworthiness developed in Session 1 and Session 2. State suspicion comprises in part a lack of certainty; as such, it may be most influential when strong perceptions of the referent have not been formed (e.g., Hilton et al., 1993). The training session served to familiarize the participants both with the task and the rest of their team, but the session was brief and interactions with the task and team were minimal. Perceptions of various referents were likely still forming because participants only interacted with each other briefly and with only one aircraft. Mayer et al. (1995) postulated that trait variables are most informative of trust early on in an interchange, insofar as little information is known about the trustee and may have influenced initial ratings. Future research should investigate the influence of these trait variables on longitudinal team-based computer-mediated tasks.

Suspicion may have inhibited the trust-building process at the beginning of executions of the team task. This finding is particularly relevant for team-based tasks. If teammates have greater state suspicion prior to receiving contextual information, then their heightened level of state suspicion may prevent the development of trustworthiness perceptions thereby to less pronounced trust intentions to be trusting and ultimately lower actual behaviors. When present, ambiguity can enhance suspicion (Ebenbach & Moore, 2000). However, once participants completed their first full round of activities, trustworthiness increased perhaps because more task-relevant information was available, which, in turn, reduced uncertainty. Hence, the later assessments of trustworthiness were not influenced by state suspicion. However, in real-world tasks in which teammates do not have the luxury of time to get to know one another, heightened state suspicion could have very real effects on teammates' perceived trustworthiness toward those whom they are expected to rely upon.

The trustworthiness and state suspicion constructs did covary negatively at each point in time of interest. This indicated the two constructs are negatively related, even though they did not consistently influence one another over time. Interestingly, the strength of the covariances between the two constructs steadily declined over time. One reason for this may be that as more information became available, state suspicion began to decline (Bobko et al., 2014). However, information alone may not always lead to greater trustworthiness. Instead, the information may lead to perceptions of distrust in the team, especially given poor team performance or a team experiencing conflicts (Simons & Peterson, 2000). Thus, state suspicion appears to be a unique construct and especially relevant in environments characterized by low information (Bobko et al., 2014). Conversely, trustworthiness is more relevant in high information environments.

Trustworthiness and state suspicion exhibited significant variance between groups at certain points in time. Interestingly, the ICC(1) for trustworthiness was not consistent over time, as only the training session (Session 0) and the last performance session (Session 2) revealed significant between-group variance. Similarly, state suspicion had a marginal ICC (1) in the training session and significant between-group variance in the first performance session (Session 1). However, after Session 1, no between-group differences in state suspicion were evident. The lack of information may have transitioned perceptions of suspicion away from the team members and toward discerning what was necessary to work with the communication breakdown and reordering of planes to perform the overall task of departing aircraft. Although not all cross-lags were statistically significant at the individual-level, the team-level constructs may have cross-lags, as they depict differences between teams, which we were unable to model in the current study.

### 3.8. Limitations and future research

The current study was not without limitations. First, we relied on single-item self-reports of trustworthiness and state suspicion. There are benefits to utilizing self-report measures of state variables, such as low cost and ease of administration (Spector & Jex, 1998). However, self-report measures have limitations such as common method variance (Podsakoff & Organ, 1986) and participants' being unable (e.g., Greenwald, McGhee, & Schwartz, 1998) or unwilling (Fazio, Jackson, Dunton, & Williams, 1995) to report their true inner states. Further, we did not administer adaptive versions of the full trustworthiness and state suspicion scales, which prevented us from investigating the influence of trustworthiness facets on state suspicion (and vice versa) fully. Future research may benefit from administering the full scales (provided that researchers implement a task that is not overly long, leading to survey response fatigue).

Second, Bobko et al. (2014) noted trust may act as a buffer against suspicion, which would indicate a moderator effect. Moderator analyses were beyond the scope of the current study. Future research should explore the relationship of trustworthiness as a moderator of state suspicion over time. Third, the current study involved computer mediation for all interactions. Although trustworthiness has been demonstrated to develop over time in computer-mediated teams (Wilson et al., 2006), state suspicion may rely on nonverbal cues to determine mal-intent. Future research should explore state suspicion amongst teammates in face-to-face and computer-mediated interactions.

Fourth, the current study did not have enough teams to run a multilevel panel analysis model, potentially due to variance at the team level. These variances are accounted for in the variance of the latent factors and the residual variances of the observed variables. Future research should explore why there may be inconsistencies in the between-group variance of trustworthiness and state suspicion over time as well as the relationships of the constructs at the group level.

Finally, familiarity amongst group members influences trustworthiness perceptions (Alarcon et al., 2016) and may too, influence state suspicion. We did not collect data regarding the familiarity of teammates with one another outside the experimental context. Thus, we were unable to enter partner familiarity as a potential covariate in our model. Future team studies should account for teammate familiarity and the potential moderating role of familiarity on trustworthiness and state suspicion development over time.

### 3.9. Implications

The present findings provide implications to both theory and application. Theoretically, we provided empirical evidence to the postulates of Bobko et al. (2014) showing that although trustworthiness may not influence subsequent state suspicion, the reverse is marginally so. Team managers may wish to foster work-contexts where co-workers are able to perceive trustworthiness in their teammates in an effort to reduce suspicion development in the team. Although computer-mediated work-contexts are becoming more prevalent, perceptions of trustworthiness can still develop and may reduce suspicion perceptions amongst teammates, leading to more trust and reliance amongst co-workers.

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#### Note

1. Results of confirmatory factor analyses at each time point are available from the first author upon request.

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