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VALIDATING THE TRUST IN TEAMS AND TRUST IN LEADERS SCALES

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Abstract

This study explores the psychometric properties of two scales: the Team Trust Scale and the Leader Trust Scale. An earlier validation effort (Adams, Bruyn and Chung-Yan, 2004) showed that although Benevolence, Integrity and Predictability formed discrete factors in exploratory factor analyses, the Competence items required revision. The goal of this work, then, is to explore the properties of the revised scales, to compare them to more established measures of trust in teams and in team leaders, and to attempt to validate their structure using confirmatory factor analyses. Lastly, it will also be important to explore the predictive validity of the scale measuring trust in teams.

Two hundred and twenty (220) regular force Army participants from a Canadian Forces base completed the Team Trust Scale and the Leader Trust Scale (Adams and Sartori, 2005), as well as several other related measures. Results showed that the scales were related in predictable ways to other scales tapping similar constructs, showing good evidence of convergent validity. Confirmatory factor analyses showed that the hypothesized structure underlying the scales provided a better fit to the data than a competing model. And, there was also very good evidence of the predictive validity of the Team Trust Scale, as it showed itself to be able to predict perceptions of teamwork, team morale, cohesion, and even combat readiness. These findings provide very good support for the scales, and suggest that they generally performed very well. However, concerns about the high internal consistency of the scale will need to be explored as work progresses.

Résumé

La présente étude porte sur les propriétés psychométriques de deux échelles de mesure de la confiance à l'égard respectivement de l'équipe et des chefs. Selon un travail de validation effectué précédemment (Adams, Bruyn et Chung-Yan, 2004), bien que la volonté de bien faire, l'intégrité et la prévisibilité constituent des facteurs discrets dans les analyses factorielles exploratoires, les points touchant à la compétence devaient être révisés. L'objet du présent travail était donc d'étudier les propriétés de nos échelles révisées, de les comparer à des outils mieux éprouvés de mesure de la confiance à l'égard de l'équipe et des chefs, et de tenter de valider leur structure au moyen d'analyses factorielles confirmatoires. Et enfin, l'étude de la validité prédictive de l'échelle de mesure de la confiance à l'égard de l'équipe est également importante.

Deux cent vingt (220) membres de la Force régulière canadienne ont répondu à nos questionnaires de mesure de la confiance à l'égard de l'équipe et à l'égard des chefs (Adams et Sartori, 2005), et à plusieurs autres échelles de même nature. Les résultats montrent qu'il existe des liens prévisibles entre nos échelles et d'autres faisant appel à des concepts hypothétiques similaires, ce qui reflète un bon degré de validité convergente. Les analyses factorielles confirmatoires indiquent que la structure hypothétique sous-jacente à nos échelles permet un meilleur ajustement avec les données qu'un modèle concurrent. On a également obtenu de bons indices de la validité prédictive de l'échelle de confiance à l'égard de l'équipe puisqu'elle a permis de prédire les perceptions concernant le travail de l'équipe, son moral, sa cohésion et même son état de préparation au combat. Ces résultats constituent une très bonne confirmation de la valeur des échelles, et ils permettent de penser que, de façon générale, elles ont bien rempli leurs fonctions. Cependant, au cours des travaux à venir, il faudra étudier les aspects liés à la forte cohérence interne de l'échelle.

Executive Summary

Previous research has identified trust as a necessary correlate for good teamwork and performance among various types of teams, from ad hoc laboratory teams, to collocated and segregated business-sector teams, to the military. Our developing model of trust in teams (Adams and Webb, 2003) argues that team trust has 4 primary dimensions: competence, benevolence, integrity and predictability. In order to promote our long term program of research, measures intended to capture trust in military teams and in the leaders of these teams were created (Adams, Bruyn, & Chung-Yan, 2004). The first iteration of these scales performed fairly well, but the Competence subscale required further revision.

The present study follows on from this work, and attempts to test revised versions of these scales. The first goal is to explore the revised scale, particularly with respect to how the new Competence items will perform. Second, this work also compares the performance of the Team Trust Scale and the Leader Trust Scale with other established scales of trust in teams and leaders. Third, this work explores the dimensionality of these scales using confirmatory factor analyses. Lastly, this research considers the predictive validity of the Team Trust Scale in predicting other relevant outcomes within a military team.

Two hundred and twenty (220) regular force Army personnel (both team members and team leaders) completed the Team Trust Scale and the Leader Trust Scale, as well as several other scales intending to tap trust in teams, trust in leaders, and related constructs.

Results for the Team Trust Scale showed that the scale seemed to capture trust in teams very well, and the reliabilities for both the scale as a whole and its subscales were very high. Moreover, the scale also behaved well in relation to other more established measures created within the work domain, and other measures created for the military context. Although significantly correlated with these scales, however, the Team Trust Scale still seemed to capture a unique aspect of team trust, as it was not wholly overlapping with existing measures. Importantly, the hypothesized dimensionality of the Team Trust Scale was also validated, with the 4 factor correlated model proving to be a better fit to the data than a competing theoretical model. There were also positive indications of the predictive validity of the Team Trust Scale, as it was able to significantly predict perceptions of teamwork, morale and cohesion. In addition, the Trust in Teams Scale was also strongly predictive of enhanced perceived combat readiness within teams. Taken together, then, the Team Trust Scale showed a good deal of promise. One potential concern, however, is the high internal consistency of the scale. This may have occurred either because the scale items define the trust construct too narrowly, or because of idiosyncrasies within the sample. If the former, this consistency could pose challenges for future validation efforts, and it would be important to attempt to address this. Even with the caveats noted, however, the Team Trust Scale validated very well in this study, and shows very good promise for the future.

Results for the Leader Trust Scale were also promising, and it showed excellent reliabilities and good evidence of construct validity. This scale showed a good level of correlation with other existing measures of trust in a leader, and the hypothesized structure of the Leader Trust Scale was also validated. However, it also showed similar levels of internal consistency, and this will also need to be understood as validation efforts proceed.

In addition, pilot versions of scales to measures organizational trust and distrust were also created and tested in this work. Results for the pilot version of the Organizational Trust and Organizational Distrust



Scales showed the expected factor structure. Moreover, the Organizational Trust Scale also showed meaningful relationships with more established scales of organizational trust.

The report ends with recommendations for the future of both the Team Trust and the Leader Trust Scales.

Sommaire

Des recherches préalables ont montré que la confiance était une condition nécessaire au bon travail collectif et au rendement de divers types d'équipes, qu'il s'agisse de spécialistes travaillant en laboratoire, de membres du secteur des affaires travaillant dans un même lieu ou dans des endroits différents, ou de militaires. Selon le modèle que nous élaborons actuellement (Adams et Webb, 2003), la confiance à l'égard de l'équipe comporte quatre dimensions principales qui sont la compétence, la volonté de bien faire, l'intégrité et la prévisibilité. Aux fins de notre programme de recherche à long terme, nous avons créé des instruments de mesure de la confiance à l'égard des équipes militaires et à l'égard des chefs qui les commandent (Adams, Bruyn et Chung-Yan, 2004). La première version de ces échelles avait assez bien rempli ses fonctions, mais la sous-échelle de la compétence avait encore besoin d'être révisée.

La présente étude fait suite à ce travail; son objet était de mettre à l'essai des versions révisées de ces mêmes échelles. Ici, le premier objectif était d'étudier l'échelle révisée, et plus particulièrement les nouveaux points relatifs à la compétence. En second lieu, nous comparons le rendement de nos deux échelles avec celui d'autres échelles éprouvées de mesure de la confiance à l'égard de l'équipe et des chefs. En troisième lieu, nous étudions l'aspect dimensionnel de nos échelles au moyen d'analyses factorielles confirmatoires. Et enfin, nous examinons la validité de notre échelle de confiance à l'égard de l'équipe sous l'angle de la prévision des autres résultats pertinents au sein d'une équipe militaire.

Deux cent vingt (220) membres de la Force régulière canadienne (membres et chefs d'équipe) ont répondu à nos questionnaires de mesure de la confiance à l'égard de l'équipe et à l'égard des chefs; ils ont également répondu à d'autres échelles mesurant les mêmes réalités et d'autres concepts hypothétiques connexes. Selon les résultats produits par notre échelle de confiance à l'égard de l'équipe, celle-ci semble très bien refléter la confiance à l'égard de l'équipe; la fiabilité de l'ensemble de l'échelle et de ses sous-échelles était aussi très élevée. De plus, notre échelle a donné de bons résultats si on la compare à des instruments de mesure plus éprouvés créés pour le monde du travail, ou à d'autres instruments destinés au contexte militaire. Cependant, bien qu'on remarque une corrélation significative avec ces mêmes instruments, notre échelle de mesure de la confiance à l'égard de l'équipe semble refléter un volet particulier de cette réalité parce qu'elle ne coïncide pas entièrement avec les échelles existantes. Chose importante, l'aspect dimensionnel hypothétique de notre échelle de confiance à l'égard de l'équipe a également été validé, le modèle corrélé à quatre facteurs produisant un meilleur ajustement aux données qu'un modèle théorique concurrent. Il y a également de bons indices de la validité prédictive de notre échelle de mesure de la confiance à l'égard de l'équipe, puisqu'elle a permis une prédiction significative des perceptions concernant le travail de l'équipe, son moral et sa cohésion. En outre, cette même échelle donnait une bonne prédiction de l'amélioration de l'état de préparation au combat perçu au sein des équipes. Globalement, l'échelle de confiance à l'égard de l'équipe s'avère donc prometteuse. Cependant, son fort degré de cohérence interne pourrait être problématique. Cela pourrait être dû au fait que les points contenus dans l'échelle donnent une définition trop étroite du concept hypothétique de confiance, ou encore au degré d'idiosyncrasie au sein de l'échantillon. Dans la première éventualité, cette cohérence interne pourrait poser des difficultés lors des travaux de validation à venir, et il serait alors important de rechercher une solution. Cependant, même avec les mises en garde soulevées, cette étude a permis de confirmer la valeur de l'échelle de confiance à l'égard de l'équipe, laquelle promet de donner de bons résultats à l'avenir.



Les résultats de l'échelle de mesure de la confiance à l'égard du chef sont également prometteurs, et ils montrent une excellente fiabilité ainsi que de bons indices de la validité du concept hypothétique. Cette échelle présente une bonne corrélation avec les instruments existants de mesure de la confiance à l'égard des chefs, et sa structure hypothétique a également été validée. Cependant, elle a un niveau comparable de cohérence interne qu'il faudra étudier au cours des travaux de validation.

De plus, dans le cadre de cette étude, nous avons créé et mis à l'essai des versions expérimentales d'échelles de mesure de la confiance et de la méfiance à l'égard de l'organisation. Les résultats obtenus montrent la structure factorielle qui était attendue. De plus, on a constaté une relation significative entre notre échelle de confiance à l'égard de l'organisation et des échelles plus éprouvées mesurant la même réalité.

À la fin du rapport, des recommandations sont formulées pour les travaux à venir sur les échelles de confiance à l'égard de l'équipe et des chefs.

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1. Recent Developments in Trust Research

The purpose of this chapter is to review relevant trust research that has emerged since the last review (in Adams & Webb, 2003). A search for new literature on trust indicated that it continues to be a concept of great interest for psychology. New contributions in this area included articles within the organizational domain, trust in romantic dyads, as well as research exploring systemic and interpersonal trust within the military context. Each of these works is considered in the sections that follow.

1.1 General Advancements in Trust Research

Several important articles have been identified since our last review of the relevant theoretical and conceptual work in the area of trust. Theoretical work exploring the relationship between trust and work group composition is of interest. This work argues that understanding the dynamics within small work groups is critical to understanding organizational behaviour more generally (Moreland and Levine, 2002). One important issue within work groups is trust, and Moreland and Levine (2002) argue that the increasingly fluid nature of many work groups has the potential to negatively impact on trust development and maintenance. To date, however, the relationship between work group composition and trust in work groups has received little attention. As shown in Figure 1, Moreland and Levine (2002) argue that their general model of socialization within work groups helps to explain intragroup trust dynamics.

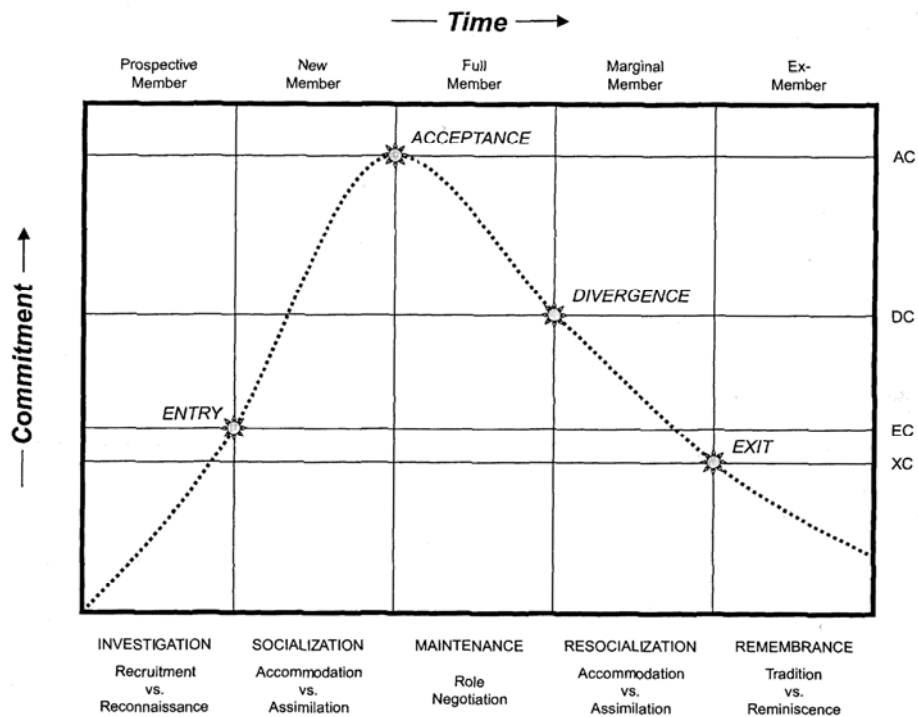


Figure 1. Moreland and Levine's (2002) model of group socialization.

As members change within a group, the group must undertake a different socialization process (e.g. "investigation" of a new group member or maintaining an existing member), and each of these tasks



poses a unique challenge for trust within the group. Prospective new members to a group, for example, have yet to show their commitment to the group. As such, the group must work to investigate this new recruit's prospective trustworthiness. However, if prospective members cross this hurdle, and are accepted by the group, these new members must then be socialized into the group, and need to be taught the norms and rules of behaviour. Full members have been accepted by the group, and have shown the necessarily high levels of commitment. As such, they are more likely to be trusted. For marginal members showing increasing divergence with the group, they may need to be "resocialized". This may involve the member being assimilated back into the group (and their trustworthiness being re-established), the group changing to accommodate the marginal member, or the member leaving the group and becoming an ex-member.

However, Moreland and Levine (2002) argue that shifting work groups may naturally give rise to conflict and issues of trust within the group. For example, from a trust perspective, newcomers can easily destabilize a group even in a short amount of time. For example, if newcomers are trusted and then behave poorly, trust among full group members may be affected as this could speak to the ability of the group to judge the character of others well. Moreover, full members might disagree about the severity of newcomers' misbehaviour, its sources, and proper remediation. The effects on trust within the group might be most severe if full members had previously disagreed about the trustworthiness of a new or marginal member. If suspicious members agreed to give the newcomer a chance on the basis of their trust in the opinions of other full members, when the newcomer misbehaves, not just this individual, but the supporting full members may become distrusted by the previously suspicious members. Moreland and Levine (2002) argue that only cooperative behaviour and open communication across an organization can alleviate the impact of varying work group membership on group trust.

Due to the high turnover rates in small teams in the military indicated in our previous research (e.g. Adams & Webb, 2003), most military teams are likely to have members at many different phases of membership. In this sense, it might be informative to use longitudinal research to understand trust dynamics during the process of group socialization. At what point does a soldier start to feel like he or she is a member of the team? And, at one point do his or her teammates feel the same? How long does reciprocal trust need to develop? Understanding these questions might help us to better understand the process of trust development, maintenance, and erosion.

Spector and Jones (2004) have also considered the influence of work group composition on trust in the workplace. They were interested in the attributions that existing employees make of new employees according to three categories: organizational membership (whether the new employee is internal or external to one's own organization), peer or superior, and male or female. More specifically, Spector and Jones (2004) argued that new internal employees would be more likely to be trusted than new employees from other organizations, because new internal employees are more similar and are likely to activate higher levels of category-based trust. They also expected that superiors would be more likely to be trusted than would peers, as superiors have status conferred by their role. Lastly, female employees were expected to be more trusted than male employees, because there is previous empirical evidence that women are more likely to be trusted than men (Jones and Kavanaugh, 1996; cited in Spector and Jones, 2004).

A total of 127 professionals working in 19 offices in the United States received scenarios concerning a hypothetical new employee being brought into an existing project team whose characteristics varied along the three dichotomous variables just listed. Using Omodei and McLennan's (2000) Interpersonal Mistrust-Trust Measure, participants were asked to rate how much they would trust the individual in a scenario. The only significant finding of interest was an interaction between respondent gender and

trustee gender, such that male respondents trusted new male employees more than they trusted new female employees. This finding conflicted with Spector and Jones' (2004) hypothesis that new female employees would be more trusted by respondents of both sexes because they would *a priori* be perceived as less threatening and competitive than unfamiliar male employees. Because workgroups in most organizations including the military are more commonly of mixed gender than before, this is an important question to explore further. Unfortunately, Spector and Jones' work (2004) did not explore the reasons for the sex differences, and the extent to which this assumption was founded on gender stereotypes is unclear. It was also unclear what dimensions of trust might have driven these effects. For example, women may be seen as having higher integrity by men, but may be seen as less competent on task-related skills. This suggests that it may be important to identify *a priori* which dimensions of trust will be most salient at a given time over the course of a relationship. However, because workgroups in organizations (including the military) are more commonly of mixed gender than before, it will be important to understand the relationship between team gender-composition and team trust dynamics more fully in the future.

Other theoretical work presents a compelling view of trust as "an organizing principle". According to Zander and Kogut (1995; cited in McEvily, Perrone, & Zaheer, 2003), organizing principles provide guidance for how work is coordinated and information is gathered, disseminated, and processed within and between organizations. Organizing principles provide heuristics for how should actors interpret and represent information and how should behave and coordinate with others. As trust allows positive assumptions about the motives and intentions of others, when trust is in place, people can economize on information processing and safeguarding behaviours. This allows for conservation of cognitive resources, simplifies how information is acquired and interpreted, and guides behaviour by helping one determine the most beneficial course of action. For this reason, then, trust is argued to be an "organizing principle" (McEvily et al., 2003) that is of specific import in working with others. This description of trust is an important one, as it clarifies the underlying process by which trust might be expected to impact within teams. However, although this work presents a compelling view of how trust might impact, the ability of trust (as an organizing principle) to actually produce more efficiency and energy saving still remains to be shown experimentally.

Another area in which trust has received relatively consistent attention over the years is within romantic relationships. A study by Miller and Rempel (2004) explored the relationship between trust within a marital relationship and attributions about one's partner over time. Although the context of this research is clearly far from the military context, the quality of the research and the processes that it describes have clear applicability to the team domain, and make this research worthy of coverage.

This study used a longitudinal design with married couples. In the first phase of the study, couples completed a measure of trust in their marital partner, and then engaged in a laboratory discussion of an issue identified by the couple to be a frequent area of conflict within their relationship. Following this problem solving session, couples then completed measures of their partner's behaviour and motives during the discussion. In the second phase of the study occurring about 2 years later, the same couples were contacted and again asked to complete the trust scale, and to review the previous videotape of the problem-solving discussion. At this point, they again rated their partner's behaviours and motives during the discussion.

Results showed that earlier trust and attributions about a partner's behaviour two years later were significantly linked. High trust couples at Time 1 showed more ascription of positive intentions to their partner at Time 2. This suggests that trust can be a "top-down" process, and that can promote positive interpretations of close others over time. However, results also showed evidence of trust being a "bottom-up" process as well. More specifically, positive attributions about one's partner at Time 1 were also



predictive of trust at Time 2. However, a partner's willingness to believe the best about their spouse even though this spouse had clearly behaved badly earlier in the relationship was the best predictor of trust. This finding is a particularly important one, as it suggests that what builds trust is not necessarily good behaviour on the part of close others, but our inherent sense that even negative behaviour is not congruent with this person's true intentions.

Of course, it is unclear how well this research might generalize to the domain of trust in teams, but it does provide a compelling account of the link between trust and attributions about close others. As such, we believe that the lessons of this study could provide important information (at both a theoretical and empirical level) as our work related to trust violations begins.

An important study just published provides evidence that trust research is gradually extending to broader questions. Recent work by Dunn and Schweitzer (2005) considers the influence of emotion on trust. These researchers argue that although trust is predicated on perceptions of the characteristics of the trustee, little consideration has been given to the potential power of incidental emotions (emotions not related to the person) on trust judgements. This is somewhat surprising, given the long established relationship between affect and both decision making and interpersonal judgement (e.g. Bower, 1981; Forgas & George, 2001). In terms of decision making, for example, people have been shown to provide higher ratings of their life satisfaction on sunny days than on rainy days (Schwartz & Clore, 1983) suggesting that incidental factors (such as the weather) can be easily misattributed when we make decisions. As such, if emotions can have such an impact on how we think about our own lives, it is natural to expect that they may also colour the trust judgements that we make when we encounter a new person.

Further, Dunn and Schweitzer (2005) argue that emotions can be distinguished by two features, valence (positive or negative) and by where responsibility for the emotion is assigned (which they call "control appraisal"). As such, the emotion of anger is typically focused on another person, guilt is typically focused on oneself, and sadness is typically situation-focused. Moreover, Dunn and Schweitzer (2005) also argue that different emotions also have different relationships with trust; happiness and gratitude promote trust, whereas anger is likely to decrease it. If this is the case, then by inducing people to experience incidental emotions, one should be able to predict trustworthiness ratings of an unfamiliar person.

In the first study in a series of 5, Dunn and Schweitzer (2005) considered the influence of three emotions (happiness, sadness, and anger) on participants' trust in a coworker whom they did not know personally. This study used a between group design with emotion (happiness, sadness, anger) and time of trust rating (before or after the emotion induction) as between group variables. Emotion was induced using a task in which participants recalled (and then wrote about) a previous experience associated with the target emotion.

Results showed that participants experiencing a happy emotion rated the coworker as more trustworthy, but only when the trust rating was completed after the induction. Similarly, participants who completed trust ratings of the coworker when angry also rated the coworker as less trustworthy. And, as expected, as the emotion of sadness is situation-focused (rather than person-focused), sadness had no impact on trust ratings. Other studies in the series showed that incidental emotion only impacted on trust judgements about unfamiliar people, and that peoples' awareness of the emotion undermined the effect of emotion trust judgements. As such, when people were conscious of being angry, they seemed to have made efforts not to allow their emotional state to carry over to their judgements of another person.

This work is extremely interesting, as it provides evidence of the area of trust research maturing, and being taken into logical, but previously unexplored domains. Moreover, it is also potentially important for the context of trust in teams. Of course, it does suggest that although incidental emotions are unlikely to have a serious impact in well established teams, in the increasingly networked and collaborative theatre of military operations, the impact of incidental emotions on judgements of unfamiliar others in ad hoc teams could be important to understand in more detail.

1.2 Trust in Military Contexts

Two other examples of research exploring trust within the military context have also emerged in the last few years. In their study on trust in organizational superiors at the systemic or collective level, Shamir and Lapidot (2003)¹ explored the differences between systemic trust and interpersonal trust in the Israeli Defence Forces (IDF). Systemic trust involves trust toward an object or system rather than a person, and it is not typically based on direct and personal experience with a trust target. However, the authors note that trust in organizations involves both impersonal and interpersonal considerations, and that leaders are major vehicles whereby individuals influence organizations and organizations influence individuals. Thus, the first major purpose of this study was to simultaneously explore the roles of systemic and interpersonal influences on trust.

The second purpose was to explore the role of groups in the formation of trust and distrust in formal leaders, and in the interplay between systemic and interpersonal factors. First, they argue that individual's trust in the larger system or organization is a critical aspect of trust. And, as individuals, people also work to form judgements about the trustworthiness of others. However, Shamir and Lapidot (2003) argue that people do not make trust judgements in isolation, but that in judging the trustworthiness of others (e.g. leaders), they are affected by the views of other members of their teams or groups. Within groups, these evaluations are often shared with others in the organization, and this sharing leads to shared group constructions of the trustworthiness of specific people; as such, groups bridge the gap between individual and systemic trust.

To explore these ideas, Shamir et al. (2003) conducted a study with the Israeli Defence Forces (IDF), in the context of an officer training course. Part of the training in this course is carried out in teams (assembled solely for this course) consisting of 15-20 cadets under an assigned leader.

This study had both quantitative and qualitative components. Quantitative data was collected at 3 points. Before the course began (Time 0), a questionnaire measure of role-based or systemic trust was administered to cadets. Then, 3 days after the course started (Time 1), cadet's trust in their team leader and their individual propensity to trust were assessed. Finally, about 2/3 of the way through the several month course (Time 2), cadet trust in the team leader was again assessed. Trust in the leader was measured using a scale with 3 factors including ability, integrity, and benevolence as well as willingness to trust (captured by 4 factors including openness, cooperation, learning and role modelling).

Shamir et al. (2003) hypothesized that at the early stages of interacting within a team, trust judgements would be primarily influenced by individual team members' propensity to trust, and by their a priori trust in the system (the system that had assigned the leader). As such, at Time 1 they expected that levels of

¹ Attempts were made to obtain these scales, however, Shamir and Lapidot (personal contact) indicated that they were in the process of translating them from Hebrew to English and they would let us know when this task was completed. Unfortunately, this did not occur, and follow up efforts to access the scales were not successful.

trust in the team leader would be relatively consistent within teams, because as they had no experience with the leader, there should be little to distinguish teams. As time passed and as trust was socially constructed within the team, however, trust measured later in the course (at Time 2) was expected to be more influenced by interaction and experience with the team leaders that was then shared and socially constructed within the team context. More specifically, over time, team-based trust in leaders was expected to replace propensity to trust and role-based trust.

The first set of analyses explored the consistency of teams' leader trust ratings at the beginning of the course. One-way ANOVAs were completed to test whether teams differed on their rating of each of the "trust in leader" factors and "willingness to trust" factors. At Time 1, results showed that different teams did rate their trust in leaders significantly different for the 3 trust dimensions (i.e. ability, benevolence and integrity), but for only 1 of the 4 willingness to trust factors.² In order to explore the proportion of variance that could be attributed to team membership, intraclass correlations were also completed for these Time 1 data, looking at the correlations of these ratings amongst different teams. These correlations were consistently low for all 7 measures of leader trust, ranging between .01 and .13, and suggesting that at this early stage, little of the variance in perceptions about the leader could be explained by group membership. Shamir and Lapidot (2003) interpret these results to mean that the team-based construction of the leaders' trustworthiness had yet to develop at this early stage of the course.

Similar analyses for teams' ratings of their leaders' trustworthiness later in the course (Time 2) showed significant differences amongst teams on all 7 variables, with intraclass correlations ranging between .10 and .55. Again, these results are argued to provide evidence of time allowing groups the opportunity to shape individual members' perceptions about leader trustworthiness and of leader trust becoming some diversified within teams as a result.

Additional analyses exploring the role of propensity to trust at Time 1 vs. Time 2 were also undertaken. Propensity to trust measures taken at Time 1 were then correlated with the 7 measures of leader trust at Time 1 and at Time 2. At Time 1, propensity to trust was significantly correlated with all 7 leader trust measures. At Time 2, on the other hand, only 3 of the 7 measures correlated significantly with propensity to trust, and additional tests showed that all 7 correlations were significantly higher at Time 1 than at Time 2. This finding is argued to indicate that propensity to trust plays an important role in determining leader trust in the early stage of a relationship with a leader. Over time, however, propensity to trust is purported to have a lesser role as the group construction of leader trust gains in influence.

Exactly the same analytic strategy was used to compare the correlation between systemic trust and ratings of leader trust at Time 1 and Time 2. Again, the expectation was that systemic trust would exert less impact over time, and that "team-based" trust would begin to play more of a role. Results showed that systemic trust was more related to ratings of leader trust at Time 1 than at Time 2, and that these correlations were significantly lower at Time 2. Later in the course, then, perceptions about the team leader were argued to have become more socially constructed, and more tailored to the actual qualities of the person (as interpreted by the team), rather than having been shaped by systemic trust.

Taken together, Shamir and Lapidot (2003) argue that these results provide evidence for their account of the leader trust development process over time, that initial leader trust early in the course moved away from both individual perceptions of leader trustworthiness (as determined by propensity to trust) and

² This finding, of course, runs somewhat counter to the authors' prediction that leader trust at this point is relatively undifferentiated within different teams.

away from systemic trust. Over the course of time, they argue that leader trust came to be more influenced by team members' shared perceptions about leaders' trustworthiness.

Unfortunately, however, some of the data analytic strategies used in this paper are potentially problematic. For example, it is important to note that even though there was a significant difference on 3 of the 7 leader trust measures at Time 1 (arguing against their account of leader trust within groups being relatively undifferentiated), these differences were apparently overlooked by the authors in favour of the intraclass correlations that do support their view. This omission is unfortunate, as it may provide an important opportunity to understand what might be happening within the data. It is also unfortunate that significant differences amongst teams in terms of their leader trust ratings are reported, but no information is provided about whether leader trust ratings increased or decreased over time. Moreover, although the data seems to be presented in order to emphasize a link between the reduction in the role of both propensity to trust and systemic trust over time, it is important to point out that even if convincing reductions in propensity to trust and systemic trust could be shown, this does not necessarily provide evidence in support of the social construction account. In fact, the only evidence supporting this account are the intraclass correlations provided. To be more convincing, it would be important to show actual evidence that group members changed their views of leader trustworthiness because of conversations with other group members, etc.

More generally, although the many patterns of correlations provided in this report do provide some evidence that the determinants of leader trust may have changed over the course of time, the "story" that the authors seem to want to tell could perhaps be more easily tested using a multiple regression approach. As presented, the patterns of correlations between successive sets of 2 different variables must be "woven" together to depict the underlying theoretical account. An approach using multiple regression, however, would allow for simultaneous exploration of the path of important variables (e.g. propensity to trust, systemic trust and leader trust) over time. Such an approach may provide more conclusive answers to the interesting questions raised in this research.

In the qualitative part of the study, Shamir and Lapidot (2003) also analysed critical incidents that had contributed to the development and/or erosion of trust during the course. In a questionnaire administered to cadets at Time 2, cadets were asked to describe an incident that had occurred in their own team that helped build or strengthen their trust in their commander and one that reduced or destroyed it. Through these questionnaires and in group interviews with cadets and leaders separately, it was clear that expulsion was the single most important critical incident in the trust building/eroding process.

More specifically, leaders' expulsion behaviour was seen by cadets as indicative of leaders' integrity. Expulsion behaviour was also related to trust; if the leader behaved in a manner signalling integrity, trust increased. If the leader behaved poorly, (such as lack of warnings to students or by making it "personal"), trust decreased. The fact that leaders indicated that they recognized this and considered it in their expulsion decisions suggests that "leaders depend on followers no less than followers depend on their leaders" (Shamir & Lapidot, 2003). One other important finding from this part of the study was that team members were more likely to criticize a leader for not expelling cadets seen as deserving it than they were to criticize a leader for expelling teammates who did not deserve to be expelled. This suggests that team members were interested in perpetuating the values and objectives that they saw as important to the system; that is, retaining only the best cadets and expelling those who are sub-par. This observation illustrates Shamir and Lapidot's (2003) claim that systemic trust appears to influence interpersonal trust.

Despite these reservations about the quantitative data analytic techniques used in this research however, the ideas underlying this work are both interesting and important. Shamir and Lapidot's (2003) overarching hypothesis that understanding trust in organizations requires attending to three levels of



analysis (i.e. the individual, the group, and the entire system) is an important one. As such, this research makes a critical contribution to understanding trust within military contexts. The Shamir et al. (2003) account is broadly consistent with our own account of the process of leader development (Adams, Bryant and Webb, 2001). At the early stage of such relationships, category-based factors are likely to be more influential, giving way over time to personal and direct impressions about a leader's trustworthiness. The assertion that trust in a leader is also influenced by group or team social construction processes is also an important one, and one currently underemphasized in the team literature. As such, this research makes an important contribution to understanding trust within military contexts.

A unique study conducted by van der Kloet (2005) explores the development of trust in military units during several deployment missions. Past research on trust has tended to focus on trust in teams at a single moment in time and has not taken into account its possible progression. Van der Kloet (2005) argues that trust is time dependent and may follow a similar pattern to other team related constructs. For instance, during deployment missions, cohesion among soldiers has shown to have an inverted u-pattern, such that it is low at the beginning of the mission, high at the middle of the mission and decreases in the end (Bartone & Adler, 1999; cited in van der Kloet, 2005). In the beginning, cohesion is low as no interaction or cooperation has occurred among team members. However, as time goes by team members have formed beliefs regarding their team members' behaviour (they have developed a "shadow of a past") and they develop prospects of future cooperation ("shadow of a future"). At this point cohesion is at its highest, as both past judgments and future investments are taken into account. At the end of the deployment cohesion is found to decrease again, as the future is no longer in sight.

Van der Kloet (2005) argues that the development of trust may also follow a u-shape as a result of cultural issues during deployment, although the shape of the function would be opposite to that seen for cohesion. That is, prior to deployment, there is an excitement about the mission, and about the opportunity to see another country. This optimism may promote trust. Once the soldiers are in their deployment area, however, reality sets in and they begin to experience anxiety regarding the upcoming mission. Such negative feelings may lead to a reduction in trust among team members. Eventually, as soldiers become accustomed to their new surroundings, the shock wears off and trust begins to re-emerge.

In her study, van der Kloet (2005) examined the development of trust in 6 teams over a three month period, with the first measurement prior to deployment, the second measurement halfway through deployment (approximately 3 months into the mission), and the third measurement two weeks after they had returned from their deployment. The four components of trust (benevolence, honesty, competence, and predictability) were analyzed separately and in aggregate. A priori t-tests were conducted in order to test for differences in team trust at the 3 different points in the mission. Contrary to expectations, there was no significant difference in trust across the three time periods for the majority of the components. Therefore trust development did not demonstrate the suggested u-shaped pattern, in fact for the most part, trust followed a flat line. This implies that if trust is high in the beginning it will continue to be high throughout the deployment and at the end of the mission. Similarly, low trust in the beginning implies low trust in the middle and the end.

Aside from the main focus of the study, results also indicated that the emotional components of trust (i.e., honesty and benevolence) tended to have the highest mean ratings across time compared with the more cognitive components (i.e., competence and predictability) (van der Kloet, 2005), suggesting that trust is assessed more by emotions than cognitions. In addition, this study found that disposition to trust and maintenance of rules (i.e., consistent sanctions and rewards) contributes to trust in teammates and that these antecedents have much more influence at mid-deployment and post-deployment than at pre-deployment (van der Kloet, 2005).

This work is not only important because it provides an exploratory look at the development of trust in teams, but also because it indicates that trust is fairly consistent and stable across time. This however does not suggest that the development of trust is immune to certain influences. For instance, uncertainties due to the unfamiliar team members, as well as unexpected irregularities in the situation may change the manner in which trust develops. Because unfamiliarity among team members is not uncommon in the military and uncertainties often ensue, it would not be surprising that trust does not remain stable in such situations. As such, these factors must be taken into account when assessing trust in teams.

However, although the study was interesting and the topic promising, there were a number of problems with how the data was analyzed. One major criticism is the use of t-tests in analyzing mean differences in trust ratings across the three time periods. Given that there were three levels of the independent variable, statistical analyses would have been better conducted with an analysis of variance (ANOVA). Making multiple comparisons as opposed to conducting a single ANOVA increases the likelihood of Type 1 errors. To be fair, this puzzling analytic strategy may have derived from the fact that respondents across the 3 time periods were not consistent. However, it would have been ideal to have found some sort of matching variable (across respondents) in order to enable a better data analytic approach. At the very least, however, it is unclear that the study can really say much about the true time course of trust at different stages in a military mission, as different set of respondents would certainly show variance in trust wholly unrelated to the stage of the mission. Future research is therefore necessary to further the work on trust development using more sophisticated analyses and a more stringent research design. Despite these concerns, however, this work represents an important contribution to the military trust literature, and one which is worthy of further study.

Overview

There have been many important developments in trust research since our last review of the literature, and work in the trust domain continues to progress. Recent research has become more experimental, applying related theories and hypotheses to rigorous empirical testing. Interest in the link between systemic and interpersonal trust is on the rise, and empirical evidence supports such a relation. Several important themes emerge from the work reviewed:

- The works of Moreland and Levine (2002) and Spector and Jones (2004) suggest that team history and composition are likely to be important in future trust research. Specifically, how long teams have been together, how much turnover they are subjected to, and the relative contribution of different forms of trust over time (e.g. Shamir and Lapidot, 2003) stand as important issues for future research. This is further support for the potential value of considering trust in military contexts from a longitudinal perspective. Only this perspective will enable tracking the course of the many forms of trust over time.
- Miller and Rempel's (2004) research with married couples emphasizes the critical role of attributions in the trust development process. This work shows that over time, trust helps to shape attributions about close others, and that high trust early in a relationship is related to more positive interpretations of others' behaviour over time. Moreover, positive attributions early in a relationship also seem to provide the "groundwork" necessary to maintain trust even in the light of challenges. In fact, these challenges themselves seem uniquely important for building trust, as couples that had undergone difficult times in their relationships (but who had gotten through these difficulties) built trust even better than those that had not faced these challenges. Again, although it is unclear how well this work can be applied to the military domain, the importance of the relationship between trust and attribution processes has been prominent in conceptualization of



the dimensionality of trust (Adams and Sartori, 2005a), as well as likely to be very influential in our trust violation work. This issue will be critical to explore in more detail.

- Work by Dunn and Schweitzer (2005) provides good evidence of trust research maturing, and being directed at increasingly diverse issues. This work shows the potentially important role of incidental emotions on trust development, and adds yet another variable that is likely to influence trust within teams and systems. Within the military domain, then, leaders may wish to be vigilant about the situational events that occur on a mission and their resolution, in terms of its impact on trust within their teams. As these broader forms of research continue, the processes by which trust develops and is maintained will hopefully be brought more into focus.
- Other research (e.g. Shamir and Lapidot, 2003, van der Kloet, 2005) provides evidence that militaries other than Canada are also directing efforts toward understanding trust and trust-related concepts. This trend is very heartening and certainly further evidence of the increasing recognition of the importance of trust within military contexts. This attention is likely to facilitate our own work and it will be important to connect with researchers in other countries. Our efforts to this point (e.g. with Shamir) suggest that this is likely to be hindered somewhat by language issues and/or intellectual property issues, these efforts may prove productive if these issues can be overcome.

2. Scale Validation Background

The following section begins with a general discussion of construct validity, our general approach in this stage of validation, previous efforts and revisions undertaken, and then defines the specific goals of this work.

2.1 Construct Validity Overview

Construct validity is arguably the most important attribute of a scale measure (Westen & Rosenthal, 2003). Construct validity refers to the extent to which a measure adequately assesses the construct it purports to measure and adequately samples the content of the domain that constitutes the construct (Nunnally & Bernstein, 1994; cited in Westen & Rosenthal, 2003; Sommer & Sommer, 1991). Construct validity is often used as an overarching construct to refer to all types of validity. Convergent and discriminant validity refer to the extent to which a measure is correlated with more established measures from similar and dissimilar domains, respectively (Nunnally & Bernstein, 1994). For example, if one were to seek to validate the Positive Affect Negative Affect Scale (Watson, Clark, & Tellegen, 1988) one might expect scores on the older, established Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961; cited in Westen & Rosenthal, 2003) to positively correlate with those from the Negative Affect subscale of Watson et al.'s (1988) Positive and Negative Affect Scale, but negatively with the Positive Affect subscale. If these hypotheses are refuted, the construct validity of the scale may be in question. Certainly, there are many other forms of validity, but these are arguably the most important components of construct validity.

With all the accumulated knowledge about construct validity, one might expect for research in the published scientific literature to show a good deal of sophistication in terms of accurately assessing and monitoring validity in measurement research. In a sweeping criticism, however, Smith and McCarthy (1992) addressed the quality and types of “validation” studies submitted to the Psychological Assessment journal, a prominent APA journal focusing on empirical research on measurement and evaluation relevant to the field of clinical psychology. Smith and McCarthy (1992) wrote that one of the major and most frequent problems is that authors find a mid-range alpha, a couple of discriminant and convergent correlations, and conclude that a measure is reliable and has construct validity. Certainly, our reviews of the literature also suggest that this is an all too common occurrence. As such, following the excellent advice of Smith and McCarthy (1992), our aim in this work has been to explore the construct validity of our scales from several different perspectives, including both standard procedures (e.g. Cronbach alpha) as well as more demanding analyses (e.g. confirmatory factor analyses). Smith and McCarthy (1992) provide an excellent summary of the issues to consider in creating and validating a new measure.

- 1) Promote homogeneity in each unidimensional factor. It is possible that some items reflect correlates of the target construct but are not prototypic of it. This is typically addressed through good item construction (Smith & McCarthy, 1992), as in the guidelines set forth in Podsakoff et al. (2003) and taught in most basic scale construction courses at the undergraduate level. Generally, these guidelines include writing items that address a single idea, that do not “pull” for a particular kind of response, and that are likely to be interpreted the same way by the majority of people.
- 2) Establish internal consistency. Typically, this is done using Cronbach’s alpha. However, Schmidt, Le, and Ilies (2003) indicated that although Cronbach’s alpha is the classically preferred

reliability co-efficient, it fails to assess and/or correct for variability arising from factors other than those in the domain of interest, and may lead to overestimates of reliability. Clark and Watson (1995) note that Cronbach alpha is virtually useless in scales containing more than 40 items, preferring instead inter-item correlations between .15 and .50 depending on the range in specificity of the target; broader constructs can fall on the lower end, but narrower constructs should fall on the more conservative, higher end. Finally, Clark and Watson (1995) maintain that all items retained should have moderate rather than high intercorrelations. This is because highly correlated items will likely be redundant, whereas moderately correlated items will constitute more differentiated items, thus, yielding far more information.

- 3) Include items that discriminate among participants at the desired level of intensity of the construct. This requires knowing the difference between extreme (e.g. “10” on a scale that runs from 0 to 10) versus mid-range items and the range required by one’s sample. Smith and McCarthy (1992) suggest that low-range items (e.g. “2” on a scale that runs from 0 to 10) are good for general constructs (e.g., personality tests), mid-range items are best for a specific personality/social phenomena (e.g., trust), and extreme-range items are best for specific populations or clinical use (e.g., determining whether a respondent has schizophrenia). One should consider these levels during item construction, then after data collection, discrepancies between the actual and the desired levels should be checked. Smith and McCarthy (1992) and Clark and Watson (1995) recommend checking frequencies of item endorsement for dichotomous items or reporting the range of the responses of a scale that was actually used, not just the means on scales. For example, if a sample only used the upper end of a 7-point scale (i.e., 5, 6, and 7), this could indicate either a response set or that the chosen intensity level was inappropriate for a normative population and should be reported.
- 4) Replicate the psychometric properties across independent samples. One cannot conclude that a measure has construct validity because it holds up in one study. Smith and McCarthy (1992) also recommend repeated convergent and discriminant validity tests with different measures. If these do not behave as predicted, the scale requires modification, then further testing for convergent and discriminant validity with different measures and samples. Smith and McCarthy (1992) and Clark and Watson (1995) also caution against abbreviating long measures unless one is absolutely certain that they perform as well as the full measure. One cannot assume that the short version of a valid long measure is valid without conducting additional validity procedures.
- 5) Identify the measure’s underlying structure. Failure to do so could lead to inaccurate specifications of theory as well as misleading correlational and experimental findings due to hidden intercorrelations. Smith and McCarthy (1992) strongly recommend conducting factor analyses. Contrary to the usual default varimax rotation used, which posits that two factors are wholly independent (or orthogonal), many authors recommend an oblique rotation as psychological and social constructs are commonly interdependent (e.g., Smith & McCarthy, 1992). As a general rule, however, researchers often use varimax rotation for exploratory factor analysis, and oblique rotation for confirmatory factor analysis (but see Podsakoff et al., 2003, for caveats when using oblique rotation). Confirmatory factor analysis is clearly a popular method for assessing construct validity. Confirmatory factor analysis (CFA) differs from exploratory factor analysis because rather than testing for the underlying structure, it tests whether a specific hypothesized structure can be validated with the existing data. As such, confirmatory factor analysis provides a more stringent test of the underlying structure of a data set, and allows for testing of one’s full hypothetical model.

Clearly, understanding the construct validity of a scale requires systematic and programmatic efforts, and these efforts need to be based on understanding both the domain in which the scale is to be applied, as well as the underlying structure of the scale in relation to the hypothesized structure. Validation efforts are typically comprised of multiple studies, affording the ability to explore construct validity from many different angles. This study, therefore, represents the next logical step in this iterative process.

2.2 Our Approach to Trust Scale Validation

Our approach to understanding the validity of the Trust in Teams and the Trust in Leaders scales has been guided by our review of the relevant literature. It is important to acknowledge at the outset that the process of assessing construct validity is a somewhat subjective venture. This process, ideally, should focus on constructs that the researcher believes to be important to the actual construct of interest. And, as is impossible to validate a measure from every angle, efforts to assess construct validity need to be strongly theoretically grounded and to be embedded in a programmatic series of research that considers the construct from varying perspectives. In addition, it is not possible to simply ‘prove’ the construct validity of a measure only that it performs well in a given domain, or in relation to a given construct. In this sense, the process of construct validation is a long term effort. As Westen and Rosenthal (2003) have argued,

“...construct validation is not only continuous (a matter of degree, not a categorical distinction between valid and invalid) but continual (a perpetuating, self-refining process).”

This process, then, is iterative, and each step involves gathering information about the validity of the measure, then refining and testing the scale in a different context. Even invested researchers need to remember that the value of a scale is always relative rather than absolute. What might work well in one context may or may not generalize well to another. Of course, one does not go about this haphazardly. Validation efforts need to be systematic, and to stem from a defined program of research that carefully considers the needs of the “users” of the scale. At this point, the Trust in Teams scale has been designed for use within the military domain. However, as there are no valid and reliable scales that measure trust in teams in general, creating a scale that could be ported to other contexts was also a goal of this research.

This is not to say, however, that creating and validating the Trust in Teams scales needs be undertaken without end. In fact, how the validation process unfolds in the long term seems very dependent on the goals of the relevant researchers and the ultimate use of the scale. The Trust in Teams Scale has been designed in order to empirically study trust within teams over the longer term, and because there was a lack of appropriate and validated scales that would help to do this. In the short term, then, if the results of the current validation study are promising, it might be possible to begin to use this scale in future research with some evidence that it measures what it was intended to measure, but while working toward a fuller understanding of all its strengths and weaknesses. On the other hand, if the goal is to be able to publish the scale broadly and to widely promote its use in measuring trust in teams, then a fuller set of validation studies may be required in order to understand its “portability” to other contexts.

2.3 Previous Work and Necessary Revisions

In previous work (Adams et al., 2004), we created and conducted a preliminary validation of three scales attempting to capture the factors important in developing trust in the military: trust in teams, trust in leaders, and propensity to trust. This section provides a brief description of these past efforts.



The first iteration of the Trust in Team and Trust in Leader scales derived from a developing model of trust in small military teams (Adams & Webb, 2003). Focus group interviews with members of armoured reconnaissance crews indicated that trust in the military involved four dimensions including competence, benevolence, integrity and predictability. The development of scale items was in accordance with sound scale construction techniques (Nunnally, 1994), and items were written to address a single idea, to not “pull” for a particular kind of response, and to be likely to be interpreted the same way by the majority of people. In addition, the scales needed to be relatively easy and quick to administer, have face validity in order to be accepted in the military environment, be of a reasonable reading level, and to tap into the affective, behavioural, and cognitive components of trust.

The first version of these scales were tested with 197 active regular force Army personnel (147 team members and 50 team leaders) over a 3-day period in 2002 at a Canadian Forces base. Reliability analyses indicated that the scale would be improved with the deletion of several items. Once this was done, exploratory factor analysis was performed. This analysis showed that the Competence subscale items were problematic and failed to load onto a single factor. However, analyses with the Competence items removed showed that Benevolence, Integrity and Predictability did form 3 distinct factors and showed excellent reliability with alpha levels in the .90s and the scale as a whole accounted for 58.3% of the variance. These initial results were encouraging and suggested that it would be important to revise the Competence items before proceeding with the current validation efforts.

Participant feedback about the scale was also positive. Most participants indicated that they thought trust played a major role in their operations and that the scales captured their views of trust quite well. Although some participants indicated that the scales did not capture their views of trust, others indicated that they were not experienced enough with their teams to provide informed answers, either because they were relatively new to the military or because they had experienced “constant turnover” within their teams. This first effort to develop scale measures of trust in teams and in team leaders, then, was relatively successful, and would likely provide a good base for the current study once revisions to the Competence items were completed.

2.3.1 Trust in Teams Scale (Adams, Bruyn & Chung-Yan, 2004) and Necessary Revisions

As the Competence subscale did not perform as expected, the Competence items, as written, may not have captured the underlying dimension of interest adequately. Because competence has been shown to be an important component of trust in military teams, as seen in our work with military teams (Adams and Webb, 2003) and by other trust researchers (e.g., van der Kloet, 2005), we decided to revise the competence items in the current iteration of the scale. We tried to tap competence using domain-specific items such as, “My team members follow instructions well”, as well more broad items such as, “My teammates are highly skilled”. In addition, in response to feedback from participants about ambiguities in specific scale items, some minor changes in items were undertaken.

Table 1 shows the new Competence items developed for the current stage of research.

Table 1: New Competence Items – Team Trust

Item
My teammates fail to do their job. (r)
I have faith in the abilities of my teammates.
My team members communicate well.
My teammates are good at solving problems.
My team often makes poor decisions. (r)
My team is good at planning.
My teammates perform well even under stress.
My team is unskilled. (r)
My teammates know what they are doing.
My teammates are competent.
My teammates are capable at their jobs.
My team members follow instructions well.
My teammates are qualified to do their job.
My teammates are highly skilled.
My team needs to improve in several areas. (r)
(r) – reversed item

It is important to note, however, that we did expect the 4 trust dimensions (as captured by the 4 subscales) to be at least moderately positively correlated. If, for example, one is consistently competent, one is more likely to also be predictable. This hypothesis is directly tested by the confirmatory factor analyses later in this report.

2.3.2 Trust in Leaders Scale (Adams, Bruyn and Chung-Yan, 2004) and Necessary Revisions

In the preliminary study of the Trust in Leader Scale, results were very similar to the Trust in Teams Scale. The reliabilities within subscales and overall were strong, and the same 3 factors of Benevolence, Integrity and Predictability emerged, and explained 63.6% of the overall variance. However, the Competence subscale was again problematic and the competence items did not form a distinct dimension. The Competence subscale for the Leader Trust Scale was also revised for the current validation efforts, and is shown in Table 2.

Table 2: New Competence Items – Leader Trust

Item
My leader gets the job done.
My team leader performs well even in stressful situations.
My team leader performs his job well.
My team leader is a good communicator.
I have confidence in the abilities of my team leader.
My team leader is incapable of doing his job. (r)
I feel that my team leader is unskilled. (r)
My team leader performs competently overall.
My team leader is capable at his job.
My team leader is qualified to do his job.
I think that my team leader solves problems well.
My team leader communicates well.
My team leader is not good at making decisions. (r)
My team leader needs to improve in several areas. (r)
My team leader is highly skilled.
My team leader's lack of skill puts us all at risk. (r)
My team leader knows what he's doing.
I trust my team leader.
(r) – reversed item

2.4 Choosing Comparison Scales

Our review of the literature suggested that a few scales have been used to trust in teams and trust in leaders within various workplace settings. However, few of these measures have been subject to extensive validation efforts, and it appears that validation per se was not the primary goal of researchers. In fact, many of the existing measures seemed to arise in response to the same challenges that we faced as researchers, and from the need of researchers to measure these constructs validly and reliably for their research (rather than simply scale creation). This distinction may explain the relative lack of validation evidence for some existing measures. Researchers may have directed their efforts toward their research goals other than attempting to formally validate the measures that they had created.

It is also important to note at this point that we made a strategic decision to alter existing measures slightly where necessary in order to provide the best possible match to the military domain. Although a common practice, evident within much of the literature accessed in this work (e.g. Dirks, 1999 etc.) this was necessary for at least two primary reasons. First, the relative scarcity of measures that were appropriate comparisons for our scales (without minor alterations) made it more important to be able to use what seemed to be good measures, even though they were not immediately portable to the military domain. In addition, in our previous work (e.g. Adams, Bruyn and Chung-Yan, 2004; Adams and Webb, 2003), we have also noted the importance of being sensitive to the face validity of both concepts and measures when administering them within the military domain. In short, although motivated and

interested participants, our experience has shown that military participants can be quite sensitive to responding to questions that do not have a clear application in their minds to the military world. As such, using validation scales that have a more academic or stilted quality would not likely enlist the best possible response rates, and could colour how other scales would be completed. So, the selection of appropriate scales and minor alterations to the validation scales would hopefully provide the best possible test of the construct validity of the Team Trust Scale and the Leader Trust Scale.

2.5 Goals of Current Study

Our goal in this round of validation efforts was to assess the most important elements of construct validity of our trust in team and trust in leader scales. In this work, an important priority was testing the revised competence subscale, as this subscale did not perform as expected in the previous work. This was the first goal of this work.

Beyond this, the primary effort was on understanding the extent to which our new measures of trust were related to existing measures of team trust and trust in a team leader. This was an important step because there are few existing measures of trust in teams, and none available that appear to have been subject to extensive validation efforts. As such, it was important to pit our scales against several measures of trust in teams and trust in leaders that had undergone at least some validation efforts.

Understanding the underlying structure of the current trust measures was also a critical goal at this stage of research. Although exploratory factor analyses can provide an easy indicator of the underlying structure, it is essentially atheoretical, and uses random relationships amongst dimensions to “guess” at the structure that best matches the data. Confirmatory factor analysis, on the other hand, allows researchers to propose their hypothetical model, and to test the extent to which the data conforms to this a priori model. As such, a confirmatory factor analysis approach is a much more in keeping with how our scales have been developed. From the earliest inception of our model of trust in teams (Adams and Webb, 2003), our program of research has been driven by the constructs argued to be important by members of military teams in trusting other teammates, and each step in the scale creation process has built logically on these ideas. At this point, using confirmatory factor analysis will help to understand both how well the scale items capture the underlying dimensions of trust in teams (and leaders) as well as indirectly providing evidence of the value of our overall trust model (Adams and Webb, 2003).

Lastly, to the extent possible at this early stage, this work will also explore our scales’ ability to predict trust in teams. Of course, for many different reasons, a new scale can be strongly related to other more established scales, to show high reliabilities, but can fail to predict any important constructs. As such, another goal of this work is to attempt to understand the predictive validity of the Team Trust Scale, and the extent to which it may be able to help identify teams that are able to better coordinate their actions, and to show high performance as a team. With these goals established, then, the study was undertaken. Methods used are described in the next chapter.



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3. Method

This chapter describes the testing procedures used for this study, and the characteristics of respondents in this study.

Testing Procedures

As a whole, this study involved 4 different sessions (one in the morning and one in the afternoon) over the course of two days. Participants attended sessions in groups of between 50 or 60, and were assigned to either a team member or team leader room upon their arrival. This was to ensure that team member ratings of leader trust did not occur with the leader in the same room. The testing rooms had separate desks, and in order to promote the distribution of team members that might have arrived together, participants were encouraged to distribute themselves randomly throughout the testing room. This lessened the likelihood that team members were adjacent to each other. All participants were first informed about the purpose of the study, and gave their informed consent to participate. All responses on the questionnaires were anonymous.

Questionnaires were administered in two sets. The first package included demographic information and the primary questionnaires of interest, the Team Trust Scale and the Leader Trust Scale. After participants had completed the first package, they typically chose to take a short break before receiving the final set of validation questionnaires. No time limit was put on the testing sessions, but all participants completed both sets of questionnaires within 1 to 2.5 hours (including breaks).

Participants

Two hundred and twenty five regular force Army personnel (225) currently serving with a Canadian Forces battalion served as respondents in this study.³ At the start of the study, participants completed a questionnaire containing demographic information and probing various team characteristics as well as military experience.

As many of the questionnaires in this study relate to trust in teams, it was important, at the outset, to establish that all of the personnel responding to the questionnaire were currently members of a team, as shown in Table 3.

Table 3: Team membership

Item	Response Option	N	%
Do you work within a team (n = 225)	Yes	220	98
	No	5	2

The vast majority of participants (98%) reported themselves to be current members of a team. As 2% of the participants reported that they were not currently members of a team, data for these 5 participants was eliminated. All analyses from this point, then, are based on data from 220 participants.

³ The total number of participants completing the questionnaires was 227. However, data from 2 participants was eliminated due to a large amount of missing data.

As Table 4 shows, thirty-seven percent (37%) of participants were under the age of 26, 45% were between 27 and 36, and 18% were between 37 and 46. No participants were older than 47. The vast majority (95%) were men, and had English (96%) as their first language. In terms of education level, 72% of participants reported having a high school diploma and some university or college.

Table 4: Demographic Information

Variable	Category	N	%
Age group (n = 219)	17-26	81	37
	27-36	99	45
	37-46	39	18
Sex (n = 220)	Male	209	95
	Female	11	5
Level of education (n = 220)	Some high school	35	16
	High school diploma	98	45
	Some university or college	60	27
	University or college	27	11
First language (n = 220)	English	211	96
	French	9	4

Table 5 shows the military status and experience of the participants. The majority of participants (76%) belonged to combat arms, with 24% in support or administrative roles. Approximately one third (34%) of participants reported having no operational experience of any kind, but the majority (66%) reported having had at least one tour.

Table 5: Military Experience

Variable	Category	n	%
Occupation category (n = 220)	Combat arms	166	76
	Combat support	19	9
	Combat service	33	15
Operational tours	None	74	34
	1 to 2	79	36
	3 to 4	46	21
	5 or more	21	9

Participants were also asked to describe the nature of their teams from several perspectives. First, participants described their own position within their teams, whether their teams had a leader, the number of people within the team and the days each week that they worked with other team members. Results are shown in Table 6.

Table 6: Team characteristics

Item	Response Option	N	%
Your position within the team (n = 220)	Team member	140	64
	Team leader	80	36
Team have a leader (n = 219)	Yes	218	99
	No	1	<1
Number of people in team (n = 220)	2-4	57	26
	5-6	39	18
	7-8	81	37
	9-10	20	9
	> 10	8	4
Days/week working with teammates (n = 218)	> 20	15	7
	5	179	82
	4	19	9
	3	9	4
	2	7	3
	1	4	2

All of the respondents in the analyses reported themselves as being current members of a team, and 99% reported that their team had a leader. Most participants were in small teams, with 80% of them belonging to teams with 10 or fewer people. The majority of respondents (82%) defined themselves as working with other members of their team 5 days a week. This suggests a high level of contact and interaction with the other members of their teams.

The stability of teams was also explored. Participants were asked to indicate the frequency of personnel changes within the previous year, and the length of time since any sort of personnel change within their current teams, as shown in Table 7.

Table 7: Team stability

Item	Response Option	N	%
Number of personnel changes in the last year (n = 216)	0	19	9
	1-2	46	21
	3-4	54	25
	5-6	35	16
	More than 7	62	29
Time without personnel changes	0-3 months	129	59
	4-6 months	47	22
	7 months – 1 year	35	16
	1-5 years	6	3

Team turnover was reported to be quite high, with only 9% of participants reporting no personnel changes within their teams in the previous year. However, 29% of participants did report more than 7 personnel changes within their teams during the previous year. In terms of the length of time since personnel changes, 59% of participants reported that their teams had seen no personnel changes within the prior 3 months. As this study was conducted in February, 2005, this low level of turnover within the 3 months prior is probably explained by the fact that posting cycles are most active in the summer months. Three percent (3%) of participants reported having had no changes within their teams for between 1 year and 5 years. This suggests a high level of stability very few teams.

In light of this turnover, it was important to explore the levels of familiarity within teams and the extent to which participants felt that they knew other team members, both at a professional and personal level. These results are shown in Table 8.

Table 8: Team familiarity

Team Size	Proportion of team known well in work	Proportion of team known well as person	N
2-4	.59	.41	57
5-6	.70	.38	39
7-8	.60	.35	81
9-10	.48	.34	20
> 10	.50	.27	23
Overall	.59	.36	219

Participants indicated that they knew about 60% of the people in their team well within a work context, and 36% well at a personal level. There was a somewhat higher level of familiarity in very small teams

(those with 2 to 4 people). This suggests that despite the turnover, team members were able to gain knowledge about and to form relationships with other team members very quickly.

In order to gauge the levels of experience in working as a member of their current teams, participants were also asked to indicate the number of field exercises and operations they had completed with their teams, as shown in Table 9.

Table 9: Team experience

Item	Response Option	N	%
Number of times working with team members for field exercises (n = 194)	0	29	15
	1-2	85	44
	3-4	49	25
	5-6	9	5
	More than 7	22	11
Number of times working with team members for operations (n = 193)	0	172	89
	1-2	16	8
	3-4	1	<1
	5-6	2	<1
	More than 7	2	<1

Only 15% of participants reported having had no prior experience working in their teams for field exercises. The majority of participants (69%) reported having completed between 1 and 4 field exercises with their team, with 16% having participated in 5 or more field exercises. However, the majority of participants (89%) reported having had no operational experience with their current teams. This is, of course, unsurprising given the very high rates of turnover within CF teams.

Although it would be ideal to obtain the impressions of individuals who had had a plethora of operational experience with their teams, the nature of the CF and the high levels of turnover clearly do not make this possible. The fact that most team members did have experience working in field exercises, however, does argue that they would have had enough experience to have developed trust over time, even though trust may not have been fully tested.



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4. Results

4.1 Team Trust Scale (Adams and Sartori, 2005)

4.1.1 Initial Analyses

At this stage, the goal was to explore the broad characteristics of the revised Team Trust scale and its subscales in terms of descriptive statistics and reliability estimates. Analyses for the full 40 item scale showed very high reliabilities for both the scale as a whole and the subscales, and very high item-total correlations. In fact, these values were so high that to analyze the entire set of items would have been redundant. This enabled the creation of a shorter set of items for each subscale, without little or no impact on the psychometric properties of the scale.⁴ This would also make the Team Trust Scale shorter and easier to complete with less redundancy for future participants. As all items had been designed to reflect the underlying constructs at a theoretical level, and as the underlying theory had not changed, there was no theoretical basis on which to make this decision. However, a decision about how to delete redundant items was made empirically, by progressively removing a single item within each subscale with the lowest item-total correlation and then recalculating the new reliability and item-total correlations. This operation continued until 5 items for each subscale remained.⁵

4.1.2 Revised Team Trust Scale

The revised 20 item scale with relevant descriptive statistics and reliabilities is shown in Table 10. All scale items were rated using a 7-point scale ranging from 1 (“Completely Disagree”) to 7 (“Completely Agree”) with a neutral midpoint.

⁴ Annex A shows the full unaltered scale and its properties before deletion of any items.

⁵ Based on the apparent strength of the subscales, it would have been possible to shorten even more. However, as this scale has been used only with military samples to this point, caution would dictate being careful about removing too many items, lest results change with another sample.

Table 10: Descriptive statistics and reliabilities – Team Trust Scale

	Valid N	Mean	Std.Dev.	Skewness	Kurtosis	Item-Total r	Alpha if deleted
Team Benevolence (mean = 4.96; mean inter-item correlation = .69; alpha = .92)							
I believe that my teammates have my best interests in mind.	220	4.78	1.28	-.47	.41	0.75	0.90
My team is motivated to protect me.	220	4.93	1.30	-.36	-.22	0.83	0.89
I feel that my teammates work to protect me.	220	4.79	1.35	-.45	.28	0.78	0.90
My teammates watch my back.	220	5.21	1.19	-.42	-.09	0.79	0.90
My teammates look out for me.	220	5.11	1.25	-.48	.14	0.77	0.90
Team Integrity (mean = 5.16; mean inter-item correlation = .66; alpha = .91)							
I can depend on my teammates to be fair.	220	5.25	1.14	-.79	.85	0.75	0.89
My teammates are honourable people.	220	5.25	1.11	-.33	.28	0.76	0.89
My teammates honour their word.	220	5.07	1.21	-.52	.29	0.72	0.89
My teammates keep their promises.	220	5.16	1.15	-.43	.06	0.83	0.87
My teammates tell the truth.	220	5.07	1.26	-.72	.73	0.76	0.88
Team Predictability (mean = 5.21; mean inter-item correlation = .58 ; alpha = .87)							
I know what to expect from my team.	220	5.34	1.12	-.88	1.44	0.75	0.83
I usually know how my teammates are going to react.	220	5.00	1.07	-.15	-.44	0.63	0.86
In times of uncertainty, my team sticks to the plan.	220	5.24	1.09	-.39	.07	0.69	0.85
My teammates are reliable.	220	5.29	1.18	-.87	1.10	0.71	0.84
My teammates behave consistently.	220	5.18	1.15	-.65	.56	0.70	0.84
Team Competence (mean = 5.40; mean inter-item correlation = .68; alpha = .91)							
My teammates are capable at their jobs.	220	5.49	1.10	-.86	1.17	0.84	0.88
My teammates know what they are doing.	220	5.42	1.13	-.70	.47	0.80	0.89
I have faith in the abilities of my teammates.	220	5.37	1.17	-.80	.70	0.81	0.89
My teammates are qualified to do their job.	220	5.51	1.22	-.87	.78	0.77	0.90
My team members communicate well.	220	5.22	1.07	-.68	.83	0.68	0.91
Team Trust (Overall Index)	220	5.18	1.18	-0.59	0.47	-	-

Table 10 indicates that participants had a relatively high degree of trust in their teams as indicated by a mean team trust score of 5.18 out of 7. Means ranged from 4.96 for the Benevolence subscale to Competence at 5.40. Scores in this range mean that soldiers agreed with positive team trust statements about their team from a “somewhat” to “very high” degree.

As can also be seen in Table 10, all subscales performed very well, with alphas ranging from .87 for Predictability to .92 for Benevolence. Although the Competence subscale did not perform well in the first iteration, the revised items appear to be capturing Competence reliably. The reliability of the Team Trust Scale overall was very high at .97. Clearly, even with the deletion of several items from the scale, the psychometric properties of the scale and subscales were still very acceptable. However, the mean inter-item correlation of .59 may be higher than is optimal, given the guideline of ideal inter-item correlations of between .15 and .50 suggested by some validation experts (Clark and Watson, 1995). This issue will be explored in more detail in the discussion.

The response distributions were explored in order to ensure that participants had responded relatively equally across the scale anchors (Clark and Watson, 1995) and bimodal distributions were not a problem.

The intercorrelations amongst the subscales and with the overall team trust index were also explored, as shown in the Table 11.

Table 11: Correlations – Team Trust subscales and Team Trust index

	Integrity Subscale	Predictability Subscale	Competence Subscale	Team Trust Index
Benevolence Subscale	0.83	0.79	0.75	0.92
Integrity Subscale		0.83	0.83	0.95
Predictability Subscale			0.78	0.92
Competence Subscale				0.91

Note: All correlations significant at $p < .05$.

Table 11 shows the strong and significant positive correlations amongst all the subscales, and with the Team Trust index as a whole. As all subscales were designed to measure a distinct part of team trust, strong correlations were expected. However, the size of these correlations and even the overall consistency of the Team Trust Scale are higher than would be desirable. This issue will be important to explore in later analyses.

One of the ways to understand the validity of the Team Trust Scale is to compare it to similar measures of team trust that use a different format. Participants were also asked to directly rate their level of trust in their team as a whole on a scale from 0 to 100 (with high scores indicating more trust). Obviously, these summary ratings are more likely than the Team Trust Scale to be subject to social desirability concerns, as they require participants to directly indicate their trust in other teammates. As such, these ratings may not be the best possible indicator. Nonetheless, they do provide a quick indicator of the status of trust within teams. Table 12 shows the descriptive statistics for each of these summary ratings.

Table 12: Descriptive statistics – Team trust summary items (0 to 100)

Item	Valid N	Mean	Std.Dev.	Skewness	Kurtosis
Benevolence Summary Item	220	71.83	22.07	-.89	.45
Integrity Summary Item	220	78.09	18.70	-1.31	1.82
Predictability Summary Item	220	73.99	16.61	-1.05	1.67
Competence Summary Item	220	79.56	15.28	-1.59	4.35
Team Trust Index	220	79.63	20.69	-1.41	1.72

As can be seen in Table 12, on the summary trust items, participants indicated that their teams were overall quite trustworthy ($m=79.63$). In addition, they rated their team members as highest in Competence ($m=79.56$), and lowest in Benevolence ($m=71.83$).

It was also crucial to consider the relation among each Team Trust subscale and the corresponding 100-point summary item. If these measures are tapping the same underlying construct, one would expect a higher correlation between the items tapping similar than dissimilar constructs. For example, the correlation between the Integrity subscale and the Integrity summary item should be higher than the correlation between the Integrity subscale and the Benevolence summary item. Table 13 exhibits these results.

Table 13: Correlations - Team Trust Subscale with Team Trust Summary Items

	TT Benev. Summary	TT Integrity Summary	TT Predictability Summary	TT Competence Summary	Team Trust Summary
TT Benevolence Subscale	0.59	0.59	0.42	0.48	0.65
TT Integrity Subscale	0.59	0.70	0.49	0.55	0.71
TT Predictability Subscale	0.53	0.59	0.52	0.51	0.60
TT Competence Subscale	0.45	0.59	0.40	0.63	0.64
Team Trust Index	0.59	0.67	0.49	0.59	0.70

Note: All correlations significant at $p<.05$.

As expected, each of the summary items was positively correlated with the Team Trust Scale index, and the Team Trust index and the summary team trust items show a strong correlation ($r = .70$). Looking at the correlations on the diagonal, the Benevolence subscale shows a high correlation with both the Benevolence and Integrity summary items. The Integrity subscale correlated distinctively with the Integrity summary item ($r = .70$) and the Competence subscale correlated most strongly with its summary item ($r=.63$). However, contrary to expectation, the Predictability subscale correlated more strongly with the Integrity summary item ($r=.59$), than with the Predictability summary item, ($r=.52$). It seems possible that some of the Predictability items might overlap somewhat with the Integrity subscale. Or, it might also be possible that social desirability concerns might have influenced ratings on the summary items. However, it is encouraging that despite the relatively high correlations between the Team Trust Scale and the summary items, the Team Trust Scale items are not wholly overlapping with the summary items, as there is considerable variance (51%) left unaccounted for.

4.1.3 Comparison to Other Measures of Team Trust

In demonstrating the validity of a measure, it is also important to consider the convergence of the scale in question with established scales measuring similar constructs.

Several scales were compared to the Team Trust Scale. A scale used by Zolin and Hinds (2004) was an important scale to be compared to our own scale because it was specifically designed to measure trust within workplace teams, although within a different context. Zolin and Hinds (2004) measured perceived trustworthiness in co-located versus geographically distributed engineering student teams comprising 12 workgroups of three or four members each with subscales pertaining to benevolence (five items), ability (two items), and integrity (two items). The items are framed in question format (e.g., “How often has this team member made an extra effort to make your job easier?”) and are rated on a 5-point Likert scale, with 1 indicating low frequency and 5 indicating high frequency. Ratings for each subscale were then averaged to form a score of perceived trustworthiness ranging from 1 to 5.

In terms of reliability, Zolin and Hinds (2004) found alpha levels for the entire scale to be .84. With regard to the construct validity of the scale, the authors expected to find that trust would be lower in distributed teams. Although the results were in the expected direction, they lacked the robustness to reach significance. They also expected that distributed teams would update their trust less often than co-located teams. These results also did not hold. It is unclear whether or not these results speak to the construct validity of the scale. However, the scale creation process is well described and suggests that this scale is worth comparing to our own. Within our sample, this scale performed well with an overall reliability of .91.

The Zolin and Hinds scale aims to tap similar dimensions to our scale. Their construct of “Care” is similar to ours of “Benevolence”, and “Ability” is similar to “Competence”. Integrity, of course, is common, but the Zolin and Hinds scale does not posit a Predictability dimension. As both the Trust in Teams and the Zolin scale aim to measure team trust, we expected a strong correlation between the two. In addition, we also expected that the correlations between the subscales tapping the same dimension (e.g. Benevolence and Care) would be more strongly correlated than would constructs tapping dissimilar dimensions. Table 14 shows these correlations.

Table 14: Team Trust Scale and Zolin (2004) scale

	Zolin and Hinds Care	Zolin and Hinds Integrity	Zolin and Hinds Ability	Zolin and Hinds Index
TT Benevolence Subscale	0.38	0.55	0.57	0.57
TT Integrity Subscale	0.47	0.57	0.66	0.63
TT Competence Subscale	0.45	0.54	0.56	0.58
Team Trust Index (excluding predictability) ⁶	0.49	0.52	0.58	0.58

Note: All correlations significant at $p < .05$.

As Table 14 shows, all relationships between our subscales and those of Zolin and Hinds (2004) were positive and highly significant. Overall, our Team Trust Index correlated quite strongly with the Zolin team trust index, $r = .58$. Importantly, it was not wholly overlapping. However, other than for the

⁶ As the Zolin and Hinds (2004) scale does not posit a predictability dimension, for this analysis only, the Team Trust Scale index excluded the predictability factor.



Competence subscale ($r = .56$) matched constructs were not uniquely correlated. Both our Benevolence subscale and our Integrity subscale were more closely related to the Zolin Ability subscale than to the related dimension subscales.

Similar analyses were also conducted with the van der Kloet Team Trust Scale (van der Kloet, 2005). It was important to use this scale because it was created to measure team trust within the military domain. This scale measures trust in teams with 4 similar dimensions, including honesty (integrity), predictability, benevolence, and competence. The scale contains 12 items, such as, “The level of education is high in my platoon”, rated on a four-point scale. In van der Kloet’s work, the H-coefficients (another indicator of alpha; values above .30 are adequate) were reported as .55 for the total scale, with subscale coefficients ranging between .51 and .59.

In our sample, this scale did not perform well with alphas ranging from .66 for Competence, .72 for Honesty, .72 for Predictability, to .74 for Benevolence, but the reliability for the scale as a whole was .90. Therefore, the decision was made to proceed with validation analyses as intended.

The relationship between the Team Trust Scale and the van der Kloet (2005) scale was explored, as shown in Table 15.

Table 15: Team Trust Scale and van der Kloet (2005) scale

	VDK Benevolence	VDK Honesty	VDK Predictability	VDK Competence	VDK Team Trust Index
TT Benevolence Subscale	0.52	0.53	0.54	0.50	0.59
TT Integrity Subscale	0.59	0.61	0.58	0.56	0.67
TT Predictability Subscale	0.54	0.58	0.52	0.49	0.61
TT Competence Subscale	0.53	0.53	0.53	0.52	0.60
Team Trust Index	0.59	0.61	0.59	0.56	0.67

Note: All correlations significant at $p < .05$.

There was a strong and significant relationship between the Team Trust scale and the van der Kloet scale ($r = .67$), suggesting that, as a whole, these scales seem to be capturing the same general construct without being redundant. Again, one would expect that subscales aiming to tap the same dimension (on the diagonal) would be more highly related than would subscales tapping different dimensions. However, although the Integrity subscales again showed this pattern, this was not the case for the other subscales.

As a whole, then, these findings comparing the Team Trust Scale to these two other scales measuring team trust suggest that the scales as a whole seem to be measuring the same overall construct, providing some evidence of the construct validity of the Team Trust Scale. Although the expected correlations are still significant, however, our subscales do not consistently show the expected pattern with respect to the other measures of team trust. The most convergence for the Team Trust Scale and the van der Kloet (2005) scale is clearly on the Integrity dimension. For the Zolin scale, the Competence dimension shows the most agreement with the Team Trust Scale. Overall, this pattern of results may suggest that some of the items within one or more of these 3 scales might be loading on constructs that are different than what we would expect. This pattern of results could speak to the construct validity of the Zolin or van der Kloet scales or to that of the Team Trust Scale. There is unfortunately no evidence suggesting that the underlying structure of the Zolin (2004) or van der Kloet (2005) scales have been assessed. As such, confirmatory factor analyses of the Team Trust Scale will be an important step in understanding the underlying structure of the Team Trust Scale, and may shed light on these results. But, although the

dimensions underlying each subscale are somewhat different, the Team Trust Scales and other measures of trust in teams all seem capture team trust as a whole fairly similarly.

Another analysis compared the Team Trust Scale with two subscales from the Cook and Wall (1980) Interpersonal Trust at Work Scale trust scale (Cook, Hepworth, Wall and Warr, 1981). This scale measures interpersonal trust in the organizational context. The full version of this scale consists of four subscales, faith in intentions and confidence of peers, and faith and confidence in management, all measured on a 7-point scale from 1 (strongly disagree) to 7 (strongly agree). Obviously, only the peer-related items were relevant to compare to the Team Trust Scale items. In their own work, Cook and Wall (1980) reported good inter-item correlations ($r = .46$ in study 1, $r = .43$ in study 2) for a sample of 260 participants, but modest test-retest reliability ($r = .60$, $p < .001$). While reliability levels were not provided, exploratory factor analyses are reported to have indicated that the items loaded as predicted on the underlying constructs (Cook and Wall, 1980).

A priori, given that the Cook and Wall scale items seemed to focus on team competence issues (e.g. “I have full confidence in the skills of my teammates” and “I can rely on other teammates not to make my job more difficult by careless work”), the Team Trust Competence subscale was expected to be most related to the Cook and Wall “confidence in peers” subscale. Similarly, our Integrity subscale was also expected to be most correlated with the “faith in peers” subscale containing items like “Most of my teammates can be relied on to do as they say they will do.” Results are shown in Table 16.

Table 16: Team Trust Scale and Cook and Wall

	Confidence in Peers	Faith in Peers
TT Benevolence Subscale	0.23	0.54
TT Integrity Subscale	0.26	0.61
TT Predictability Subscale	0.23	0.51
TT Competence Subscale	0.31	0.56
Team Trust Index	0.28	0.60

Note: All correlations significant at $p < .05$.

Correlations between all subscales of the Team Trust Scale and the Cook and Wall subscales were significant. As expected, the strongest correlation shown for the “confidence in peers” subscale was with the Team Trust Competence subscale ($r = .31$). This correlation, however, is lower than expected given that these subscales are presumed to measure the same construct. Moreover, as hypothesized, the strongest correlation evidenced for the “faith in peers” subscale was with the Integrity subscale ($r = .61$). Again, the confirmation of these hypotheses provides more support for the construct validity of the Team Trust Scale.

Lastly, several items on the Human Dimensions of Operations scale (HDO; originally called the Unit Climate Profile) also directly address team trust (Murphy and Farley, 2000). The current version of this scale is a 56-item scale which assesses the ongoing milieu within military units with respect to cohesion, morale, and confidence in leadership. The HDO uses a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). Only a few items used to capture trust within teams were relevant for this comparison. These items related primarily to competence of other team members, and included statements such as “I am confident in the combat abilities of soldiers in my platoon/troop”, as well as effectiveness in training exercises and in garrison. For the full version of the scale, Dobрева-Martinova (2001) reported a very



high internal consistency (.93) and indicated that earlier versions of the HDO were able to capture subtle changes in trust in leadership over time in an operational setting.

Again a priori, as these HDO items seem to tap team skills and abilities, one would expect that the Team Trust Competence subscale would be the most highly correlated with these items. Table 17 shows the correlations between the Team Trust Scale and these HDO items.

Table 17: Team Trust Scale and Human Dimensions of Operations Items

	I am confident in the combat abilities of soldiers in my platoon/troop.	Overall, my platoon/troop is effective in field training exercises.	Overall, my platoon/troop is effective in garrison. ⁷	HDO Item Index
TT Benevolence Subscale	0.39	0.32	0.33	0.45
TT Integrity Subscale	0.43	0.40	0.40	0.53
TT Predictability Subscale	0.40	0.42	0.35	0.50
TT Competence Subscale	0.51	0.44	0.44	0.60
Team Trust Index	0.47	0.42	0.41	0.56

Note: All correlations significant at $p < .05$.

As expected, although all Team Trust Scales are significantly related to these items tapping confidence at the platoon and troop level, the Competence subscale is most highly correlated with these items. Again, this provides good evidence that the Team Trust Scale measures what it is intended to measure.

As a whole, then, the Team Trust Scale is related in predictable ways to other scale measures of team trust. There are strong and significant correlations between subscales of the Team Trust Scale and other scales of team trust developed to be used in other related contexts. It is important to note, however, that these correlations are not so high as to indicate that the Team Trust Scale is redundant with existing scales. Indeed, although it explains a significant portion of the variance in other scales, a significant portion of the variance remains unexplained. Moreover, although there are some patterns among subscales that are not entirely consistent, it is unclear whether this is due to the underlying structure of the Team Trust Scale or the comparison scales. This issue will be explored in detail using confirmatory factor analyses.

A critical issue that remains, however, is the extent to which the Team Trust Scale is able to capture trust in teams uniquely. In order to compare the ability of the Team Trust Scale to predict trust within teams over and above existing measures, a hierarchical regression analysis was undertaken. This analysis used the single item rating of trust in teams (0 to 100) as the dependent variable, and then entered indices for the van der Kloet, Zolin and Cook and Wall scales. The result of this first step of the hierarchical regression is shown in Table 18.

⁷ For ease of presentation in this table, the full item description was shortened. It should read “Overall, my platoon/troop is effective in garrison (inspections, cleanliness of barracks, individual task training, physical fitness, etc.).”

Table 18: Hierarchical Regression with Other Team Trust Scales (Model 1)

	Beta	Std.Err. of Beta	B	Std.Err. of B	t(215)	p-level
van der Kloet	0.33	0.08	0.89	0.21	4.19	0.001
Zolin	0.19	0.08	0.34	0.15	2.25	0.03
CW (confid in peers)	0.10	0.05	0.09	0.05	1.98	0.05
CW (faith in peers)	0.19	0.07	0.20	0.08	2.57	0.01

Note: Adj. $R^2 = .434$, $F(4, 215) = 43.04$, $p < .001$.

This analysis showed that these scales did a good job of capturing trust within teams, explaining a significant 43% of the variance. And, as the beta weights show, all competing team trust scales explained significant proportions of the variance in team trust on their own.

However, whether or not the Team Trust Scale was capable of uniquely predicting trust within teams above and beyond existing measures still remained to be seen. To test this, the Team Trust Scale was added as a predictor at the next step. The results of this analysis are shown in Table 19.

Table 19: Hierarchical Regression Adding Team Trust Scale (Model 2)

	Beta	Std.Err. of Beta	B	Std.Err. of B	t(214)	p-level
van der Kloet	0.09	0.06	0.25	0.17	1.49	0.14
Zolin	0.03	0.06	0.05	0.12	0.42	0.67
CW (confid in peers)	0.03	0.04	0.02	0.04	0.63	0.53
CW (faith in peers)	0.05	0.06	0.05	0.06	0.81	0.42
Team Trust Scale Index	0.71	0.06	0.92	0.07	12.77	0.001

Note: Adj. $R^2 = .677$, $F(5, 214) = 93.00$, $p < .001$

As a whole, this set of predictors also significantly predicted trust in teams, explaining 68% of the overall variance. Importantly, the Trust in Teams Scale was only scale that significantly predicted trust within teams, as evidenced by the significant beta weight. Above and beyond the other trust in teams scales, the addition of the Team Trust Scale explained an additional 24% of the variance in team trust, $F(1, 214) = 162.00$, $p < .001$. This suggests that although highly related to other measures, the Team Trust Scale is uniquely capable of predicting trust within teams.

4.1.4 Confirmatory Factor Analysis of the Team Trust Scale

At this stage, our goal was to confirm the hypothesized structure of the Team Trust Scale. The Team Trust Scale is based on very specific assumptions about the underlying structure of trust within teams, and is derived from our theoretical model (Adams and Webb, 2003). The Team Trust Scale was written to capture four dimensions of the latent variable, team trust, with each dimension being represented by several items. As such, it is important to test whether these assumptions are valid. Even though previous exploratory factor analyses (Adams, Bruyn and Chung-Yan, 2004) had shown promise (with Benevolence, Integrity and Predictability loading onto the expected factors), the Competence items did not form a discrete factor, making it impossible to test the structure of the full scale. This made it important to retest the structure of the Team Trust Scale with an even larger sample and refined

Competence items. Moreover, exploratory factor analysis is not the best possible test of a scale's underlying structure, as it is essentially atheoretical. As noted earlier, confirmatory factor analysis enables researchers to assess the fit of their proposed theoretical models compared to other potential models that might also fit the data. As such, undertaking confirmatory factor analyses would pose an even more stringent test of the structure of the Team Trust Scale.

Although we had a clear theoretical model of the structure of our Team Trust Scale, it was important to test other models that might also provide a good fit to the data. It would be reasonable to argue that the fine distinctions amongst different dimensions of trust might not be necessary, and to propose a model that simply depicts all dimensions of trust related to a simple undifferentiated trust construct. Such a model would have all scale items loading on a single dimension, as shown in Figure 2.

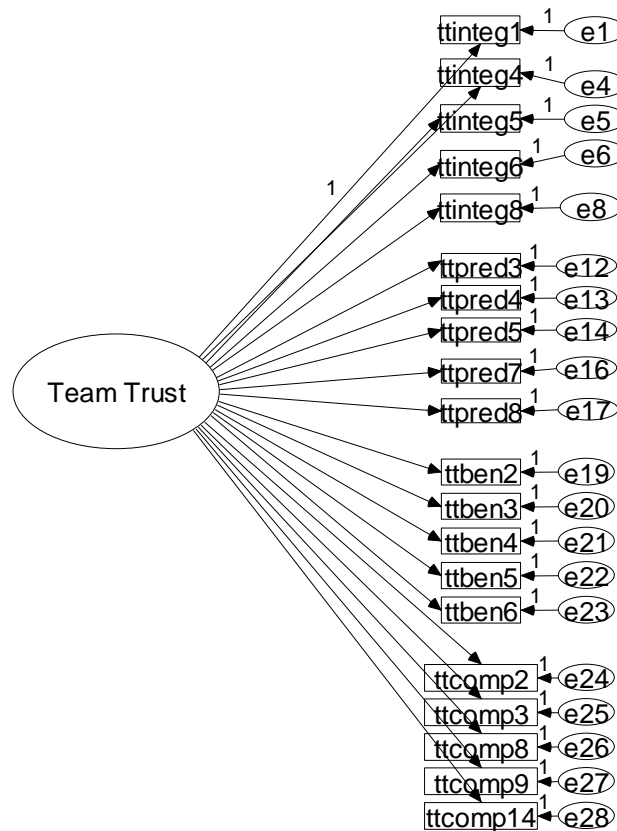


Figure 2. One factor model of trust in teams.

Our hypothesized model, on the other hand, argues that trust in teams is actually compromised of 4 distinct dimensions, each represented by unique subscales in the Team Trust Scale. This model also posited for all trust dimensions to be correlated, as shown in Figure 3.

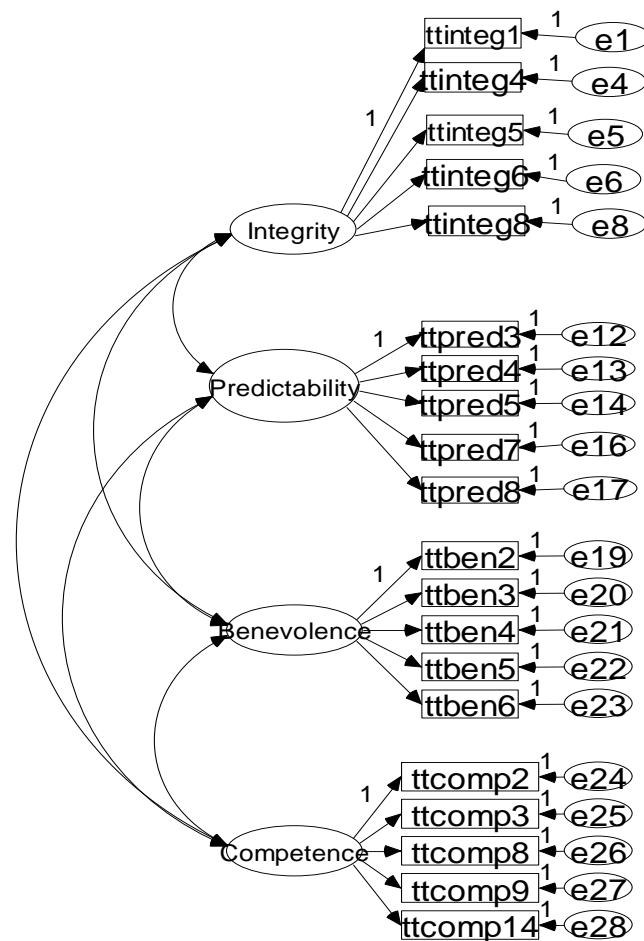


Figure 3. Four factor correlated model of trust in teams

As there are many indicators of fit evident in the literature, several different indicators were used to assess the fit of these models. First, the χ^2 statistic was used to assess the fit between the actual and the reproduced correlation matrix. However, this statistic is notoriously sensitive to large sample sizes (Kline, 2004), and it is no longer accepted as the sole indicator of fit. Several other indicators of fit were also used to compare the fit of the models (Kline, 2004). These included the Goodness of Fit test (GFI), the Tucker Lewis Index (TLI rho2), the comparative fix index (CFI) and the root mean square error of approximation (RMSEA). Taken together, these indicators will assist in determining which model provides a better fit to the data.

Both of these models were tested using confirmatory factor analyses, and the results are depicted in Table 20.

Table 20: Results of Team Trust Confirmatory Factor Analyses

Proposed Model	χ^2	df	GFI	TLI rho2	CFI	RMSEA	$\Delta\chi^2$	df
One factor	577.32	170	.77	.88	.89	.11	-	-
Hypothesized model (4 factors - all correlated)	395.50	164	.85	.93	.94	.08	182.82***	6

Note: For all χ^2 , $\pi < .01$, GFI = goodness of fit index; TLI rho2 = Tucker Lewis; CFI = comparative fit index; RMSEA = root mean square error of approximation, *** $p < .001$

In general, the one-factor model provided a less than adequate fit to the data, surpassing the conservative .10 RMSEA cut-off.

This one-factor model was then compared with the proposed 4 factor hypothetical model underlying the Team Trust Scale. As noted earlier, we also expected for the 4 trust dimensions to be correlated.

As expected, the correlated 4 factor model showed a significantly better fit to the data than the 1 factor model, as evidenced by a significant χ^2 change score, $\Delta\chi^2 = 182.82$, $p < .001$. In addition, all fit indices were better for the 4 factor model than for the 1 factor. In keeping with our theoretical model, no modifications were made to improve the fit of the model (e.g. adding paths based on modification indices etc.), as these were not anticipated at a conceptual level.

This finding suggests that the underlying structure of the Team Trust Scale is as hypothesized, providing yet another indication of its construct validity. Moreover, these analyses also suggest that the lack of consistency among some of the team trust subscales may be attributable to the structure of the other scales (e.g. Zolin, etc.), because the structure of the Team Trust Scale is known, but the structure of both the Zolin and van der Kloet scales is unknown. The next set of analyses explores the extent to which the Team Trust Scale is able to predict important team processes and outcomes.

4.1.5 Team Trust Scale in Relation to Team Outcomes

The Team Trust Scale arose out of a research program working to better understand trust in military teams, and ultimately, to help predict positive team outcomes deriving from trust in teams. As such, even at this early stage of research, it was important to also explore the actual predictive validity of the Team Trust Scale.

Trust research within both organizational contexts and in academic laboratories has attended to both the direct and indirect ways that team trust can influence behaviour. For example, as noted in recent work (Ferrin and Dirks, 2001, reviewed in Adams and Webb, 2003), although trust has often been espoused as impacting directly on behaviour and/or performance, there is also strong empirical evidence that it impacts indirectly as well, by influencing attitudes and expectations. For example, indirectly, trust has been argued to decrease team conflict (Simons and Peterson, 2000) and to be positively related to morale (Cassel, 1993) within military teams.

If this is the case, then good measures of team trust should be able to predict the ability of teams to create positive team milieu and morale, as well as to work together effectively. To explore the predictive ability of the Team Trust Scale, several relevant items from another measure, the Human Dimensions of Operations (Murphy and Farley, 2000), were also analyzed in parallel with the Team Trust Scale. If the Trust in Teams scale has predictive validity, it should be able to anticipate positive team outcomes.

Trust has been argued to enable the ability of diverse people with different goals and priorities to work together as a team (e.g. Doney and Cannon, 1998; Dirks, 1999). One would expect that trust would positively influence team members' expectations of working as a team. Table 21 shows a regression analysis in which the subscales of the Team Trust Scale were used to predict team members' perceptions of teamwork within their platoons or troops.

Table 21: Team Trust as a Predictor of Teamwork

	The soldiers in my platoon/troop encourage each other to work as a team.
N	220
Overall R ²	0.33**
Benevolence β	-0.01
Integrity β	0.39**
Predictability β	-.10
Competence β	0.31**

Note: *p < .05, **p < .001

Results showed that the Team Trust Scale was a significant predictor of perceived teamwork, $F(4, 215) = 26.28$, $p < .05$, and predicted 33% of the variance. More specifically, participants who had high levels of trust in their teammates also reported positive teamwork within their teams; namely, that their team members actively work to encourage each other. As the beta weights show, this effect was driven by the predictive power of the Integrity and Competence subscales. Benevolence and Predictability were not significant influences.

The relationship between the Team Trust Scale and morale at both the personal and platoon level was also explored. Clearly, as team trust is likely to be closely related to team morale, high scores on the Team Trust Scale should be able to predict levels of morale within teams, as shown in Table 22.

Table 22: Team Trust as a Predictor of Morale

	My personal level of morale is very high.	The level of morale in my platoon/troop is very high.
N	220	220
Overall R ²	0.13*	.15*
Benevolence β	-0.03	-0.12
Integrity β	0.25**	0.29**
Predictability β	-0.17	-0.09
Competence β	0.30**	0.29**

Note: *p < .05, **p < .001

Again, the Team Trust Scale was a significant predictor of team members' personal level of morale, $F(4, 215) = 8.32$, $p < .001$, as well as a predictor of morale within one's platoon or troop, $F(4, 215) = 9.48$, $p < .001$. Again, only the Integrity and Competence subscales seemed to drive these effects.

As team trust and cohesion are argued to be related in the military literature (e.g. Scull, 1990), the Team Trust Scale was also expected to positively predict team cohesion, as shown in Table 23.

Table 23: Team Trust as a Predictor of Cohesion

	There is a lot of togetherness in my platoon/troop.
N	.220
Overall R ²	0.21*
Benevolence β	0.08
Integrity β	0.19
Predictability β	-0.12
Competence β	0.31**

Note: *p < .05, **p < .001

Results showed that the Team Trust Scale was a significant predictor of perceived cohesion, $F(4, 215) = 13.86, p < .001$, and this effect was driven solely by the Competence dimension. Again, individuals who rate their teams as highly trustworthy also reported that their troops were high in cohesion. This effect is clearly surprising, as one would expect that Benevolence and Integrity would be likely to influence perceptions of cohesion within teams.

Indeed, as a whole, it is somewhat surprising that Benevolence did not play more of a role in predicting positive team processes. Our experience in exploring trust in focus groups with military personnel is that they seem more comfortable downplaying the Benevolence aspects of trust, preferring to see trust in terms of Competence and Integrity, and this inclination may have influenced these results. In another sample with different social norms and values, Benevolence may well play more of a role in team trust. The fact that the Predictability dimension did not play much of a role in predicting positive team outcomes is also puzzling. The slightly negative (but not significant) correlations remind us of lessons learned in our previous validation paper, where military participants argued that predictability was not always a positive trait within military contexts (Adams, Bruyn and Chung-Yan, 2004). However, given that the Predictability items did seem to load (as predicted) on the Predictability dimension, it will be necessary to explore this issue in further work. Some of these results may also be attributable to direct vs. indirect effects on performance. Some trust researchers have argued the importance of the distinction between factors that influence directly vs. indirectly (e.g. Dirks, 1999). This pattern of results might suggest, for example, that Integrity and Competence may have direct effects on performance, whereas Benevolence and Predictability have indirect effects on performance. Intuitively, however, one might expect for Competence and Predictability to be more direct influences and for Integrity and Benevolence to be more indirect.

It was also important to explore how well the Team Trust Scale would predict combat readiness. In theory, high trust within teams should promote team members' overall sense of optimism about the tasks that the team needs to accomplish. In military teams, such as the ones within this sample, a critical future task is going into combat. As such, other analyses explored the relationship between perceived combat readiness and the measure of team trust. Trust in another team member's abilities is likely to be the most influential predictor of combat readiness. This hypothesis was tested by regressing the Team Trust subscale items onto a scale item tapping perceived combat readiness, as shown in Table 24.

Table 24: Team Trust as a Predictor of Combat Readiness

	My platoon/troop is ready for combat.
N	220
Overall R ²	.17*
Benevolence β	-0.08
Integrity β	-0.01
Predictability β	-0.06
Competence β	0.46**

Note: *p < .05, **p < .001

Importantly, the Team Trust Scale did significantly predict combat readiness, $F(4, 215) = 11.01, p < .001$, and in fact, accounted for 17% of the variance in perceived combat readiness as measured with the Human Dimensions of Operations scale. Again, the Competence subscale showed the only significant beta weight, suggesting that trusting one's teammates to be competent is an important predictor of to be combat ready.

These results are encouraging, as they suggest that the Team Trust Scale is capable of predicting several important outcomes clearly related to team trust including perceived teamwork, morale, cohesion and even expectations about combat readiness. At this point, then, these results also support the predictive validity of the Team Trust Scale.

Several caveats, however, are in order. First, it is important to emphasize that the Team Trust Scale and the Human Dimensions of Operations scale (Murphy and Farley, 2000) do address somewhat different levels of analysis (sections vs. platoons). Of course, despite the difference in levels of analysis, one would still expect for trust in one's section to be well correlated with trust in one's platoon, and switching levels is more likely to attenuate than to enhance correlations. Nonetheless, this remains an empirical question. Secondly, although framed in terms of team trust as predicting outcomes, these analyses can obviously only address the relationship between team trust and other constructs rather than shedding light on the causal paths. As such, whether team trust improves morale and perceived combat readiness within teams or whether morale and combat readiness promote higher levels of team trust must remain an open question, and of course, there is no guarantee that the causal paths are even unidirectional. Finally, these analyses address expected rather than actual outcomes. The fact that people in high trust teams were more optimistic about team processes and outcomes, of course, does not necessarily mean that these teams would perform better in actual operations. Exploring the relationship between important constructs such as team trust and actual combat readiness would be an important extension of validating the Team Trust Scale in the future.

4.1.6 Team Trust Scale Summary

The results above suggest that the Team Trust scale performs well in relation to other measures of team trust, suggesting good convergent validity. One concern that needs to be considered is the high internal consistency of the scale. This issue is considered in detail in Chapter 5. However, these results also provide some early support for the predictive validity of the Team Trust Scale, as it showed itself to be a significant predictor of several important team outcomes (e.g. morale, cohesion and combat readiness). And, there is also good evidence of the underlying structure of the Team Trust Scale, as it does seem to reliably capture the 4 dimensions of team trust promoted in our earlier model of trust in military teams



(Adams and Webb, 2003). As a whole, then, the Team Trust Scale performed well and shows very good promise for future research.

4.2 Leader Trust Scale (Adams and Sartori, 2005)

As part of this trial, team members also completed questionnaires assessing their trust in their direct leaders. Results of these analyses are presented within the following sections.

4.2.1 Initial Analyses

Trust in the leader of a small military team must be considered separately from that of trust in the team as a whole because the leader is a different type of member, with differentiating power and privileges. We have argued that leader trust is also based on the same four dimensions of Benevolence, Integrity, Predictability and Competence. The Leader Trust Scale was developed to capture these dimensions.

At this stage, the goal was to explore the broad characteristics of the revised Leader Trust Scale and its subscales in terms of descriptive statistics and reliability estimates. As with the Team Trust Scale, analyses for the full 40 item scale showed very high reliabilities for both the scale as a whole and the subscales, and very high item-total correlations. In fact, these values were so high that to analyze the entire set of items would have been redundant and unnecessary. This enabled the creation of a shorter set of items for each subscale, without substantive impact on the psychometric properties of the scale.⁸

As all items had been designed to reflect the underlying constructs at a theoretical level, the decision about removal of items proceeded by progressively removing a single item within each subscale with the lowest item-total correlation and then recalculating the new reliability and item-total correlations. This operation continued until 5 items for each subscale remained.⁹

4.2.2 Revised Leader Trust Scale

Table 25 shows the descriptive statistics and reliability estimates for the revised Leader Trust Scale. All scale items were rated using a 7-point scale ranging from 1 (“Completely Disagree”) to 7 (“Completely Agree”) with a neutral midpoint.

Table 25: Descriptive statistics and reliabilities – Leader Trust Scale

	Valid N	Mean	Std.Dev.	Skewness	Kurtosis	Item-Total r	Alpha if deleted
Benevolence (mean = 5.12; mean inter-item correlation = .76; alpha = .94)							
I have confidence in the motivations of my leader.	140	5.13	1.46	-0.71	0.19	0.81	0.93
My leader watches my back.	140	5.11	1.48	-0.79	0.48	0.83	0.93

⁸ Annex A shows the full unaltered scale and its properties before deletion of any items.

⁹ Based on the apparent strength of the subscales, it would have been possible to shorten even more. However, as this scale has only been used with a military sample to this point, caution would dictate being careful about removing too many items, lest results change with another sample.

My team leader has my best interests in mind.	140	5.09	1.48	-0.81	0.24	0.85	0.92
My leader is genuinely concerned about my well being.	140	5.01	1.43	-0.80	0.67	0.84	0.93
My team leader is likely to protect me.	140	5.24	1.45	-0.84	0.41	0.85	0.92
Integrity (mean = 5.38; mean inter-item correlation = .67; alpha = .89)							
I believe my leader is fair.	140	5.49	1.44	-1.21	1.44	0.82	0.85
I believe my leader is honest.	140	5.48	1.32	-0.85	0.53	0.83	0.85
I can depend on the fairness of my leader.	140	5.26	1.51	-0.97	0.68	0.84	0.84
My leader puts his words into action.	140	5.41	1.51	-0.78	-0.24	0.44	0.93
I know my leader will keep his word.	140	5.25	1.56	-0.99	0.77	0.78	0.86
Predictability (mean = 4.97; mean inter-item correlation = .64; alpha = .90)							
I usually know how my leader is going to react.	140	4.87	1.17	-0.50	0.24	0.81	0.86
I can anticipate what my leader will do.	140	4.85	1.22	-0.60	0.90	0.77	0.86
I know exactly what my leader will do in difficult situations.	140	4.61	1.14	-0.29	0.47	0.77	0.87
I can rely on my leader to behave predictably.	140	5.11	1.34	-0.66	0.29	0.66	0.89
My leader behaves in a very consistent manner.	140	5.29	1.19	-0.77	0.67	0.71	0.88
Competence (mean = 5.52; mean inter-item correlation = .80; alpha = .95)							
My team leader performs his job well.	140	5.64	1.21	-0.98	1.14	0.81	0.86
I have confidence in the abilities of my team leader.	140	5.35	1.44	-1.11	0.98	0.77	0.86
My team leader is capable at his job.	140	5.67	1.18	-0.97	1.09	0.77	0.87
My team leader is highly skilled.	140	5.44	1.33	-0.97	1.19	0.66	0.89
My team leader knows what he is doing.	140	5.48	1.28	-0.96	0.69	0.71	0.88
Leader Trust (Overall Index)	140	5.24	1.36	-0.83	0.64		

Higher scores, therefore, indicate more trust in the leader. As can be viewed in Table 25, participants indicated a relatively high degree of trust in their leaders. The overall mean for trust in the leader was 5.24, indicating that soldiers expressed a relatively trusting perspective of their team leaders. Means ranged from 4.97 for Predictability to 5.52 for Competence, with Integrity at 5.38, and Benevolence at 5.12. Scores in this range mean that soldiers agreed with positive trust statements about their leader from a “somewhat” to “very high” degree. As can also be seen in Table 25, all subscales performed very well, with alphas ranging from .89 for Predictability to .95 for Competence. The reliability of the Leader Trust Scale overall was very high at .97 with a mean inter-item correlation of .62. Again, this level of internal consistency within the scale is perhaps higher than desirable. Although the competence subscale did not perform well with in the first iteration, the revised items appear to be capturing competence reliably.



Clearly, even with the deletion of several items from the scale, the psychometric properties are still very acceptable.

The correlations among the 4 subscales and the Leader Trust index as a whole are shown in Table 26.

Table 26: Correlations – Leader Trust subscales and Leader Trust index

	Integrity Subscale	Predictability Subscale	Competence Subscale	Leader Trust Index
Benevolence Subscale	0.84	0.69	0.82	0.94
Integrity Subscale		0.63	0.85	0.93
Predictability Subscale			0.68	0.82
Competence Subscale				0.93

Note: All correlations significant at $p < .05$.

Table 26 indicates that all indices were positively and significantly correlated as expected. The Benevolence, Integrity and Competence subscales, however, were more highly correlated with the Leader Trust index than was the Predictability subscale.

Obviously, the Leader Trust Scale taps team members’ trust in their leader indirectly, hopefully circumventing biased responding stemming from social desirability concerns. It seemed important to compare these ratings with more transparent indicators of trust in a leader using simple and direct statements capturing trust in one’s leader (e.g. “On a scale from 0 (not at all) to 100 (completely) how much do you trust your team leader?”). Descriptive statistics for these leader trust summary items are presented in Table 27.

Table 27: Descriptive statistics – Leader trust summary items

Item	Valid N	Mean	Std.Dev.	Skewness	Kurtosis
Benevolence Summary Item	140	77.07	17.32	-1.40	3.13
Predictability Summary Item	140	71.95	14.88	-1.26	3.42
Integrity Summary Item	140	78.94	15.60	-1.59	3.69
Competence Summary Item	140	81.31	14.21	-1.93	6.08
Leader Trust Index	140	79.61	18.19	-2.02	5.60

Table 27 indicates that participants were overall quite trusting of their leaders ($m=79.61$), and rated their leaders as highest in Competence ($m=81.31$) and lowest in Predictability ($m=71.95$). It is noteworthy that these findings mostly mirror those for Team Trust, except that Predictability was the least positively endorsed trust factor for leaders, rather than Benevolence.

Correlations between the Leader Trust Scale items (tapping leader trust indirectly) and the direct measure of leader trust (using the 0-100 summary items) were examined. Again, if the Leader Trust subscales and the summary items are actually measuring the same underlying dimension, one would expect for matched dimensions to show higher correlations than unmatched dimensions. Table 28 presents these results.

Table 28: Correlations - Leader Trust Subscales and Leader Trust Summary Items

	LT Summary Benevolence	LT Summary Integrity	LT Summary Predictability	LT Summary Competence	Leader Trust Summary
LT Benevolence Subscale	0.77	0.74	0.47	0.73	0.82
LT Integrity Subscale	0.72	0.78	0.47	0.76	0.83
LT Predictability Subscale	0.55	0.55	0.63	0.56	0.57
LT Competence Subscale	0.69	0.72	0.43	0.82	0.79
Leader Trust Index	0.76	0.78	0.54	0.80	0.84

Note: All correlations significant at $p < .05$.

Overall, the Leader Trust Scale was quite highly correlated with the leader trust summary item ($r = .84$). The results in Table 28 indicate the expected pattern with the matched dimensions (as shown on the diagonal) between each subscale and summary item higher than unmatched dimensions. This provides some preliminary evidence that the subscale items intended to represent specific dimensions of leader trust are actually seen by participants to represent these dimensions.

4.2.3 Comparisons to Other Measures of Leader Trust

The relationship between the Leader Trust Scale and several other scales measuring leader trust were explored.

The Confidence in the Leader Scale (Shamir, Brainin, Zakay, & Popper, 2000) is a 4-item scale designed to measure confidence in a military leader with items such as, “I have complete trust in him”. The questionnaire is rated on a five-point from 1 (“Never”) to 5 (“Always”) and all items are summed into a single index of leader trust. In other work (Shamir et al., 2000), this scale has shown acceptable reliability, $\alpha = .85$, in four samples of soldiers ($n = 1550$), with varying ranks and specialities from the Israel Defence Forces (IDF). With regard to construct validity, Shamir et al., (2000) found that, as expected, confidence in the leader was positively related to confidence among the unit that they were ready for combat, however, this finding was only significant for soldiers, not staff. In this study, we expected that scores on the CLS would correlate positively with scores on our Trust in Leader scale.

A scale created by McAllister (1995) scale which measured managers’ trust in their peers was adapted to the military context for this research. The 9 item scale uses a 7-point rating system ranging from 1 (strongly disagree) to 7 (strongly agree), and includes items such as “Given my team member’s past performance, I see no reason to doubt his competence.” When item stems were altered slightly and used to explore trust within teams (Dirks, 1999), this scale showed excellent reliability at .96, and confirmatory factor analysis showed that items loaded on a single factor. In this study, we expected a moderate positive correlation between this scale and our leader trust scale.

A scale created for the military domain by van der Kloet (2005) was also used to measure trust in one’s leader. This scale was originally created to measure trust in the platoon commander. However, for our purposes, the referent of the scale was changed from “platoon commander” to “team leader”. This scale is comprised of seven items, such as, “If the platoon commander compliments me, I wonder if he is sincere” (reverse-coded)”, with three response options: 0 (“Don’t know”), 1 (“Not true”), and 2 (“True”). Mokken H for all items was .46, above the typical .30 level of acceptability for this statistic. With regard to construct validity, van der Kloet (2005) expected higher scores on the leader trust scale in accordance



with a greater task-oriented and relationship-oriented leadership style which she tested within two hypothetical situations, a low risk and a high risk situation. The findings confirmed expectations concerning task-orientation, but not relationship-orientation. Thus, construct validity was partially demonstrated, but further research is needed.

Results showed that the Shamir et al. (2000) and McAllister scales (1995) both performed very well within our samples, with alphas at .90 and .95, respectively. Mean scores were 3.72 on the 5-point Shamir et al. scale, and 5.05 on the 7-point McAllister scale. The van der Kloet Leader Trust scale performed slightly less well with an alpha of .76.

We expected strong and significant (but not wholly overlapping) relationships between our Leader Trust scale and these other available measures of leader trust, and Table 29 shows these results.

Table 29: Leader Trust Scale vs. Zolin, McAllister and van der Kloet Scales

	Shamir Leader Trust	McAllister Leader Trust	van der Kloet Leader Trust
LT Benevolence Subscale	0.74	0.78	0.50
LT Integrity Subscale	0.74	0.79	0.49
LT Predictability Subscale	0.57	0.57	0.39
LT Competence Subscale	0.76	0.75	0.46
Leader Trust Index	0.78	0.81	0.51

Note: All correlations significant at $p < .05$.

In short, our scales were significantly and positively correlated with all of the leader trust scales, but particularly strongly with the Shamir and McAllister leader trust scales. The correlations for Competence, Benevolence and Integrity were larger than the correlations with the Predictability subscale. As a whole, these findings suggest that the Leader Trust Scale parallels existing scales that measure leader trust very well.

Several of the items in the Human Dimensions of Operations scale (Murphy and Farley, 2000) also related specifically to trust in one's leader. Within an infantry context, the section commander serves as the leader for small teams or sections. A priori, looking at these 3 items, we expected that the first item "The section commander is respected by section members" would be most highly related to the Leader Trust Integrity subscale, as this item seems to tap issues of character and personal integrity. The second item, "My section commander stands up for his troops" has the potential to tap Benevolence, Integrity or Competence, depending on how individuals construe the question. The third item, "In the event of combat, I have confidence in the section commander" is expected to be the most highly correlated with the Competence subscale. Within the military context, as much as Benevolence, Integrity and Predictability can be important, Competence of one's leader would seem likely to be the most important attribute when facing combat. Table 30 explores these predictions.

Table 30: Leader Trust Scale vs. Human Dimensions of Operations Items

	My section commander is respected by section members	My section commander stands up for his troops	In the event of combat, I have confidence in the section commander.
LT Benevolence Subscale	0.58	0.58	0.26
LT Integrity Subscale	0.59	0.56	0.32
LT Predictability Subscale	0.51	0.50	0.29
LT Competence Subscale	0.61	0.58	0.37
Leader Trust Index	0.63	0.61	0.34

Note: All correlations significant at $p < .05$.

Again, these correlations are highly significant, suggesting that the Leader Trust Scale is very congruent with these HDO items tapping leader trust. However, contrary to our prediction, the first item is most highly correlated with the Competence subscale rather than the Integrity subscale ($r=0.61$). However, the relationship between the 3rd item and the Leader Trust Competence subscale is the strongest of all the correlations ($r=.34$). Moreover, unlike the Team Trust Scale, the Leader Trust Scale is more balanced in terms of the most influential dimensions. For example, although all LT subscales are significantly implicated in leader trust, Benevolence, Competence and Integrity play somewhat stronger roles than Predictability in explaining trust in a leader within a military context, as measured by these HDO items. However, Competence remains the strongest dimension.

In general, then, the Leader Trust Scale was strongly correlated with existing scales also aiming to capture trust in one's team leader. These correlations were in a good range as they shared a decent amount of variance with existing scales, but left a significant amount of variance in leader trust was still left unexplained. The next issue to examine was the dimensionality of the Leader Trust Scale.

4.2.4 Confirmatory Factor Analyses of the Leader Trust Scale

Confirmatory factor analyses were conducted to explore whether the Leader Trust Scale as written actually captures the dimensions underlying leader trust.

As for the Team Trust Scale, these analyses tested two different models, our hypothesized 4-factor correlated model, and a full model depicting leader trust as unidimensional construct underlying the Leader Trust Scale items. The comparison of these models would signal the actual structure underlying the Leader Trust Scale. These models are shown in Figures 4 and 5.

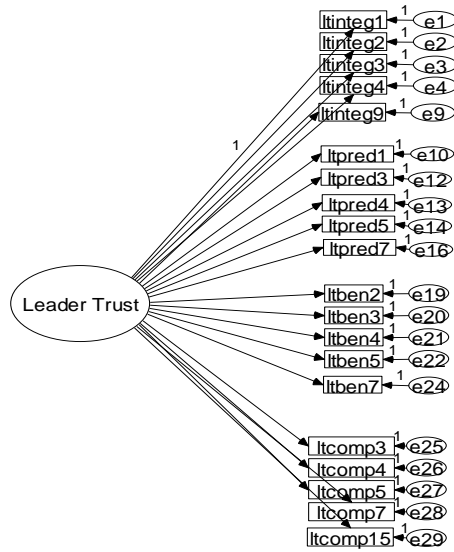


Figure 4. One factor model of leader trust.

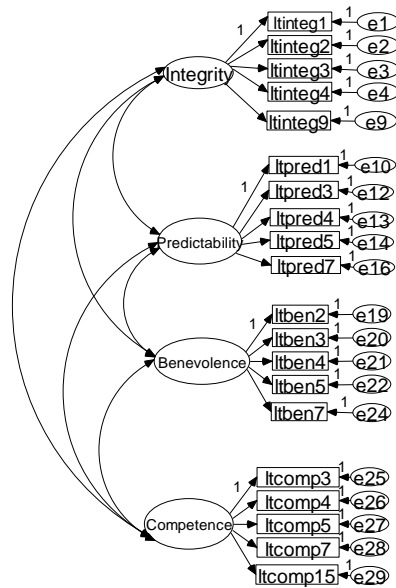


Figure 5. Four factor correlated model of leader trust.

Results for both models are shown in Table 31.

Table 31: Results of Leader Trust Confirmatory Factor Analyses

Proposed Model	χ^2	df	GFI	TLI rho2	CFI	RMSEA	$\Delta\chi^2$	df
One factor	632.32	170	.636	.550	.836	.143	-	-
Hypothesized model (4 factors - all correlated)	307.92	164	.82	.941	.949	.081	324.40***	6

Note: For all χ^2 , $\pi < .01$, GFI = goodness of fit index; TLI rho2 = Tucker Lewis; CFI = comparative fit index; RMSEA = root mean square error of approximation, ***p < .001

Although providing some fit to the data, the 1 factor model is clearly inferior to the 4 factor model depicting competence, benevolence, integrity and predictability as the most influential factors in Leader Trust. The $\Delta\chi^2$ statistic ($\Delta\chi^2 = 324.40$, $p < .001$) shows that the 4 factor model provides a significantly better fit to the data. In addition, the other indicators of fit (e.g. RMSEA) are also considerably better for the 4 factor correlated model.

The results of this confirmatory factor analysis verify the structure of the Leader Trust Scale, and its theoretical underpinnings.

4.2.5 Leader Trust Scale Summary

The results above clearly suggest that the Leader Trust scale performs well and seems to measure the construct that it was designed to measure. It was interesting that Benevolence appeared to be a more influential factor here than with the Team Trust Scale. This may suggest that participants expect a certain amount of caring behaviours from their leaders and may look to them for mentoring, or even emotional support, more than they do with their teammates.

The Leader Trust Scale again proved to be highly reliable within subscales and as a whole. The Leader Trust Scale also showed good convergence with other existing measures of trust in a leader. Again, the internal consistency of the scale will need to be understood in more detail.

There was also good evidence that the underlying structure of the Leader Trust Scale is congruent with our theoretical model of trust in a leader. Specifically, a model positing a correlated 4 factor solution provided a significantly better fit than a model positing a simple 1 factor solution. This suggests that the dimensions of Competence, Benevolence, Integrity and Predictability are discernable within the scale, and that they combine to form the latent “leader trust” construct.

For the future, it will be important to explore the predictive validity of the Leader Trust Scale in detail. At this point, however, the good convergent validity of the Leader Trust scale has been demonstrated.



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5. Discussion

To this point, the construct validity of the Team Trust Scale and the Leader Trust Scale have been explored in relation to measures with different formats, different scales purported to capture the same constructs, and in relation to competing theoretical models. All of these analyses have provided good evidence of our scales' internal consistency and construct validity. There is also good evidence from the confirmatory factor analysis that the scale items load onto the dimensions defined by the theoretical model.

Despite these positive results, however, it is important to consider the high internal consistency of both scales, and what this might mean for their construct validity. This issue was explored in more detail by drawing on the existing scale validation literature. The literature suggests that in designing a scale, researchers ideally want to work toward both construct validity and reliability and that they often have to make decisions how exactly to target their scale items in relation to the construct of interest (Clark and Watson, 1995). In essence, scale creation must attempt to represent the construct of interest in the scale items, and to promote both consistency and variability in responding. To do this, scale items can be written to tap either a very narrow range of a construct, or a much broader range. Items that sample the construct too narrowly are more likely to be strongly correlated and these items may yield very high reliabilities. However, a phenomenon known as the "attenuation paradox" (Loevinger, 1957; cited in Clark and Watson, 1995) argues that it is important to preserve both consistency and variability during scale creation efforts. In fact, paradoxically, increasing internal consistency might come at the cost of construct validity. Scales with inter-item correlations that are higher than the range of .15 to .50 might be more difficult to validate widely, because the scale may be presenting a restrictively narrow conceptualization of the construct of interest. If this high level of internal consistency is caused by narrowly defined scale items, revising the items to improve variability may improve the prospects for construct validation down the road.

Unfortunately, it is impossible at this time to pinpoint the exact cause of the high levels of internal consistency found in our scales. Although this consistency could result from the narrow definitions of the four trust dimensions used in the scale items, there are other possible explanations. Other alternative accounts might indicate either anomalies or systemic biases within the sample. For example, if participants had experienced a heightened state of intensity at some point before completing the trust questionnaires, this might cause a uniformly high level of interrelatedness in their responses. This pattern could, for example, be a product of unknown events within the battalion that brought issues of trust specifically to the fore. In such a case if the scales were ported to a less intense context, the scale items might yield more variability and the problem of high internal consistency would diminish or might disappear altogether. Or, if team trust within a military context was predominantly salient, this might also lead to high internal consistency, as participants would be more likely to rate every item as being equally important and very similar to other items. It might also be that the lack of reversed scored items within the questionnaires may have allowed participants to respond more uniformly than would otherwise have been the case. It will be important to continue to address this issue using the literature and subject matter experts. For the time being, due to the high correlations within and among subscales, it seems prudent to frame the current scale and its potential at a more holistic than subscale level, until it can be validated more broadly and with different samples.

At the same time, however, it is important to point out that high internal consistency is a potential concern not only in our scales, but in many other scales as well. Unfortunately, inter-item correlations are often



not reported in scale validation publications, so it is impossible to compare our results in this sample with other results from varying contexts. However, if the performance of the validation scales in the current sample (shown in Annex A) is any indication, high internal consistency is a problem even in more established scales. For example, high consistency can be seen in Cook and Wall's (1980) team trust items, as well as in Shamir's (2003) and McAllister's (1995) leader trust items. This suggests that the performance of a scale may be perfectly adequate for measuring a construct despite some less-than-ideal indicators, depending on the goals of the researchers.

Despite our emphasis on the important of continuing to improve the Team Trust and Leader Trust scales, it is important not to underestimate the progress to date and the results. These scales will certainly make a strong contribution to our own program of research, and they have the potential to contribute to the area of trust research as a whole. Their dimensionality has been well established, and they perform well in relation to existing measures of trust in teams and in leaders. Moreover, it is possible that once they are ported to another domain, we will be able to get a better understanding of the source of the internal consistency. However, based on the literature available, these scales may represent the best validated measures of trust in teams and trust in team leaders that are currently available. More specific recommendations for how we might want to proceed with further development is offered in the next section.

5.1 Recommendations

This section considers both short-term recommendations for the way forward with the Team Trust Scale and the Leader Trust Scale, as well as longer term issues that might be important to address.

Short-Term

- 1) Validate the revised scale with an independent sample. At this point, despite the internal consistency issues, the basic construct validity of the scale has been shown. However, it would be ideal to validate the shortened version with an independent sample from a different (e.g. non-military) context.
- 2) Work to correct and/or to understand the potential problem with high internal consistency. These efforts may be facilitated by creating a broader version of the scale and providing it to other researchers working in different (i.e. non military) contexts who might help to understand whether the sample might account for this problem, or whether the scale was simply too narrowly defined.
- 3) The most effective way to promote the "life" of the scale is to make it available to other researchers (both in the military research field and outside) who are specifically interested in trust in teams or trust in leaders. There are, of course, many ways to make this happen, either through personal contact with researchers with a known interest in the topic, through the production of a paper that describes the scale creation and validation efforts, or presentations at conferences etc. Of course, if a decision is made to provide the scale to other interested researchers, it would be most beneficial to do this in exchange for timely release of their data back to us in order to promote future validation of the scale (if that is our goal). Priority should be given to research that can shed light on the discriminant validity of our new scales.
- 4) A decision will need to be made about how the intellectual property associated with these new scales will be handled. If the goal is to make the scales broadly available without copyrighting them, there will be little control over them in the longer term. On the other hand, if our hope is to "own" the scales, and to make them available on a more limited basis, immediate protection of this intellectual property would

seem to be a good idea at this point. At a very pragmatic level, this would probably include not publishing this paper on the DRDC publication site.

5) It will be important to consider the pros and cons of producing a paper describing the scale development and validation of the Trust in Teams and Trust in Leader scales. Producing a paper for an applied journal is likely to be the best route to put the scale into use widely (if that is a goal), and to receive critical feedback about its strengths and weaknesses. A military journal may also be another avenue to consider. There are, of course, pros and cons to both approaches. An applied academic journal may be more desirable, but it also offers more significant challenges for publication. A military journal is likely to be less demanding in terms of rejection rates, but offers less “visibility” for the scale.

6) Obviously, with a data set this large, there are many more analyses and questions that could be answered with the data reported herein. More specifically, it would be ideal to explore the relationship between team and leader trust in more detail. For example, our previous work showed some interesting relationships between team and leader trust and competence that might be further explored with this data. Within the existing data set, there are also additional scales that might shed more light on the Team Trust Scale and the Leader Trust Scale results. These include scales related to positive and negative affect, leadership, and tests of biased responding. These data have been processed and cleaned, but have not been explored in detail due to time constraints.

7) The original definition of work for this project was specifically targeted at the Team Trust Scale and the Leader Trust Scale. However, our access to a large military sample for this study allowed us to include measures that anticipated our future needs. The Organizational Trust Scale, for example, was included because DRDC Toronto’s program of research has been moving to include the organizational trust domain.¹⁰ Although only pilot measures, these scales would give us a “step-up” if we decide to create and refine measures for our future work. And, another iteration of the Propensity to Trust Scale was also explored using validation scales. Our intention was to attempt to include as much of this additional work as possible within the current report. Unfortunately, although this data was prepared and analyzed to some extent, time and budget overrun did not allow for finalized results to be included within this report. Whenever possible as our work proceeds, the opportunity to fully explore and report these findings would be helpful.

8) These scales will obviously be used in our upcoming program of trust violation research. Although this research is unlikely to afford high numbers of participants, this research does provide the opportunity to refine our understanding of the scales without a high level of additional effort. For example, collecting test-retest reliability data (with a smaller sample) may be easier to do if we can access participants who might be more easily available over multiple testing periods.

9) It will also be important to watch for opportunities to achieve additional testing of our scales in the context of other research ongoing either within the Command Effectiveness and Behaviour group, within DRDC Toronto as a whole, or within future Humansystems research. With the Team Trust Scale and the Leader Trust Scale both being very easy to administer, it may be possible (and cost effective) to piggy-back on existing research projects in order to address specific questions of interest.

Long Term

¹⁰ In addition, new pilot versions of a Team Distrust Scale and a Leader Distrust Scale were created and included as part of this research, in order to anticipate our upcoming research looking at trust violations within teams.

In the longer term, whether in our own efforts, or in working with other researchers who might want to use our scales, efforts should be directed toward understanding the construct validity from as many different “angles” as possible. A specific area required for future validation efforts relates to discriminant validity. It may be important to identify other scales and measures that would assist in further refining the Team Trust Scale, via the elimination of other possible accounts of its structure. The literature has suggested that trust has frequently been confused with the concepts of confidence and cooperation. As we have argued that these constructs are theoretically distinct from one another (e.g. Adams, Bryant and Webb, 2001; Adams, 2005), it would be important to establish discriminant validity using existing measures of confidence and cooperation.

Future efforts will obviously also need to work further to understand the predictive validity of both the Team Trust Scale and the Leader Trust Scale, as only limited insight about the Team Trust Scale could be gained in this work. As noted, these early results show that the Team Trust Scale is clearly capable of predicting expectations about team processes such as morale, cohesion and combat readiness. On the other hand, it will be important to test both scales’ ability to predict actual process and performance of both teams and leaders.

As our work proceeds, several different approaches to assessing the construct validity of the Team Trust Scale and the Leader Trust Scale should also be considered in future research. For example, Westen and Rosenthal (2003) outlined procedures for obtaining two effect size estimates for quantifying construct validity. These procedures are relatively simple as no estimates or assumptions about parameters are necessary and are more direct as highly specific and focused questions can be addressed. These procedures require lower sample sizes, and resulting product-moment correlations are readily interpretable. The two effect size correlations proposed by Westen and Rosenthal (2003) are $r_{\text{alerting-CV}}$ and $r_{\text{contrast-CV}}$. The first, $r_{\text{alerting-CV}}$, assesses the simple correlation between the predicted and actual pattern of correlation of the target variable and other variables of interest. It is called an “alerting” variable because it provides a readily interpretable index that signals trends of interest (Westen & Rosenthal, 2003). The second coefficient, $r_{\text{contrast-CV}}$, uses the median intercorrelation between variables and the absolute value of correlations in order to assess the effect size correlations. In a sense, then, these new measures function like meta-analytic techniques, and allow comparisons across multiple studies, independent of the method employed. This procedure would be helpful for taking a more holistic view of the construct validity of our scales once we have additional data.

Another possible approach is identified in work related to incremental validity (Hunsley and Meyer (2003). This work identifies a specific technique, usually using regression equations, to establish whether a new measure contributes new understanding or predictive ability in addition to existing measures. Specifically, stepwise or hierarchical regression equations are conducted to determine the differences in semi-partial r with and without the new measure. This shows whether or not the new measure can account for any additional variance in the construct in question over and above previous measures. This procedure is a quick and easy way to determine changes in r as a result of a new measure, and should be explored to see how this approach differs from analyses undertaken and reported in the Team Trust Scale chapter.

As work progresses, it will be important to undertake validation efforts that do not rely exclusively on self-report. In light of the potential for social desirability concerns to influence responses when rating one’s trust in teammates, it will be important to explore both direct as well as indirect measures in detail. For example, behavioural observation measures could also be used to compare to ratings of team trust. Another possibility is to use a multitrait-multimethod approach (Kenny, 1995) combining, for example, team trust self report measures with behavioural observation measures and a construct expected to be

theoretically distinct from trust in teams (e.g. confidence). Such a matrix would simultaneously provide evidence of both convergent and discriminant validity.

Using known-group techniques would be one way to further validate the scale. In the case of the Team Trust Scale, for example, this would require finding relatively established teams, and having leaders or SMEs provide ratings and information about levels of trust within the team. The Team Trust Scale should be able to predict high vs. low trust teams (as indicated by SMEs). An obvious way to do this, then, would be to use discriminant function analyses to a priori identify high vs. low trust teams, and then to compare these results with SME ratings. Moreover, due to problems encountered in matching team members in the current research, it was impossible to explore the data using hierarchical techniques. This is another avenue that should be pursued in future research.

As a whole, then, there are many opportunities in both the short term and in the longer term in order to better understand the validity and reliability of the Team Trust Scale and the Leader Trust Scale. At this stage, the basic validity of them has been established. From this point, efforts can be directed toward distributing the scales to other researchers, and to using the scales in our own research with a view toward exploring their properties to the extent possible.

At the same time, it will also be important to articulate the ideal future uses of the scales. The Team Trust Scale and the Leader Trust Scale, were also developed in order to aid future trust research efforts within military systems. However, it is also important to consider other potential uses of the scales. One obvious possible use would be as a diagnostic tool, in order to help assess the current status of trust within teams, for example, and to be able to take remedial action for teams in which trust was either too high or too low. The value of these scales at a diagnostic level, however, would be dependent on the creation of norms and cutoff values for what trust should be in the “ideal” team. As different teams are likely to function in situations with varying levels of risk and uncertainty, the need for trust (and hence the “ideal” level of trust within a team) may be widely variable. The development of proper norms and cutoff values would require perhaps a prohibitively large N, and research conducted in multiple samples in order to achieve any convergence.

Given the personal nature of trust judgements, there are obvious ethical issues associated with providing this kind of a scale to untrained observers. Judgements about the trustworthiness of other teammates (not to mention one’s leaders) have the potential to be extremely provocative and potentially very dangerous to established relationships. Even teams in which trust is relatively low may have found a means by which to be a productive working unit, and a diagnostic tool that shows trust to be low has the potential to be used too generally, or to be overinterpreted. Moreover, trust is also integrally related to control and power issues, and there is a great deal of potential misuse of such scales.

All this is to say that there are both pragmatic and philosophical issues that would need to be addressed in full before consideration could be given to using these scales as true diagnostic tools. At best, perhaps, the scales have the potential to be used (with the data protected) as a general indicator of trust within teams within larger units, such that specific team trust is not addressed, but is left to leaders to identify and to manage. In this sense, for example, the development of a Commander Handbook addressing trust has the potential to help commanders to have an informed sense of the status of trust within their teams, and to work to improve in problem areas. This has the benefit of both protecting individual rights and of providing a longer term strategy to building a positive trust environment within military teams.

6. Organizational Trust and Distrust Scales

Another important part of trust in small military teams stems from the climate of the organization, the Canadian Forces, itself. We designed two questionnaires measuring organizational trust and organizational distrust with respect to the CF as a whole. Although not originally indicated as a goal of this large study, we decided to pilot measures of organizational trust and distrust with the large sample that was available. The purpose at this stage was simply to explore the psychometric properties, to compare to existing measures, and (to the extent possible within time constraints of the larger study) to receive feedback from participants about how the scales might be further refined.

6.1.1 Scale Creation and Preliminary Analyses

Trust in the CF as an organization was assessed with the Organizational Trust Scale. This scale is comprised of 7 questions tapping trust in the CF with respect to Competence, Benevolence, etc. Examples include, “How competent (i.e., able to do its job) do you think the CF as an organization is?” with all items rated from 0 (“Not at all”) to 100 (“Completely”).

Descriptive statistics and reliability estimates for the organizational trust items are presented in Table 32.

Table 32: Descriptive Statistics – Organizational Trust Scale

Item	Valid N	Mean	StDev	Skewness	Kurtosis	Item-total r	α if item deleted
Organizational Trust (mean = 55.14; mean inter-item correlation = .49; alpha = .86)							
How competent (i.e., able to do its job) do you think the CF as an organization is?	218	55.11	26.24	-.45	-.57	.68	.89
How concerned about your interests and safety do you think the CF as an organization is?	219	53.98	28.42	-.33	-.82	.72	.88
How predictable (i.e., consistent) do you think the CF as an organization is?	220	60.89	29.73	-.55	-.74	.39	.91
How much integrity (i.e., fairness, honesty, ethical values) do you think the CF as an organization has?	219	59.42	26.60	-.57	-.42	.69	.89
To what extent do you agree that the CF promotes people with integrity?	218	52.05	29.71	-.25	-.90	.60	.89
To what extent do you agree that CF members can rely on the leaders and commanders above them?	218	55.92	25.37	-.37	-.51	.69	.89
To what extent do you think the CF as an organization is looking out for you?	218	48.62	27.79	-.08	-.95	.72	.88

Table 32 shows that the mean of the organizational trust items ($m = 55.14$) was just over the midpoint of the 100-point scale, suggesting that participants had a relatively, albeit very slight, trusting attitude toward the CF. Scale reliability was high at .86.

In creating the Organizational Distrust Scale, we attempted to write items that captured the higher end of the scale rather than the fuller range of distrust concepts. As such, we focused on malevolent intentions and the need to protect oneself, rather than simple misgivings or scepticism about the motives of others. This decision was made because the more extreme items are the ones within an organizational context that are likely to be the most problematic. Table 33 shows the descriptive statistics and reliability estimates for this scale.

Table 33: Descriptive Statistics – Organizational Distrust Scale

Item	Valid N	Mean	StDev	Skewness	Kurtosis	Item-total r	α if item deleted
Organizational Distrust (mean = 40.34; mean inter-item correlation = .68; alpha = .89)							
To what extent do you think the <u>CF as an organization</u> would intentionally screw you?	219	39.78	31.68	.25	-1.19	.76	.85
To what extent do you think the <u>CF as an organization</u> would intentionally treat other members of the CF unfairly?	219	39.34	29.76	.23	-1.11	.82	.83
To what extent do you need to protect yourself from the <u>CF as an organization</u> ?	218	41.99	32.93	.22	-1.23	.71	.86
To extent do you agree that most organizations like the CF tend to screw their workers?	217	40.26	30.65	.32	-1.01	.74	.85

Results showed that distrust in the CF was below the midpoint of the scale, but still relatively high at 40.34. However, due the extremity of these organizational distrust items, it was important to understand the frequency distribution of responses for items individually, and as a whole, as shown in Figure 6.

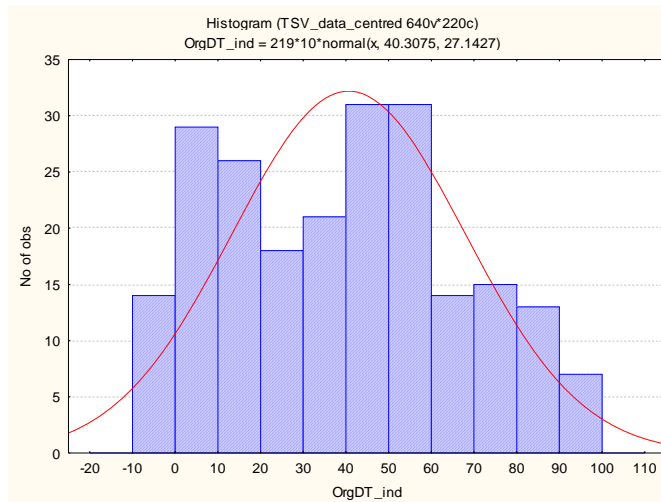


Figure 6. Frequency distribution for Organizational Distrust Scale index.

As Figure 6 shows, the distribution of participants endorsing the organizational distrust items shows that there were more participants endorsing a less distrustful stance than those above the midpoint (50) of the scale. On the other hand, considering the relative extremity of the organizational distrust items, even if some participants endorse items in the mid-range, this is a strong statement about the status of trust in the CF given that they clearly had the option not to agree in any way.

Participants also responded to two summary item questions regarding organizational trust and distrust, as shown in Table 34.

Table 34: Descriptives – Organizational Trust and Distrust summary items (0 to 100)

Item	Valid N	Mean	Std.Dev.	Skewness	Kurtosis
Organizational Trust Summary Item	220	54.91	27.48	-.39	-.72
Organizational Distrust Summary Item	220	44.70	28.44	.21	-.89

As seen in Table 34, ratings of organizational trust were above the midpoint of the scale ($m = 54.91$), and ratings of organizational distrust were only somewhat lower ($m = 44.70$). As the organizational trust summary items ask directly about the status of trust in the CF, the size of these means is somewhat telling. Clearly, participants did not appear to be hesitant in noting their low trust (and relatively high distrust) in the CF as an organization.

These results were then explored in relation to the more elaborated questionnaire ratings of organizational trust and distrust. Of course, as the organizational trust scale and the organizational trust summary item ratings are expected to be similar, one would expect a high correlation between these, but a negative correlation with distrust measures, as shown in Table 35.

Table 35: Correlations – Organizational Trust Indices and Summary Items

	Org. Trust Summary item	Org. Distrust Summary item
Organizational Trust Index	0.83	-0.53
Organizational Distrust Index	-0.51	0.56

Note: All correlations significant at $p < .05$.

Table 35 shows the strong and significant positive correlations amongst the organizational trust scale measure and the summary item measure ($r = .83$), and between the related distrust measures ($r = .56$). Moreover, it is important to note that the pattern of correlations is exactly as expected, with organizational trust and distrust being overlapping, but not redundant.

In a previous literature review (Adams and Sartori, 2005a), we have argued that trust and distrust form two distinct constructs, rather than being the opposing poles of one construct. More specifically, we have argued that distrust is not a mere opposite of trust, but a construct integrally linked with the attribution of malevolent intention to another person or system. Consistent with this logic, items that tap trust at the organizational level should be distinguishable from items tapping organizational distrust. In order to explore the dimensionality of the organizational trust vs. organizational distrust items, a factor analysis was conducted. This exploratory factor analysis used oblique rotation because we expected that organizational trust and distrust would be correlated. Table 36 illustrates the results of this analysis.

Table 36: Factor analysis - Organizational Trust and Distrust scales

Item	Factor 1 (Trust)	Factor 2 (Distrust)
How competent (i.e., able to do its job) do you think the <u>CF as an organization</u> is?	.75	-.03
How concerned about your interests and safety do you think the <u>CF as an organization</u> is?	.76	-.09
How predictable (i.e., consistent) do you think the <u>CF as an organization</u> is?	.67	.31
How much integrity (i.e., fairness, honesty, ethical values) do you think the <u>CF as an organization</u> has?	.68	-.19
To what extent do you agree that the CF promotes people with integrity?	.67	-.07
To what extent do you agree that CF members can rely on the leaders and commanders above them?	.72	-.14
To what extent do you think the <u>CF as an organization</u> is looking out for you?	.74	-.15
To what extent do you think the <u>CF as an organization</u> would intentionally screw you?	-.02	.88
To what extent do you think the <u>CF as an organization</u> would intentionally treat other members of the CF unfairly?	-.02	.88
To what extent do you need to protect yourself from the <u>CF as an organization</u> ?	-.09	.77
To extent do you agree that most organizations like the CF tend to screw their workers?	-.08	.84
Eigenvalue	5.06	1.88
% Total Variance Explained	.46	.17

Table 36 shows that the Organizational Trust and Organizational Distrust items emerged as two distinct and reliable factors precisely as expected, explaining 46% and 17% of the proportion of variance, respectively. In addition, their eigenvalues were acceptable at 5.06 and 1.88, respectively. At an exploratory level, then, these new measures of organizational trust appear to have a distinct factor structure. Of course, using confirmatory factor analysis will be a more stringent test of the distinct structure of the two scales.

6.1.2 Comparisons with Other Measures of Organizational Trust

It was also important to compare the pilot organizational trust and distrust questionnaires with existing organizational trust scales.

The Organizational Trust Inventory was developed by Cummings and Bromiley (1996). The short form of this 15-item scale was designed to measure trust within the units of an organization or between organizations on a 9-point scale from 1 (strongly disagree) to 9 (strongly agree). This scale was carefully constructed to include affective, behaviour, and cognitive items. Several iterations have resulted in retention of only the affective and cognitive items that exhibited the highest item-to-factor correlations (.75 to .94), and reliability levels of .90 and .94. In this study, this scale was altered to make CF the subject of the test items.

Two other subscales from the Interpersonal Trust at Work Scale (Cook & Wall, 1980) were used in this research. These subscales measure trust toward management, in terms of faith in intentions and confidence in actions, both using a 7-point scale ranging from 1 (strongly disagree) to 7 (strongly agree). We altered managerial-oriented items to reflect the CF context instead. A sample question included “The CF has a poor future unless it can attract better leaders”. Cook and Wall (1980) reported good inter-item correlations ($r = .46$ in study 1, $r = .43$ in study 2) for a sample of 260 participants, but modest test-retest reliability ($r = .60$, $p < .001$). While reliability levels were not provided, the factor analysis indicated that the items loaded as predicted on the underlying constructs.

In addition, 3 items from an organizational trust scale by Defuria (1996) were also included in this research. The Defuria scale attempts to capture trust with respect to several referents within an organization, including upper management, the organization as a whole, and the basic organizational unit (one’s branch or division). For this study, only the broad organizational items were analyzed, after having been adapted to represent the CF context, and included questions such as “The CF as an organization lives up to my expectations”, rated on a 9-point scale, ranging from 1 (strongly disagree) to 9 (strongly agree). These 3 items were indexed into a single item for analyses.

We expected our organizational trust scales to be correlated with all of the other scales measuring trust within organizational domains, as shown in Table 37. We also expected a moderate negative correlation between our organizational distrust scale and other organizational trust scales.

Table 37: Organizational Trust and Distrust Scales vs. Other Scales

	Cook and Wall Confidence in Management	Cook and Wall Faith in Management	Cummings and Bromiley	Defuria
Org. Trust Scale	0.26	0.61	0.69	0.59
Org. Distrust Scale	-0.20	-0.59	-0.61	-0.39

Note: All correlations significant at $p < .05$.

As these results attest, the Organizational Trust scale is significantly correlated with all of these existing measures of trust at the organizational level. For the Cook and Wall measures, the Organizational Trust showed correlations of .26 with the Cook and Wall “confidence in management” subscale and a stronger correlation ($r = .61$) with the “faith in management” subscale. Our organizational trust scale was also strongly correlated with the Cummings and Bromiley (1996) measure, with $r = .69$, and also showed a strong correlation ($r = .59$) with the 3 items from the Defuria scale. Overall, then, the results for the Organizational Trust Scale suggest very good convergence with existing measures of trust at the organizational level.

These analyses also show that the pilot organizational distrust scale is strongly negatively correlated with existing organizational trust measures. Given that we have posited for trust and distrust to be distinct but related constructs, the size of the correlations between organizational trust and distrust is perhaps stronger than would be ideal. It will be important to explore this issue in more detail in the future.

6.1.3 Overview of Organizational Trust and Distrust Scales

The findings reported herein indicate that the first iteration of the Organizational Trust and Distrust scales performed relatively well, showed good correlations with more established measures of organizational trust.

In talking to CF personnel who had completed the organizational trust scales, however, it became clear that there are many different organizational referents relevant within the CF context. As such, although this scale did not differentiate between the many different aspects of “the CF”, military participants do make a strong distinction between the CF, for example, and the Department of National Defence. Future scales attempting to capture organizational trust will need to include this distinction.

Moreover, CF members also pointed out the importance of the distinction between the organizational milieu within their own battalion vs. that outside of the battalion. This issue will need to be explored.

Lastly, other important feedback from participants also indicated the need to make a distinction even within the CF category between the CF as a whole, and National Defence Headquarters specifically, as the implications for trust may be very different between these two bodies. This feedback was very helpful in working toward further refinements of the organizational trust measures.

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Annex A

Long Team Trust Scale (Adams and Sartori, 2005)

	Valid N	Mean	Std. Dev.	Skewness	Kurtosis	Item-to-Total	Alpha if deleted
Team Benevolence (mean = 5.04; mean inter-item correlation = .67; alpha = .93)							
Even in tough times, my team members are supportive.	220	5.28	1.18	-.67	.31	.76	.92
I believe that my teammates have my best interests in mind.	220	4.78	1.28	-.47	.41	.78	.92
My team is motivated to protect me.	220	4.93	1.30	-.36	-.22	.82	.92
I feel that my teammates work to protect me.	220	4.79	1.35	-.45	.28	.77	.92
My teammates watch my back.	220	5.21	1.19	-.42	-.09	.83	.92
My teammates look out for me.	220	5.11	1.25	-.48	.14	.78	.92
When I need them, my teammates are there for me.	220	5.15	1.08	-.36	.15	.74	.93
Benevolence (Index)	220	5.04	1.04	-.34	-.01	-	-
Team Integrity (mean = 5.20; mean inter-item correlation = .66; alpha = .95)							
I believe my team has integrity.	220	5.40	1.03	-.38	-.26	.80	.94
I believe that my teammates have strong ethics.	220	5.06	1.26	-.73	.74	.75	.94
I can depend on my teammates to be fair.	220	5.25	1.14	-.79	.85	.78	.94
I feel confident about the integrity of my teammates.	220	5.32	1.14	-.64	.46	.77	.94
I have faith in the integrity of my teammates.	220	5.24	1.17	-.66	.53	.84	.94
My teammates are honourable people.	220	5.25	1.11	-.33	.28	.79	.94
My teammates honour their word.	220	5.07	1.21	-.52	.29	.76	.94
My teammates keep their promises.	220	5.16	1.15	-.43	.06	.81	.94
My teammates tell the truth.	220	5.07	1.26	-.72	.73	.79	.94
Integrity (Index)	220	5.20	.97	-.42	-1.02	-	-
Team Predictability (mean = 5.06; mean inter-item correlation = .47; alpha = .87)							
I can guess what my fellow team members are likely to do.	220	4.81	1.15	-.72	1.08	.65	.85
I cannot predict what teammates are likely to do. (reverse)	220	4.58	1.34	-.21	-.55	.30	.89
I know what to expect from my team.	220	5.34	1.12	-.88	1.44	.73	.84
I usually know how my teammates are going to react.	220	5.00	1.07	-.15	-.44	.71	.84
In times of uncertainty, my team sticks to the plan.	220	5.24	1.09	-.39	.07	.68	.84
My team agrees on what to do in most situations.	220	5.03	1.31	-.80	.87	.60	.85
My teammates are reliable.	220	5.29	1.18	-.87	1.10	.68	.84

My teammates behave consistently.	220	5.18	1.15	-.65	.56	.68	.84
Predictability (Index)	220	5.06	0.85	-.18	-.29	-	-
Team Competence (mean = 5.26; mean inter-item correlation = .52; alpha = .94)							
My teammates are highly skilled.	220	5.25	1.26	-.56	-.09	.77	.93
My teammates are capable at their jobs.	220	5.49	1.10	-.86	1.17	.84	.93
My teammates know what they are doing.	220	5.42	1.13	-.70	.47	.83	.93
My teammates are good at solving problems.	220	5.30	1.10	-.86	1.56	.70	.93
My team often makes poor decisions. (reverse)	220	5.32	1.21	-.68	.07	.46	.94
My teammates perform well even under stress.	220	5.13	1.18	-.49	.14	.75	.93
My teammates are competent.	220	5.35	1.12	-.68	.62	.69	.93
I have faith in the abilities of my teammates.	220	5.37	1.17	-.80	.70	.80	.93
My teammates know what they are doing.	220	5.31	1.10	-.74	.97	.82	.93
My teammates fail to do their job. (reverse)	220	5.59	1.31	-.82	-.11	.57	.94
My team is unskilled. (reverse)	220	5.85	1.17	-.87	.01	.65	.93
My team is good at planning.	220	5.13	1.22	-.73	.84	.69	.93
My team needs to improve in several areas. (reverse)	220	3.68	1.60	.33	-.63	.32	.94
My teammates are qualified to do their job.	220	5.51	1.22	-.87	.78	.72	.93
My team members communicate well.	220	5.22	1.07	-.68	.83	.74	.93
My team members follow instructions well.	220	5.27	1.13	-.86	1.06	.63	.93
Competence (Index)	220	5.26	.86	-.32	-.38	-	-
Team Trust (Overall Index)	220	5.45	1.20	-1.03	1.41	-	-



Long Leader Trust Scale (Adams and Sartori, 2005)

	Valid N	Mean	Std.Dev.	Skewness	Kurtosis	Item-Total r	Alpha if deleted
Leader Benevolence (mean = 5.14; mean inter-item correlation = .74; alpha = .95)							
My leader shows respect for me as a person.	140	5.36	1.21	-1.17	2.52	.80	.95
I have confidence in the motivations of my leader.	140	5.13	1.16	-.88	2.00	.81	.95
My leader watches my back.	140	5.11	1.18	-.98	2.47	.83	.94
My team leader has my best interests in mind.	140	5.09	1.18	-1.01	2.08	.87	.94
My leader is genuinely concerned about my well being.	140	5.01	1.14	-1.00	2.75	.86	.94
My leader makes me feel valued.	140	5.04	1.15	-1.07	2.69	.83	.94
My team leader is likely to protect me.	140	5.24	1.15	-1.05	2.35	.84	.94
Benevolence (Index)	140	5.14	1.03	-1.08	2.64	-	-
Leader Integrity (mean = 5.37; mean inter-item correlation = .67; alpha = .94)							
Especially in difficult times, I believe my leader has integrity.	140	5.33	1.11	-1.12	2.84	.86	.93
I believe my leader is fair.	140	5.49	1.14	-1.51	3.94	.83	.93
I believe my leader is honest.	140	5.48	1.05	-1.06	2.53	.84	.93
I can depend on the fairness of my leader.	140	5.26	1.20	-1.21	2.77	.88	.93
In risky situations, I know my leader tells the truth.	140	5.36	1.05	-.93	2.36	.81	.93
My leader has poor ethics.	140	5.29	1.04	-1.00	2.82	.71	.94
My leader puts his words into action.	140	5.41	1.20	-.98	1.34	.49	.95
When it really counts, my team leader breaks his promises.	140	5.49	1.18	-.98	1.72	.75	.93
I know my leader will keep his word.	140	5.25	1.24	-1.24	2.91	.81	.93
Integrity (Index)	140	5.37	.94	-.98	2.35	-	-
Leader Predictability (mean = 4.99; mean inter-item correlation = .57; alpha = .90)							
I usually know how my leader is going to react.	140	4.87	.94	-.63	2.09	.81	.87
I can anticipate my leader's actions before he does them.	140	4.87	.98	-.77	2.76	.57	.89
I can anticipate what my leader will do.	140	4.85	.97	-.75	3.11	.77	.87
I know exactly what my leader will do in difficult situations.	140	4.61	.91	-.36	2.44	.76	.87
I can rely on my leader to	140	5.11	1.07	-.83	2.17	.70	.88

behave predictably.							
In times of uncertainty, I know I can rely on my leader.	140	5.31	1.18	-1.26	3.15	.59	.89
My leader behaves in a very consistent manner.	140	5.29	.95	-.96	2.75	.72	.88
Predictability (Index)	140	4.99	.78	-.92	3.57	-	-
Leader Competence (mean = 5.43; mean inter-item correlation = .63; alpha = .96)							
My team leader is not good at making decisions.	140	5.06	1.36	-.85	.89	.51	.96
My leader gets the job done.	140	5.68	.99	-1.49	4.47	.78	.96
My team leader performs his job well.	140	5.64	.96	-1.23	3.48	.86	.96
I have confidence in the abilities of my team leader.	140	5.35	1.15	-1.38	3.23	.88	.95
My team leader is capable at his job.	140	5.67	.94	-1.21	3.40	.85	.96
I think that my team leader solves problems well.	140	5.36	1.06	-1.22	3.45	.84	.96
My team leader is highly skilled.	140	5.44	1.06	-1.21	3.56	.87	.95
My team leader performs well even in stressful situations.	140	5.21	1.15	-1.12	3.07	.81	.96
My team leader communicates well.	140	5.18	1.16	-1.25	2.88	.80	.96
My team leader performs competently overall.	140	5.58	.98	-1.29	4.05	.84	.96
My team leader is incapable of doing his job.	140	5.59	1.30	-1.53	2.97	.60	.96
I feel that my team leader is unskilled.	140	5.68	1.15	-1.47	3.40	.66	.96
My team leader is a good communicator.	140	5.19	1.21	-1.34	2.83	.78	.96
My team leader needs to improve in several areas.	140	4.64	1.34	-.32	.46	.65	.96
My team leader knows what he's doing.	140	5.48	1.02	-1.19	2.79	.87	.96
My team leader is qualified to do his job.	140	5.89	.83	-.78	.79	.75	.96
My team leader's lack of skill puts us all at risk.	140	5.66	1.19	-1.43	2.92	.59	.96
Competence (Index)	140	5.43	.87	-1.07	2.62	-	-
Leader Trust (Overall Index)	140	5.31	1.26	-1.35	2.99	-	-

Validation Scales for Team Trust

Table A: Descriptive statistics - Zolin Team Trust scale (2004)

	Valid N	Mean	Std. Dev.	Skewness	Kurtosis	Item-to-Total r	Alpha if deleted
Team Ability (mean = 4.00)							
How often have you noticed your teammates exhibiting professional behaviour?	219.00	3.99	0.77	-0.77	1.35		*not available due to size of subscales
How often have your teammates exhibited technical or project competence?	219.00	4.01	0.74	-0.50	0.21		
Team Care (mean = 3.79)							
How often have your teammates listened carefully to hear your problems or concerns?	218.00	3.58	1.04	-0.65	0.12		
How often have your teammates made an extra effort to make your job easier?	219.00	3.70	0.86	-0.54	0.39		
How often have your teammates checked to make sure that communication was received and understood?	219.00	3.79	0.86	-0.47	0.09		
How often have your teammates notified you when unable to keep commitments?	219.00	3.93	0.93	-0.66	0.15		
How often have your teammates passed on new information or ideas that may be helpful to you or the group?	219.00	3.98	0.83	-0.50	-0.26		
Team Integrity (mean = 4.00)							
To what extent are your teammates ethical?	219.00	3.93	0.82	-0.42	-0.08		
To what extent are your teammates honest?	217.00	4.08	0.73	-0.48	0.01		
Zolin Overall (mean = 3.89, mean inter-item correlation = .54, alpha = .91)							

Table B: Descriptive statistics – van der Kloet Team Trust scale (2005)

Item	Valid N	Mean	Std. Dev.	Skewness	Kurtosis	Item-to-Total r	Alpha if deleted
Team Competence (mean = 3.08; mean inter-item correlation = .45; alpha = .66)							
The level of education is high in my team.	218	2.90	0.63	-0.69	1.49	0.28	0.84
My team members always deliver good quality work.	218	3.09	0.60	-0.17	0.22	0.62	0.40
I think my team members do a professional job.	218	3.26	0.62	-0.48	0.54	0.61	0.42
Team Benevolence (mean = 3.16; mean inter-item correlation = .50; alpha = .74)							
In my team, we are always prepared to help each other.	218	3.28	0.60	-0.21	-0.58	0.56	0.64
In my team, we work together very well.	217	3.28	0.58	-0.14	-0.54	0.65	0.55
I can count on my team members not to make my work harder by making mistakes.	217	2.93	0.70	-0.48	0.52	0.48	0.76
Team Honesty (mean = 3.10; mean inter-item correlation = .46; alpha = .72)							
I can count on my teammates to stick to their promises most of the time.	218	3.27	0.55	0.07	-0.42	0.51	0.66
My team members tell me what they think of me.	217	2.80	0.81	-0.46	-0.12	0.47	0.70
Within my team, we can openly discuss our ideas and expectations.	218	3.23	0.75	-0.61	-0.35	0.64	0.46
Team Predictability (mean = 3.10; mean inter-item correlation = .46; alpha = .72)							
I know how my team members will react in different situations.	217	2.91	0.64	-0.34	0.52	0.50	0.67
Within my team, we know that we can count on each other.	218	3.21	0.58	-0.06	-0.34	0.55	0.61
I know where I stand with my team members.	218	3.17	0.66	-0.59	0.84	0.55	0.60



**Table C: Descriptive statistics – Faith and Confidence in Peers
Cook and Wall (1980)**

	Valid N	Mean	Std. Dev.	Skewness	Kurtosis	Item-to-Total r	Alpha if deleted
Faith in Peers (mean = 5.51; mean inter-item correlation = .67; alpha = .86)							
If I got into difficulties at work I know my teammates would try and help me out.	219	5.51	1.30	-1.00	0.88	0.76	0.77
I can trust the people I work with to lend me a hand if I needed it.	219	5.59	1.28	-1.35	2.36	0.75	0.78
Most of my teammates can be relied upon to do as they say they will do.	219	5.44	1.22	-1.02	1.32	0.68	0.84
Confidence in Peers (mean = 5.08; mean inter-item correlation = .51; alpha = .75)							
I have full confidence in the skills of my teammates.	219	5.50	1.22	-1.01	1.18	0.56	0.69
Most of my teammates would get on with their work if leaders were not around.	219	5.03	1.63	-0.82	-0.09	0.62	0.60
I can rely on other soldiers not to make my job more difficult by careless work.	219	4.71	1.60	-0.66	-0.30	0.56	0.68

Validation Scales for Leader Trust

Table D: Descriptive statistics - Zolin Leader Trust scale (2004)

	Valid N	Mean	Std. Dev.	Skewness	Kurtosis	Item-to-Total r	Alpha if deleted
Leader Competence (mean = 4.08)							
How often have you noticed your team leader exhibit professional behaviour?	137.00	4.14	0.82	-0.66	-0.20		*not available due to size of subscales
How often has your team leader exhibited technical or project competence?	137.00	4.02	0.84	-0.49	-0.46		
Leader Benevolence (mean = 3.85)							
How often has your team leader made an extra effort to make your job easier?	137.00	3.53	0.99	-0.44	-0.17		
How often has your team leader passed on new information or ideas that may be helpful to you or the group?	137.00	3.99	0.94	-0.75	0.27		
How often has your team leader notified you when unable to keep commitments?	137.00	3.91	0.93	-0.61	-0.14		
How often has your team leader listened carefully to hear your problems or concerns?	137.00	3.83	0.99	-0.58	-0.05		
How often has your team leader checked to make sure that communication was received and understood?	137.00	3.96	0.92	-0.65	-0.07		
Leader Integrity (mean = 4.01)							
To what extent is your team leader honest?	137.00	4.01	0.84	-0.71	0.50		
To what extent is your team leader ethical?	137.00	4.00	0.88	-0.46	-0.66		
Zolin Overall (mean = 3.93, mean inter-item correlation = .60, alpha = .92)							

Table E: Descriptive statistics – Shamir Leader Trust Scale (2003)

	Valid N	Mean	Std. Dev.	Skewness	Kurtosis	Item-to-Total r	Alpha if deleted
Leader Trust (mean = 3.72; mean inter-item correlation = .74; alpha = .91)							
I have complete trust in him.	136	3.90	0.98	-0.79	0.30	0.84	0.85
I fully trust his decisions and judgment.	136	3.81	0.90	-0.42	-0.52	0.83	0.86
I tend to trust his ability to overcome any obstacle.	136	3.87	0.94	-0.70	0.21	0.86	0.85
In time of war, I would follow him blindly.	136	3.29	1.27	-0.33	-0.85	0.67	0.93

Table F: Descriptive statistics – McAllister's (1995) Leader Trust scale

	Valid N	Mean	Std. Dev.	Skewness	Kurtosis	Item-to-Total r	Alpha if deleted
Leader Trust (mean = 5.05; mean inter-item correlation = .69; alpha = .95)							
Most team members trust and respect my team leader.	138	5.18	1.48	-0.87	0.35	0.85	0.94
I can rely on my team leader not to make my job more difficult by poor leadership.	138	4.96	1.74	-0.80	-0.22	0.66	0.95
I have a sharing relationship with my team leader. I can freely share my ideas, feelings, and hopes with him/her.	138	4.79	1.69	-0.74	-0.13	0.80	0.94
My team leader approaches his/her job with professionalism and dedication.	138	5.48	1.34	-0.80	0.40	0.74	0.95
Given my team leader's past performance, I see no reason to doubt his competence.	138	5.36	1.52	-0.74	-0.23	0.87	0.94
I would feel a sense of loss if my team leader left.	138	4.67	1.88	-0.54	-0.68	0.76	0.95
I can talk freely to my team leader about difficulties I am having and know that he/she will want to listen.	137	4.90	1.69	-0.60	-0.49	0.84	0.94
If I shared my problems with my team leader, I know he/she would respond in a caring way.	138	4.83	1.61	-0.68	-0.01	0.86	0.94
Other teams and team leaders consider my team leader to be trustworthy.	138	5.25	1.47	-0.88	0.75	0.84	0.94

Table G: Descriptive statistics – van der Kloet (2005) Leader Trust scale

	Valid N	Mean	Std. Dev.	Skewness	Kurtosis	Item-to-Total r	Alpha if deleted
Leader Trust (mean = 2.36; mean inter-item correlation = .32; alpha = .74)							
If the team leader compliments me, I wonder if he is sincere.	138	2.11	0.72	0.07	-0.53	-0.23	0.85
I assume that the team leader is honest.	137	2.59	0.73	-1.46	0.47	0.62	0.70
If I want to confide in the team leader, I am sure he will listen to me.	137	2.46	0.84	-1.12	-0.41	0.64	0.69
If I tell the team leader something, he will not tell it to others in a different way.	137	2.24	0.91	-0.56	-1.42	0.60	0.70
If the team leader tells me something, I am sure that he sticks to it.	137	2.46	0.85	-1.12	-0.45	0.63	0.69
If the team leader knows my weaknesses, he will not take advantage of them.	137	2.36	0.87	-0.84	-0.97	0.63	0.69
If the team leader knows I did something wrong, he will not criticize me in front of others.	137	2.23	0.80	-0.52	-1.00	0.51	0.72



Validation Scales for Organizational Trust

**Table H: Descriptive statistics – Faith and Confidence in Management
(Cook and Wall, 1980)**

	Valid N	Mean	Std. Dev.	Skewness	Kurtosis	Item-to- Total r	Alpha if deleted
Faith in Management (mean = 3.98; mean inter-item correlation = .40; alpha = .66)							
The CF as an organization is sincere in its attempts to meet the soldier's point of view.	219	3.68	1.61	-.03	-.86	.49	.51
I feel quite confident that the CF will always try to treat me fairly.	219	3.93	1.65	-.14	-.85	.61	.35
The CF would be quite prepared to gain advantage by deceiving the soldiers (rev).	219	4.34	1.75	.00	-.77	.31	.76
Confidence in Management (mean = 3.51; mean inter-item correlation = .49; alpha = .72)							
The CF has a poor future unless it can attract better leaders (rev).	219	3.21	1.80	.47	-.68	.38	.82
CF management can be trusted to make sensible decisions for the CF's future.	219	3.53	1.56	.06	-.73	.61	.54
Senior CF leaders seem to do an efficient job.	219	3.80	1.71	-.11	-.98	.64	.49

**Table I: Descriptive statistics for Organizational Trust Inventory
(Cummings and Bromiley, 1996)**

Item	Valid N	Mean	Std. Dev.	Skewness	Kurtosis	Item-to-Total r	Alpha if deleted
Organizational Trust (mean = 4.91; mean inter-item correlation = .48; alpha = .91)							
I think the CF tells the truth in communications.	216	4.80	1.83	-0.16	-0.37	0.73	0.90
I think that the CF meets its obligations to its soldiers.	216	4.81	1.89	-0.27	-0.73	0.74	0.89
In my opinion, the CF is reliable.	215	5.06	1.97	-0.24	-0.53	0.77	0.89
I think that people in the CF succeed by stepping on other people (rev).	216	4.75	2.05	0.16	-0.48	0.55	0.90
I feel that the CF tries to get the upper hand (rev).	215	4.70	1.81	0.32	0.05	0.56	0.90
I think that the CF takes advantage of our problems (rev).	216	5.19	1.87	0.03	-0.09	0.58	0.90
I feel that the CF communicates with us honestly.	215	4.70	1.82	-0.14	-0.41	0.70	0.90
I feel that the CF will keep its word.	215	4.61	1.86	-0.15	-0.67	0.76	0.89
I think that the CF does not mislead us.	215	4.69	1.83	-0.19	-0.35	0.75	0.89
I feel that the CF tries to get out of its commitments (rev).	215	5.18	1.78	-0.03	-0.01	0.33	0.91
I feel that the CF communicates expectations fairly.	214	4.96	1.66	-0.25	-0.03	0.72	0.90
I feel that the CF takes advantage of people who are vulnerable (rev).	214	5.51	1.99	0.12	-0.59	0.49	0.91



**Table J: Descriptive statistics for Organizational Trust Survey
Defuria (1996)**

Item	Valid N	Mean	Std. Dev.	Skewness	Kurtosis	Item-to-Total r	Alpha if deleted
Organizational Trust (mean = 4.39; mean inter-item correlation = .68; alpha = .86)							
The CF as an organization lives up to my expectations.	218	4.91	2.15	-0.18	-0.81	0.76	0.79
The CF as an organization is open to discussion about upper level decisions.	217	3.67	2.08	0.32	-0.84	0.67	0.86
The CF as an organization lives up to its responsibilities to its members.	218	4.60	2.11	-0.15	-0.93	0.78	0.76

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(U) This study explores the psychometric properties of two scales: the Team Trust Scale and the Leader Trust Scale. An earlier validation effort (Adams, Bruyn and Chung–Yan, 2004) showed that although Benevolence, Integrity and Predictability formed discrete factors in exploratory factor analyses, the Competence items required revision. The goal of this work, then, is to explore the properties of the revised scales, to compare them to more established measures of trust in teams and in team leaders, and to attempt to validate their structure using confirmatory factor analyses. Lastly, it will also be important to explore the predictive validity of the scale measuring trust in teams.

Two hundred and twenty (220) regular force Army participants from a Canadian Forces base completed the Team Trust Scale and the Leader Trust Scale (Adams and Sartori, 2005), as well as several other related measures. Results showed that the scales were related in predictable ways to other scales tapping similar constructs, showing good evidence of convergent validity. Confirmatory factor analyses showed that the hypothesized structure underlying the scales provided a better fit to the data than a competing model. And, there was also very good evidence of the predictive validity of the Team Trust Scale, as it showed itself to be able to predict perceptions of teamwork, team morale, cohesion, and even combat readiness. These findings provide very good support for the scales, and suggest that they generally performed very well. However, concerns about the high internal consistency of the scale will need to be explored as work progresses.

14. **KEYWORDS, DESCRIPTORS or IDENTIFIERS** (Technically meaningful terms or short phrases that characterize a document and could be helpful in cataloguing the document. They should be selected so that no security classification is required. Identifiers, such as equipment model designation, trade name, military project code name, geographic location may also be included. If possible keywords should be selected from a published thesaurus, e.g. Thesaurus of Engineering and Scientific Terms (TEST) and that thesaurus identified. If it is not possible to select indexing terms which are Unclassified, the classification of each should be indicated as with the title.)

(U) Team Trust Scale; Leader Trust Scale; validation; psychometric properties

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