

Watson, A. M., Harman, R. P., & Surface, E. A. (2010, April). *Examining the stability of trait goal orientation during long-term training*. Paper presented at the 25th annual conference of the Society for Industrial and Organizational Psychology, Atlanta, GA.

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Goal orientation has received much attention as an important motivational construct in training contexts. This study answers calls to examine the temporal stability of goal orientation. Results indicated measurement invariance/equivalence over time for a commonly used instrument, as well as evidence of some instability in the underlying facets.

Goal orientation has become an important and highly researched motivational construct, but as DeShon and Gillespie noted in 2005, “the current goal orientation literature is in a state of conceptual and methodological disarray” (p. 1096). Although there has been much new research since this observation, there is still a need for research examining some basic measurement properties of the underlying facets of goal orientation. In particular, the stability of trait-based goal orientation over time and across contexts warrants examination. There are clear calls in the literature for an examination of the dynamic nature of goal orientation (e.g., DeShon & Gillespie, 2005; Ford, Kraiger, & Merritt,

2009) and this study responds to this research call.

There is currently a debate as to whether trait-based goal orientation fluctuates over time and across contexts, or whether goal orientation functions more as a stable, personality characteristic, unchanged by the environment (DeShon & Gillespie, 2005; Ford et al., 2009). In this study, we will examine two aspects of goal orientation change in the context of long-term, achievement-focused training to address this debate. First, we will examine the equivalence (or invariance) of measurement properties of a trait-based, domain-specific measure of goal orientation (VandeWalle, 1997) to determine the stability of measurement over the duration of a long-

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term training context. That is, we will first investigate the extent to which facets of goal orientation remain conceptually consistent and distinct over time. It is essential to establish measurement invariance before assessing the presence or absence of mean level or alpha change (Golembiewski, Billingsley, & Yeager, 1975; Riordan, Richardson, Schaffer, & Vandenberg, 2001; Vandenberg & Lance, 2000), which is the second aspect of change that will be examined in this study. This will provide an answer to the fundamental question: Does goal orientation remain stable or change over time?

In this study, we examine Vandewalle's (1997) conceptualization of goal orientation, which is considered to be a trait-based, domain-specific (i.e., work domain) approach. Vandewalle (1997) identifies three dimensions of goal orientation: 1) learning (i.e., the desire to improve oneself through acquisition and mastery of new skills), 2) prove performance (i.e., the desire to prove one's competence to others), and 3) avoid performance (i.e., the desire to avoid demonstration of incompetence to others).

As mentioned previously, Vandewalle's (1997) approach is trait-based, which is only one of the ways that goal orientation has been conceptualized. Others, including some of the original thinkers in this area, have questioned the stability of the construct (e.g., Dweck, 1986, 1996) and suggested that it may function more as a quasi-trait that is relatively stable, but open to the influence of situational characteristics (Button, Mathieu, & Zajac, 1996). One way of addressing this debate is by looking at the temporal dynamics of goal orientation.

The first important step is to examine the basic measurement properties of Vandewalle's (1997) measure of goal orientation to determine if the measure itself is invariant over time. If support is found for measurement invariance, it would suggest

individuals' conceptualizations of each goal orientation facet are stable or consistent over time. Such a finding would also indicate it is possible to assess the occurrence of changes in individuals' levels on each goal orientation facet. But, first it is necessary to argue why we would expect to find mean level change in a trait-based measure of goal orientation. We would not expect goal orientation or any other relatively stable personality characteristics to change on its own simply as a function of time. However, it is logical and quite possible that certain situational factors can influence goal orientation, even using 'trait-based' rather than 'state-based' conceptualizations of this construct. In fact, context has been known to affect measurement properties of behavioral constructs (Johns, 2006).

This study examines goal orientation in the context of a long-term, achievement-focused training program. Goal orientation has been shown to have both main and interactive effects on various training outcomes, including learning and training performance (e.g., Bell & Kozlowski, 2002; Fisher & Ford, 1998; Schmidt & Ford, 2003). This construct has traditionally been considered an important predictor of training effectiveness (Colquitt, LePine, & Noe, 2000) and, more recently, has been conceptualized as an outcome of training (Ford et al., 2009). As such, it is argued that experiences in training can change a person's relatively stable characteristics, depending upon the nature of the training. For instance, *proving* goal orientation may be influenced by extended exposure to learning situations that are a) cognitively or physically challenging, and b) require demonstration of new knowledge or skills in the presence of others. That is, *proving* orientation relates to an individual's motivation to appear competent in social contexts. Individuals who are more motivated to *prove* their competence to

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others (i.e., high on *proving*) may find themselves less motivated to do so if they are repeatedly required to demonstrate they have acquired difficult new skills in the presence of other learners. However, any change in goal orientation may depend on one's ability to learn the new knowledge or skill.

Prior research examining the stability of goal orientations over time is lacking in two key areas. Much of the research that has explored goal orientation over time has focused on student populations (e.g., Gehlbach, 2006; Seifert, 1996). There is also a lack of research into the stability of goal orientations over the duration of long-term training on complex tasks and skills (Ford et al., 2009). The present study contributes to the existing literature in two important ways. First, the present study included a nonstudent population of adult learners taking part in an on-the-job language training program with career implications contingent on their successful completion of training. Second, this study examines changes in trait-based goal orientation over a relatively long period of time compared to prior published research.

The following research questions will be explored in the current study:

RQ1: Does this trait-based measure of goal orientation display measurement invariance over the duration of training?

RQ2: Are there changes in the levels of goal orientation over the duration of training? If so, what is the nature of this change?

Method

Sample and training context

The sample consisted of 1,005 U.S. military personnel participating in a required, job-related foreign language

training program. The duration of training ranged from 19 to 25 weeks, depending on the difficulty level of the language to which respondents were assigned. Training was the only job responsibility for these respondents during the 19 to 25 weeks. The training was conducted in a classroom setting with a single instructor for six hours per day (five days per week), with class sizes generally ranging between 5 and 12 students.

Measured variables

Goal orientation. Work-domain *learning* (or mastery), *proving* (or performance prove), and *avoiding* (or performance avoid) goal orientations were assessed using a 13-item instrument developed and validated by VandeWalle (1997). Sample items include “I enjoy challenging and difficult tasks at work where I’ll learn new skills” (*learning*), “I’m concerned with showing that I can perform better than my coworkers” (*proving*), and “I prefer to avoid situations at work where I might perform poorly” (*avoiding*). Items used a 7-point Likert-type response scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

Goal orientation was assessed using the same instrument at five different measurement occasions, which were synchronized with the delivery of training content. Measures were taken pre-training, at the 25%, 50%, and 75% completion points during training, as well as post-training. While the total duration of training could vary between 19 to 25 weeks due to respondents' assigned training language, the program-of-instruction was standardized across languages. This standardization allowed us to conduct assessments at consistent training completion points regardless of training language. Responses from each participant were linked across all measurement occasions.

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Analysis strategy

Confirmatory factor analysis (CFA) was used to assess the measurement properties of the goal orientation measure over time. Recommendations from the measurement invariance/equivalence (MI/E) literature (e.g., Vandenberg & Lance, 2000) were followed. Chi-square difference ($\Delta\chi^2$) tests were used in model comparisons of goodness-of-fit. Additionally, differences in the comparative fit index (ΔCFI) were used to determine the statistical significance of nested model comparisons specifically testing for metric and scalar invariance. For these tests, research suggests using ΔCFI as an alternative to chi-square difference testing for measurement invariance has notable advantages, including increased power to detect true lack of invariance, less sensitivity to sample size, and decreased Type I error rates (see Cheung & Rensvold, 2002; Meade, Johnson, & Braddy, 2008). As recommended by Meade, Johnson, and Braddy (2008), a ΔCFI value greater than .002 was considered indicative of a significant decrease in model fit (i.e., lack of invariance).

Due to the logistical challenges inherent to longitudinal field studies such as this, some respondents did not have complete data across all measurement occasions. Given the current study context and the advantages and disadvantages of various methods of handling missing data in longitudinal research (see Little & Rubin, 1987; Schafer & Graham, 2002), we deemed it appropriate to assume data to be missing-at-random (MAR; Little & Rubin, 1987) and employed maximum-likelihood estimation using all available data.

Results

CFA was employed to assess (a) the equivalence of measurement properties of each goal orientation factor over the

duration of the training event, and (b) changes in latent levels of each factor over time. Nested model comparisons were conducted, with each subsequent model imposing additional constraints holding specific measurement properties invariant across all (or a subset) of the five measurement occasions (Taris, Bok, & Meijer, 1998; Vandenberg & Lance, 2000). The present analysis adopted a longitudinal measurement invariance approach, assessing the measurement and stability of latent constructs across measurement occasions (e.g., Taris et al., 1998).

In the first model, the *learning*, *proving*, and *avoiding* goal orientation factors were specified as latent variables using their corresponding items as indicators. In this baseline (or joint fit) model, factor loadings, item intercepts, and residual variances were freely estimated across occasions. Latent factor means were constrained to zero in the baseline model. For model identification and scaling purposes, factor loadings were fixed at unity for one item for each factor at each occasion. As is commonly done in longitudinal invariance testing, the error terms for each item were allowed to correlate across measurement occasions (Ployhart & Oswald, 2004; Vandenberg & Lance, 2000). All latent factors at all occasions were also allowed to covary. This model represents a test of the equality of factor structure across occasions (i.e., configural invariance; Horn & McArdle, 1992). Results indicated adequate model fit for the configural model (see Table 1).

To test for metric invariance, the second model (Model 2) imposed equality constraints on all factor loadings (the Λ_x matrix) across measurement occasions. Comparison of Model 2 to Model 1 did not produce a significant decrement in fit (see Table 1), indicating item loadings were invariant across all measurement occasions for all three goal orientation factors.

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To test for scalar invariance, Model 3 imposed equality constraints on all item intercepts (the τ_x matrix) across all measurement occasions. Comparison of Model 3 to Model 2 produced a significant decrement in fit (see Table 1), indicating all item intercepts were not invariant across all measurement occasions. Estimated item intercepts from Model 2 indicated intercept differences were most pronounced in *proving* Items 1 and 2 at the Pre and 25% measurement occasions. Following others' recommendations (Ployhart & Oswald, 2004; Vandenberg & Lance, 2000), the equality constraints for these four parameters were sequentially relaxed to test for partial scalar invariance. Freely estimating intercepts for *proving* Items 1 ("I'm concerned with showing that I can perform better than my coworkers") and 2 ("I try to figure out what it takes to prove my ability to others at work") at the Pre and 25% measurement occasions (Model 3a) resulted in a nonsignificant ΔCFI (though the $\Delta\chi^2$ remained statistically significant). Given the sensitivity of $\Delta\chi^2$ to large sample sizes, we followed previous recommendations (Cheung & Rensvold, 2002; Meade, Johnson, & Braddy, 2008) to consider ΔCFI as a more reliable indicator of true lack of invariance (of item intercepts). Therefore, these results support full scalar invariance for the *learning* and *avoiding* factors, and partial scalar invariance for the *proving* factor.

Model 4 tested for equality of latent factor means across measurement occasions by imposing equality constraints on the latent means across occasions (e.g., Time 1 *learning* equal to Time 2-5 *learning*). Results of a model comparison indicated constraining all latent means for a given goal orientation factor to be equal over time (Model 4) significantly degraded model fit. Thus, respondents' level on at least one of

the three goal orientation factors was not invariant over time at the group level.

Subsequent tests sequentially relaxed equality constraints on latent means (in the order suggested by the latent mean estimates of the partial scalar invariance model). Results indicated lack of invariance in latent means between the pre-training assessment and at least one other time point for all three goal orientation factors. Results of each latent mean contrast are presented graphically in Figure 1. After relaxing equality constraints for latent means shown to differ from the pre-training assessment and constraining those remaining to equality (Model 4a), model fit was not significantly worse than that of the comparison model (Model 3a) that freely estimated all latent means.

Evaluation of Research Questions

RQ1 asked whether Vandewalle's (1997) trait-based measure of goal orientation demonstrate measurement invariance over the duration of long-term training. That is, do respondents display consistent conceptualizations of the underlying goal orientation facets over time? Results indicated that the *a priori* factor structure (i.e., *learning*, *proving*, and *avoiding*) of the measure was consistent over time. All three goal orientation scales displayed full metric invariance over time, indicating the relationships between items and their corresponding goal orientation factors were consistent over time. That is, there was no detectable shift in metric by which each item assessed its underlying factor (Vandenberg & Lance, 2000). Finally, the *learning* and *avoiding* factors displayed full scalar invariance, while the *proving* factor displayed partial scalar invariance. These findings indicate the measurement properties of all three scales were consistent over time, and we can proceed to interpret

latent level changes (Vandenberg & Lance, 2000).

RQ2 asked learners' levels on each goal orientation scale remained stable over the duration of training. Results indicated some changes in latent means between pre-training levels and those of later measurement occasions. As shown in Figure 1, latent means for the *learning* and *avoiding* factors generally remained stable over the duration of training, with some small decreases from pre-training levels achieving statistical significance. However, latent means for the *proving* factor showed notable decreases as early as the 25% and 50% completion points, which persisted through the conclusion of training.

Discussion

Our findings that the measurement properties of all three goal orientation scales were generally consistent over time and that there was latent mean level change in *proving* orientations provide important information for training researchers, evaluators, and designers. Our results for *learning* and *avoiding* are consistent with Vandewalle's (1997) trait-based conceptualization. That is, respondents' showed some minor fluctuations in the levels of these two constructs over time, but remained fairly stable overall.

However, the *proving* factor appears to operate more like what DeShon and Gillespie (2005) refer to as a quasi-trait, which they define as "a somewhat stable trait that can be modified by appropriate situational characteristics" (p. 1101). Other researchers have conceptualized goal orientation in this way (e.g., Button et al., 1996). As Ford et al. (2009) point out in their chapter, the way in which we conceptualize goal orientation (as a trait, quasi-trait, or state) has important implications for its use in training contexts.

According to Ford et al., if goal orientation factors operate like traits, then this construct should be evaluated at the beginning of training and the information used to adapt training to the learner. If however, goal orientation factors operate like a quasi-trait, then this may be an indication of learning that has happened during training.

The overall decrease in respondents' levels of *proving* goal orientation over the duration of training is interpretable when considering the training context. Learning a foreign language is a highly cognitively demanding and challenging task. Foreign language instruction also provides many opportunities to demonstrate your capability, especially if the curriculum is focused on developing speaking and participatory listening proficiency. Furthermore, these respondents were engaged in this demanding task every day on the job for six hours a day for several months. This training was also conducted in a social setting, taking place in a classroom environment in which learners are constantly required to demonstrate newly learned skills and knowledge in the presence of their peers. Therefore, because the environment was focused on constant demonstration of a difficult, observable skill in front of their peers for a long duration, the data suggests trainees, as a group overall, reframed their need for having to demonstrate their competence to others—revising it downward.

The current findings suggest such an environment can impact the types of goals individuals strive to achieve, even when such behavioral tendencies are thought to be fairly stable and resistant to change. These findings further support calls to examine the impact of context on individuals' learning and work behaviors in organizational contexts (e.g., Johns, 2006).

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Strengths/Limitations and Future Research

This study has two notable strengths in comparison to other research that has been conducted in this area. First, this study examined job-relevant training in a real-world environment in which there were real consequences for successful completion of training (i.e., certification). Second, we had a relatively large sample of adult learners and measurement of the construct of interest at five different time points prior to, during, and following training. Considering these strengths, the current study contributes to our understanding of the stability of goal orientation in long-term training contexts in organizations.

As with any study, there are also some limitations to our research that suggest areas for future research. This study was conducted in a specific training context, which calls into question the generalizability of the findings to other training or work contexts. There is a need to look at the stability of goal orientation over time in different training and work contexts to determine what situational characteristics may be responsible for (or interact with individual characteristics to cause) the shift in latent means that were observed in this study. Johns (2006) describes several features of context (e.g., elements of the task and social environment) that may provide insight as to the reason for this shift. Other researchers, such as Hatstrup and Jackson (1996), provide frameworks for how features of context might impact variables and their relationships. Studying the dynamic nature of goal orientation across contexts will provide further insight into the contextual factors which influence this change over time.

Additionally, more research is needed to determine whether goal orientation should be considered a trait, state, or quasi-trait or if

some facets function differently than others (i.e., some act as traits while others are more state-like). While researchers have conceptualized goal orientation in many different ways (DeShon & Gillespie, 2005), little empirical evidence exists examining the extent to which trait-based measures of goal orientation themselves show ‘state-like’ measurement properties or instability over time (cf. Payne, Youngcourt, & Beaubien, 2007). To address this gap in the literature, latent state-trait frameworks (e.g., Steyer, Schmitt, & Eid, 1999) could be applied to longitudinal assessments of trait-based goal orientation to determine the extent to which these measures capture enduring dispositional characteristics of individuals as opposed to less stable transitory states.

Conclusion

From a training perspective, it is both theoretically and practically important to understand the dynamic nature of goal orientation, as this construct has been linked to both training outcomes and job performance (Payne et al., 2007). The current study contributes to the existing literature by investigating both the consistency with which a commonly used trait-based goal orientation instrument measures the underlying facets of the construct over the duration of long-term training and the stability of those facets. Our findings suggest a) the instrument examined showed consistency of measurement over time, and b) the *learning* and *avoiding* facets of goal orientation were more stable than the *proving* facet. These findings make theoretical sense given the characteristics of the training context, and suggest future research should seek to extend and compare the current findings to those observed in other training and organizational contexts.

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Table 1. Tests of Measurement Invariance of Goal Orientations Across Measurement Occasions

Model	χ^2	df	CFI	TLI	RMSEA	SRMR	Comparison			
							Model	$\Delta\chi^2$	Δdf	ΔCFI
1 Configural invariance	3392.18*	1780	0.967	0.961	0.030	0.032	-	-	-	-
2 Full metric invariance ($\Lambda^g = \Lambda^{g'}$)	3447.70*	1820	0.966	0.962	0.030	0.034	1	55.52	40	0.001
3 Full scalar invariance ($\tau^g = \tau^{g'}$)	3644.93*	1860	0.963	0.959	0.031	0.035	2	197.23*	40	0.003 [†]
3a Partial scalar invariance	3590.32*	1858	0.964	0.960	0.030	0.035	2	142.62*	38	0.002
4 Invariant factor means ($\kappa^g = \kappa^{g'}$)	3721.22*	1870	0.962	0.957	0.031	0.037	3a	130.91*	12	0.002
4a Partially invariant factor means	3599.69*	1862	0.964	0.960	0.030	0.035	3a	9.38	4	0.000

Note. CFI = comparative fit index, TLI = Tucker-Lewis index, RMSEA = root mean squared error of approximation, SRMR = standardized root mean squared residual.

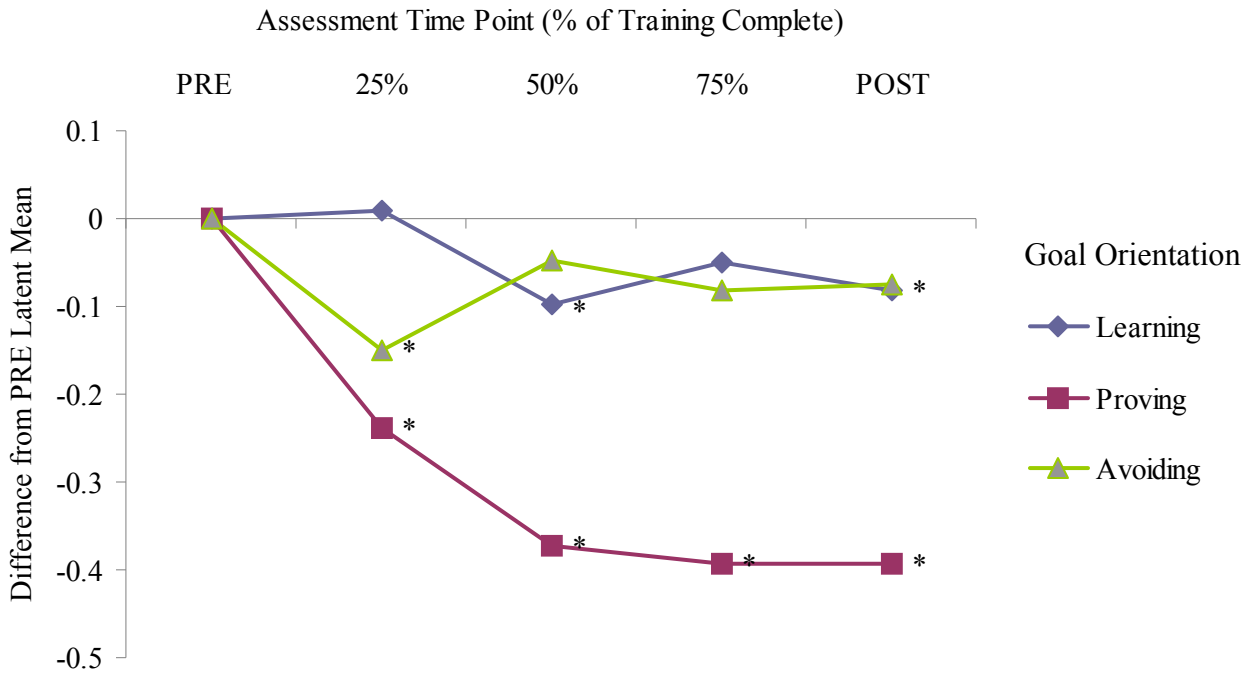
* $p < .05$

[†] Exceeds 0.002 cutoff for ΔCFI , indicating lack of invariance (Meade, Johnson, & Braddy, 2008)

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Figure Caption

Figure 1. Comparison of Latent Means of Goal Orientations Across Measurement Occasions



Note. Latent mean contrasts are unstandardized (i.e., on the original metric ranging from 1 to 7). Latent means presented were obtained from partial scalar invariance model (Model 3a). * $p < .05$. Significantly different than zero according to chi-square difference test and significance test of parameter estimate.

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