5-16-2018

The Influence of Individual Differences on Eco-Driving Training Transfer and Spillover: a Correlational Study of Proactive Personality and Motivation

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by
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An undergraduate honors thesis submitted in partial fulfillment of the
requirements for the degree of
Bachelor of Science
in
University Honors
and
Psychology

Thesis Advisor
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Portland State University
2018

This research was funded in part by a grant from
the National Institute for Transportation and Communities (NITC)

Abstract

Eco-driving is an environmentally-conscious way of operating a vehicle that decreases fuel emissions and increases safety. The present study analyzed the relationship of proactive personality with 1) eco-driving training transfer and 2) spillover to home driving behaviors, along with the moderating effects of motivation. After an eco-driving information campaign was implemented at three public sector organizations, web-based surveys were administered to light-duty fleet drivers at three time points over the span of 6 months. Results based on hierarchical multiple regression models demonstrated the effect of proactive personality on Time 3 eco-driving behaviors was moderated by Time 1 motivation, such that those high in both factors demonstrated the highest levels of training transfer. Conversely, the findings revealed a negative relationship between proactive personality and Time 3 spillover. Additional analysis revealed that the effect of proactive personality on Time 3 spillover was moderated by Time 3 motivation; however, the lowest levels of spillover were reported by those with low motivation and high proactive personality. Together, these findings provide important insight for the promotion and development of eco-driving behaviors within organizations.

Keywords: proactive personality, motivation, eco-driving, spillover, training transfer

The Influence of Individual Differences on Eco-Driving Training Transfer and Spillover: A Correlational Study of Proactive Personality and Motivation

Despite innovations in automotive engineering, recent reports indicate that a focus must also be placed on driving behaviors that reduce fuel consumption (USEPA, 2017, 2018). Specifically, greenhouse gas emissions from the transportation sector have remained relatively constant over the past decade (USEPA, 2017) despite drastic improvements in vehicle efficiency (USEPA, 2018). This lack of reduction in greenhouse gas emissions represents a dire issue for not only the United States but also for the global population who will continue to be affected by greenhouse gas emissions, including their associated air quality and climate change issues (Stowell, et al., 2017). Therefore, in conjunction with advances in vehicle efficiency, a necessary component of driver education must include encouraging behaviors that limit emissions. Accordingly, researchers have begun to design interventions aimed at improving fuel efficiency (Martin, Chan, & Shaheen, 2014; Wahlberg, 2007). However, some attempts, such as information campaigns have had mixed success (Martin, Chan, & Shaheen, 2014), and researchers are still trying to uncover what makes these driving interventions and trainings most effective. Given that the workplace is one place in which individuals commute to and from daily, and that some jobs require driving while at work, organizations can serve as an excellent avenue to disseminate educational information, provide structure for employee learning and development, and evaluate the effectiveness of fuel efficient driving campaigns.

To reduce fuel emissions and save on fuel costs, many researchers are now studying eco-driving, a driving style that encourages fuel-efficient behaviors such as moderate acceleration, gentle braking, and limited idling times. They have found promising initial results including reduced fuel consumption, lower emissions, and increased driving safety (Barkenbus, 2010).

Eco-driving can benefit organizations, particularly those that employ fleet drivers, by reducing fuel costs and increasing safety among their workers. Previous interventions have focused on factors such as increasing driver knowledge of eco-driving behaviors through training and technical aspects of the vehicle that promote eco-driving (e.g., Stillwater & Kurani, 2013; Wahlberg, 2007). However, these studies demonstrated rather inconsistent results, with energy savings ranging anywhere from 2% (Wahlberg, 2007) to 20% (Stillwater & Kurani, 2013). Considering these findings, eco-driving training programs can lead to behavioral change, however there are questions that still need to be answered, such as what individual factors impact the effectiveness of eco-driving programs and how consistent, long-term benefits of eco-driving can be realized.

In-vehicle eco-driving feedback systems can provide helpful insight into the optimization of workplace interventions. For example, studies have shown that reducing an individual's mental workload and distractions (Rouzikhah, King, & Rakotonirainy, 2013) and improving one's ability to manage multiple goals (Dogan, Steg, & Delhomme, 2011) can lead to greater rates of eco-driving behaviors. These findings underscore the inherent complexity and cognitive capacity required to change one's driving habits. Additionally, Joo and Lee (2014) demonstrated that an in-vehicle voice prompting system that emphasized benefits to oneself (egoistic benefit appeals) increased eco-driving behaviors more for participants in a positive mood. Taken together, these findings show that individual factors (e.g., mood) can have a substantial impact on the efficacy of eco-driving training programs. Consequently, other individual differences associated with behavior change, such as motivation and being proactive, should be considered in eco-driving research (Crant, 2000).

Indeed, rather than solely looking at the effectiveness of training design, recent research has begun to analyze some individual differences of participants in eco-driving workplace interventions. For example, perceived behavioral control and favorable attitudes toward eco-driving were positively related to the intention to practice eco-driving (Lauper, Moser, Fischer, Mathies, & Kaufman-Havoz, 2015). However, this study was unable to establish a connection between the intention to practice eco-driving and the actual implementation of the learned behaviors on the job. Mansfield, Guros, Truxillo, and MacArthur (2016), on the other hand, demonstrated that individual motivation and supervisor support were positively related to the transfer of eco-driving behaviors, albeit through self-reports.

These findings show that eco-driving interventions can produce positive results and that individuals with certain characteristics may benefit most from eco-driving training. However, further research is needed to understand how these individual characteristics are related to the adoption of eco-driving practices. For example, motivation and personality can play an important role in training performance (Smith-Jentsch, Salas, & Brannick, 2001), but researchers have not fully investigated how these factors influence the application of eco-driving training principles to the workplace. Additionally, while longitudinal research indicates that many people who participate in eco-driving training tend to revert to their old driving patterns over time (Beusen, et al., 2009), there may be certain individual characteristics that mitigate the decay of training. This study will help address these gaps in the existing literature by answering the following research questions:

1. What personal characteristics are related to the effectiveness of eco-driving workplace interventions?

2. How do these personal characteristics interact to influence changes in eco-driving behaviors?

Theory and Hypotheses

The workplace training literature, which for many years focused mostly on training design, has begun to call for more individual-based research to determine which trainee characteristics play an important role in predicting training outcomes (Baldwin & Ford, 1988). Similar to the wide-range of estimates of eco-driving training effectiveness, training effectiveness for other workplace outcomes ranges from 10% (Georgenson, 1982) to 50% (Saks, 2002). Although this variability may be partly due to differences in training content and medium, it also suggests that personal and contextual factors play a determining role in the success of training interventions. Baldwin and Ford's (1988) review of the workplace training literature demonstrated that personal characteristics can impact learning and retention within the context of training programs, as well as the integration of training concepts on the job (known as training transfer). For example, their review showed that high levels of self-expectancy were related to improved performance during training (Eden & Ravid, 1982) and that an internal locus of control and a high need for achievement were positively related to the application of training knowledge to the workplace setting (Baumgartel, Reynolds, & Pathan, 1984). Additionally, Alvarez, Salas, and Garofano's (2004) model of training effectiveness showed that the individual characteristics of trainees can influence each aspect of the training process (training reactions, training performance, and transfer performance). Therefore, to produce successful training results, organizations must adopt a person-centered approach to learning that acknowledges the innate differences of its participants.

Personality is one such relatively stable disposition toward certain behaviors and has been linked to numerous training outcomes (Burke and Hutchins, 2007). For example, the Big Five personality traits (e.g., Digman, 1990) of openness to experience and extraversion have been positively related to training proficiency (Barrick & Mount, 1991) and conscientiousness has shown a positive relationship to the confidence in one's capacity to learn new information (Martocchio & Judge, 1997). Other studies have linked self-efficacy, a belief in one's ability to perform a task (Bandura, 1982), to training transfer (Chiaburu & Marinova, 2005; Gaudine & Saks, 2004) suggesting that while the Big Five are useful to consider, additional individual characteristics need to be considered as well. For example, further research has shown that proactive personality is a strong predictor of the motivation to learn (Major, Turner, & Fletcher, 2006) and may provide incremental validity over the traditional Big Five personality traits in predicting performance in certain jobs (Crant, 1995).

Proactive Personality

Proactive personality has been operationalized by Bateman and Crant (1993) as a disposition towards self-initiated change and is an important construct to consider within the context of training (Major et al., 2006). Since this personality trait has been positively related to job performance (Crant, 1995), career success (Seibert, Kraimer, & Crant, 2001; Yang & Chau, 2015), and engagement in organizational citizenship behaviors (Kisamore, Liguori, Muldoon, & Jawahar, 2014), its direct relation to the application and retention of training information on the job shows much promise. Considering that proactive personality has been connected to participation in learning and developmental activities through the motivation to learn (Major et al., 2006) as well as organizational innovation and improved team performance (Crant, 2001), analyzing the impact of proactive personality would fill an important gap in the training

literature. Furthermore, exploring the relationship between eco-driving behaviors and proactive personality within the realm of an eco-driving intervention would provide important insight into the personal characteristics that are predictive of driving behavior changes, and ultimately inform organizations about how to optimize their investment in eco-driving training programs and resources.

Proactive Personality and Eco-Driving Behaviors

The behavioral elements that define eco-driving are representative of prototypical proactivity. For example, Crant's (1995) study linked proactive personality to job performance in autonomous jobs, indicating that proactive people may require less support and a less structured environment than people with other dispositions. Since eco-driving is an autonomous unsupervised task (Barkenbus, 2010), it would stand to reason that those with a high level of proactive personality should be more successful in integrating eco-driving behaviors into their daily routines compared to those who have low levels of this trait. Additionally, the anticipatory actions of slow braking and acceleration, combined with the personal initiative necessary to perform regular vehicular maintenance, require a forward-focused preventative mindset synonymous with proactive thinking. Finally, the local and global impacts of eco-driving, such as improved safety and reduced emissions (Ericsson, 2001), align with goals often held by those focused on changing their environment, a primary characteristic of proactive personality (Bateman & Crant, 1993). Thus, people who report high levels of this personality trait should be more likely to integrate these environmentally-conscious driving behaviors into their daily work lives.

Hypothesis 1: There will be a greater increase in post-training eco-driving behaviors for participants who are high in proactive personality.

Proactive Personality and the Spillover of Eco-Driving Behaviors

Bateman and Crant's (1993) finding that proactive people are more likely to participate in activities outside the workplace that produce positive change in their communities indicates a personality-based consistency of behavioral patterns across multiple situational contexts. This phenomenon can often take the form of spillover, known as the bi-directional transfer of behaviors, cognitions, and emotions between work and personal life (Edwards & Rothbard, 2000). Studies on the spillover effect of environmentally-conscious behaviors such as recycling (Tudor, Barr, & Gilg, 2007) and safe driving practices (Naveh and Katz-Navon, 2015) show promising implications for workplace eco-driving interventions indicating that such behaviors learned on the job can transfer to one's personal life. Additional research connecting self-identity to the spillover of carbon offsetting behaviors (Whitmarsh, O'Neill, 2010) from work to home suggests that personal dispositions play an important role in the spillover of environmentally-conscious behaviors, such as eco-driving. Therefore, I hypothesize the following:

Hypothesis 2: Proactive personality will be positively related to the spillover of an eco-driving intervention to home driving behaviors.

Training Motivation as a Moderator for Proactive Personality

Since proactive personality is a stable disposition relatively unaffected by situational influences, its relation to training transfer may be moderated by internal drives rather than contextual variables. Training motivation, for example, defined as "the direction, intensity, and persistence of learning-directed behavior in training contexts", has been positively related to various training outcomes such as knowledge, skill acquisition, and reactions (Colquitt, LePine, & Noe, 2000). In addition to individual traits such as proactive personality, extraversion, and openness (Major et al., 2006), training motivation has consistently predicted training transfer

back to the workplace (Burke & Hutchins, 2007). In the context of an eco-driving training program, training motivation may strengthen the relationship between proactive personality and training outcomes. That is, those who are both proactive and motivated may show the greatest gain in eco-driving behaviors, whereas those that are high in only one of these characteristics may demonstrate much smaller increases in eco-driving behaviors. Given that most research has focused on the individual antecedents of training motivation, this paper adds to the conversation by analyzing the moderating influence that training motivation may have on the relationship between personality and training transfer. Proactive personality may indicate a stable dispositional tendency toward specific eco-driving behaviors, yet training motivation may explain why people follow through with the behaviors they are already naturally inclined to perform, and provide suggestions for training those who are less proactive. Therefore, I hypothesize that:

> *Hypothesis 3: The effect of proactive personality on post-training eco-driving behaviors will be moderated by training motivation, such that those high in training motivation and proactivity will show the greatest increases in eco-driving behaviors at work.*

Similarly, the relationship between proactive personality and the spillover of eco-driving to the home domain may also be influenced by one's level of motivation, a factor that has been linked with the practice of other environmentally-responsible behaviors (Green-Demers, Pelletier, & Menard, 1997). While highly proactive people may naturally be inclined to engage in eco-driving behaviors, the greatest increases in spillover rates may occur for people who concurrently possess high levels of eco-driving motivation. Therefore, I hypothesize that:

Hypothesis 4: The effect of proactive personality on spillover to home driving behaviors will be moderated by training motivation, such that those high in training motivation and proactive personality will show the greatest increases in eco-driving behaviors.

Method

Participants

In total, 144 unique participants were recruited from 3 different public-sector organizations that occupied the role of a light duty fleet driver. Fifty participant responses from Time 1 to Time 2 and 48 participant responses from Time 1 to Time 3 were matched. The average age of participants was 46.9 (*SD* = 9.8) years old. Seventy-one percent of the participants were male and 73% were white. The average tenure across all organizations was 11.9 (*SD* = 7.7) years, and the average number of hours driven per week was 10.0 (*SD* = 10.5).

Materials and Procedure

This study analyzes data collected from a quasi-experimental research project funded in part by the National Institute for Transportation and Communities (NITC) that assessed the effectiveness of the Oregon Department of Transportation (ODOT) EcoDrive informational campaign in combination with training aimed at promoting supervisor support for eco-driving behaviors. The EcoDrive materials, developed in conjunction with ODOT and Pac/West Communications, consisted of instructional videos, educational posters, reminder cards, and static cling tags. All participant responses were collected via online surveys. After baseline (Time 1) measures of various dispositions, driving knowledge, and driving behavior were collected, the EcoDrive materials were distributed to supervisors within the organizations. In addition, for those in the “training” condition, the supervisors received supervisor training consisting of a video on how to support eco-driving, an electronic overview of recommendations

for supporting eco-driving, and reminder emails throughout the course of the study to encourage the promotion of those supportive behaviors. Post-intervention data collections occurred after 2 months (Time 2) and 6 months (Time 3). Participants were offered one entry into a drawing for a $50 Amazon or Fred Meyer gift card for every survey completed.

Eco-driving behaviors. Eco-driving behaviors were measured at baseline (α = .73), Time 2 (α = .71), and Time 3 (α = .85) and operationalized with six items. Two items were related to general efficient driving practices. The first item, "*In terms of fuel usage, how efficiently do you think you drive your work vehicle now*?", was rated on a scale of 1 (*Very Inefficiently*) to 7 (*Very Efficiently*). The second item, "*When driving your primary work vehicle, how often do you adjust your driving behavior in ways to improve your fuel economy*?", was rated on a scale of 1 (*Never*) to 7 (*Always)*. The remaining 4 items were derived from an eco-driving checklist rated on a scale of 1 (*very unlikely*) to 7 (*very likely*) and consisted of the following: *drive at a slow and steady speed, accelerate/brake gradually, close windows at high speeds*, and *avoid quick starts and stops*. Higher scores indicated more efficient driving behaviors.

Proactive personality. Proactive personality was measured at baseline, and operationalized via Seibert, Crant, and Kraimer's (1990) scale and consisted of six items rated on 7-point scale (1 = *strongly disagree* and 7 = *strongly agree*). Two sample items are "*No matter what the odds, if I believe something, I will make it happen"* and "*I am always looking for better ways to do things*". In this sample, the measure demonstrated good internal consistency (α = .85). Higher scores indicate greater levels of proactive personality.

Eco-driving motivation. Eco-driving motivation was measured at baseline (α = .90) and Time 3 (α = .94). This scale incorporated three subscales corresponding with the three elements

of expectancy theory specifically applied to the context of eco-driving: valence, instrumentality, and expectancy (Van Eerde & Thierry, 1996). Eight items were rated on a scale of 1 (*strongly disagree*) to 7 (*strongly agree*), such as "*I think it's important to learn how to save gasoline*" (valence), "*There are things that I can do that will influence fuel efficiency*" (instrumentality), and "*I can actually improve my car's fuel efficiency if I try*" (expectancy). Higher scores indicate more eco-driving motivation. The eight items from all three subscales were combined to create an overall motivation score.

Eco-driving spillover. Eco-driving spillover to home behaviors was measured at Time 2 ($\alpha = .92$) and Time 3 ($\alpha = .92$). This scale consisted of six items, including "*I am using the information from the eco-driving program in my personal driving habits*" and *"I am more conscious of my driving behaviors now, even when not at work"*, rated on a scale of 1 (*strongly disagree*) to 7 (*strongly agree*). High scores correspond to greater levels of work-to-home spillover of eco-driving practices.

Data Analysis

The aforementioned hypotheses were tested via multiple linear regression using IBM's Statistical Package for the Social Sciences (SPSS), Version 25. Prior to running the analyses, internal consistency of each scale was evaluated. In addition, the means and standard deviations of each scale were assessed, and box-plots were used to help ensure better data quality and evaluate the potential for outliers. In this dataset, no participants were removed as outliers, however as noted, only 50 responses were matched from Time 1 to Time 2, and 48 responses from Time 1 to Time 3.

Results

Multiple regression analyses were conducted to test the proposed hypotheses. When assessing changes in eco-driving behaviors from Time 1 to follow-up at Time 2 and Time 3 within the work context, baseline eco-driving behaviors were controlled for. However, in analyses of spillover behaviors, baseline spillover behaviors were not controlled because these measures were only assessed at Time 2 and Time 3. In addition, because this study was conducted within a broader intervention, the intervention condition was controlled in all analyses.

Table 1 displays the means, standard deviations, and inter-correlations of the variables examined in this study. While Time 1 eco-driving motivation was moderately positively correlated with both Time 2 eco-driving behaviors, $r(50) = .41$, $p = .003$, and Time 3 eco-driving behaviors, $r(48) = .31$, $p = .031$, proactive personality showed no correlation with eco-driving behaviors at either time point. Further, Time 1 eco-driving motivation was moderately positively correlated with Time 2 eco-driving spillover, $r(49) = .31$, $p = .028$, while Time 3 eco-driving motivation was weakly positively correlated with Time 3 eco-driving spillover, $r(72) = .24$ $p = .042$, and strongly positively correlated with Time 3 eco-driving behaviors, $r(75) = .62$, $p < .001$. In contrast, proactive personality was, unexpectedly, moderately negatively correlated with Time 3 eco-driving spillover, $r(48) = -.31$, $p = .030$. These findings suggest a strong positive main effect of eco-driving motivation on eco-driving behaviors at both work and at home.

Table 1
Inter-correlations with Means and Standard Deviations.

Variables	*M*	*SD*	1	2	3	4	5	6	7	8
1. T1 Proactive Personality	5.45	.78	(.85)							
2. T1 Eco-Driving Motivation	5.42	.83	.44**	(.90)						
3. T1 Eco-Driving Behaviors	5.40	.85	.17	.22*	(.73)					
4. T2 Eco-Driving Behaviors	5.70	.79	.24	.41**	.45**	(.71)				
5. T2 Eco-Driving Spillover	4.19	1.38	.16	.32*	-.25	.13	(.92)			
6. T3 Eco-Driving Motivation	5.51	.98	.15	.52**	.37**	.57*	.21	(.94)		
7. T3 Eco-Driving Behaviors	5.78	.88	.15	.31*	.53**	.74**	.11	.62**	(.85)	
8. T3 Eco-Driving Spillover	4.09	1.20	-.31*	.16	-.04	.42**	.42**	.24*	.27*	(.92)

Note. Cronbach's alpha is displayed in parenthesis on the diagonal. **$p < .01$. *$p < .05$.

Proactive Personality and Eco-Driving Behaviors

To test Hypothesis 1, two hierarchical multiple linear regression equations were calculated to predict post-training ratings of eco-driving behaviors at Time 2 and Time 3. Step 1 included the control variables (baseline eco-driving behaviors and the training condition), while Step 2 added proactive personality. Overall, this model predicted eco-driving behaviors at Time 2, $F(3,46) = 4.89$, $p = .005$, $R^2 = .24$. However, in this model proactive personality did not predict Time 2 eco-driving behaviors, and it did not explain additional variance in eco-driving behaviors ($\beta = .20$, $p = .127$, $\Delta R^2 = .04$) above and beyond the control variables. This model also predicted eco-driving behaviors at Time 3, $F(3, 44) = 6.37$, $p = .001$, $R^2 = .30$. Nevertheless, proactive personality again did not explain additional variance in eco-driving behaviors ($\beta = .12$, $p = .323$, $\Delta R^2 = .02$). Based on these results, Hypothesis 1, was not supported. However, since there was a

non-significant positive correlation between proactive personality with Time 2 and Time 3 eco-driving behaviors (see Table 1), it should be noted that the small sample sizes from Time 1 to Time 2 (N = 50) and from Time 1 to Time 3 (N = 48) may not have provided sufficient statistical power to detect a significant relationship between the variables when controlling for other factors.

Proactive Personality and Spillover

To test Hypothesis 2, two hierarchical multiple linear regression equations were calculated to predict post-training ratings of eco-driving spillover to home driving behaviors at Time 2 and Time 3. In these analyses, Step 1 controlled for the training condition, and Step 2 added proactive personality. This model did not predict spillover at Time 2, $F(2,46) = .68$, $p = .512$, $R^2 = .03$. Further, proactive personality did not explain additional variance in Time 2 spillover ($\beta = .16$, $p = .284$, $\Delta R^2 = .03$). In contrast, the model predicting Time 3 spillover behavior was marginally significant $F(2,45) = 2.56$, $p = .088$, $R^2 = .10$. Specifically, proactive personality explained additional variance and predicted spillover at Time 3 ($\beta = -.31$, $p = .033$, $\Delta R^2 = .10$). However, the relationship between proactive personality and Time 3 spillover was negative n(see Table 2). Taken together, these results fail to support the hypothesis that proactive personality would be positively related to the spillover of an eco-driving intervention to home driving behaviors.

Table 2
Hierarchical Multiple Regression Predicting Time 3 Spillover with Proactive Personality.

	Time 3 Spillover	
Predictor	ΔR^2	β
Step 1	.01	
Training Condition		.08
Step 2	.10*	
Training Condition		.06
Proactive Personality		-.31*
Total R^2	.10	

Note. *$p < .05$.

Eco-Driving Motivation as a Moderator

To test Hypothesis 3, three hierarchical multiple linear regression equations were calculated to predict post-training eco-driving behaviors. The first analysis predicted Time 2 eco-driving behaviors, with Step 1 controlling for baseline eco-driving behaviors and the training condition, Step 2 including proactive personality and baseline motivation, and Step 3 adding the interaction of proactive personality and baseline motivation. Overall, this model predicted eco-driving behaviors at Time 2, $F(5,44) = 4.05$, $p = .004$, $R^2 = .32$. However, the interaction of proactive personality and baseline motivation did not explain additional variance in Time 2 eco-driving behaviors ($\beta = .05$, $p = .729$, $\Delta R^2 = .00$). Further analysis also revealed a strong main effect of baseline motivation on Time 2 eco-driving behaviors ($\beta = .31$, $p = .042$), which may have absorbed the majority of the variance in this regression, thereby providing insight as to why the interaction of proactive personality and baseline motivation was not significant. This model also predicted eco-driving behaviors at Time 3, $F(5, 42) = 6.19$, $p < .001$, $R^2 = .42$. In this case, the interaction of proactive personality and baseline motivation explained additional variance in predicting Time 3 eco-driving behaviors ($\beta = .35$, $p = .012$, $\Delta R^2 = .09$). This finding supports Hypothesis 3 (see Table 3) and suggests that having high levels of both motivation and proactive

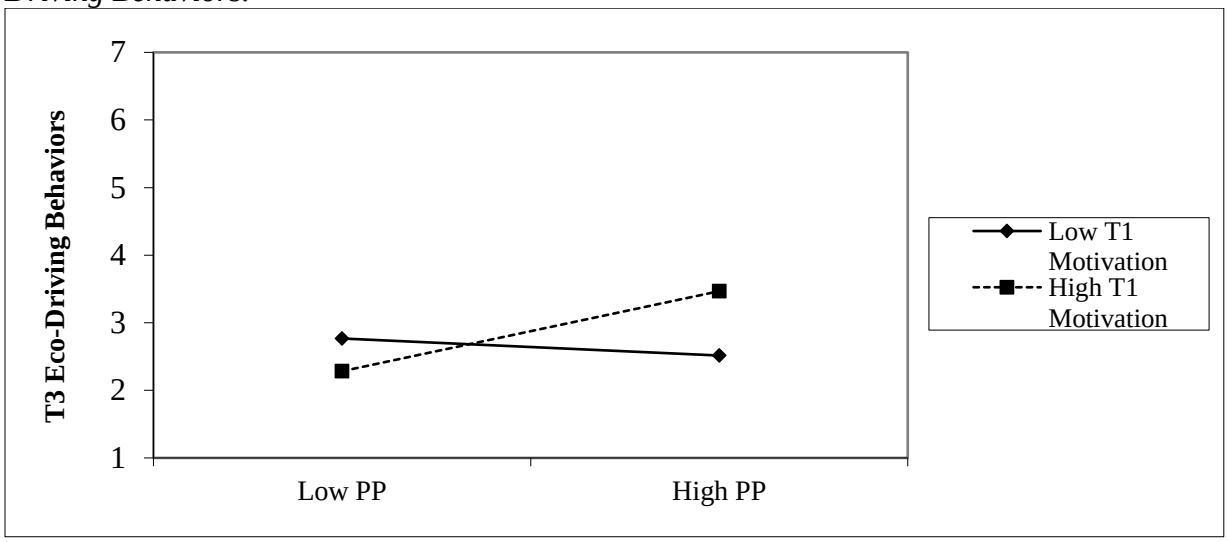
personality produces greater gains in eco-driving behaviors than considering both motivation and proactive personality individually (see Figure 1).

Table 3
Hierarchical Multiple Regression Predicting Eco-Driving Behaviors with Baseline Motivation as a Moderating Variable.

	Time 2 Eco-Driving Behaviors		Time 3 Eco-Driving Behaviors	
Predictor	ΔR^2	β	ΔR^2	β
Step 1	.20**		.29***	
Baseline Eco-Driving Behaviors		.44**		.52***
Training Condition		.06		.05
Step 2	.11*		.04	
Baseline Eco-Driving Behaviors		.38**		.48**
Training Condition		.05		.05
Proactive Personality		.05		.06
Baseline Motivation		.31*		.18
Step 3	.00		.09*	
Baseline Eco-Driving Behaviors		.38*		.47***
Training Condition		.05		.01
Proactive Personality		.07		.23
Baseline Motivation		.31*		.13
Proactive Personality x Baseline Motivation		.05		.35*
Total R^2	.32*		.42***	

Note. *$p < .05$. **$p < .01$. ***$p < .001$.

Figure 1
Interaction effect of Proactive Personality and Baseline Motivation in Relation to Time 3 Eco-Driving Behaviors.



Because eco-driving motivation was assessed at baseline as well as Time 3, the final regression used to assess Time 3 eco-driving behaviors controlled for baseline eco-driving behaviors and the training condition in Step 1, added proactive personality and Time 3 motivation in Step 2, and included the interaction of proactive personality and Time 3 motivation in Step 3. This model predicted eco-driving behaviors at Time 3, $F(5, 42) = 5.38$, $p = .001$, $R^2 = .39$. However, the interaction of proactive personality and Time 3 motivation did not explain additional variance in Time 3 eco-driving behaviors ($\beta = .04$, $p = .731$, $\Delta R^2 = .00$). These findings, therefore, fail to support Hypothesis 3. Taken together, when considering baseline motivation and motivation at Time 3, these results provide partial support for Hypothesis 3.

Motivation as a Moderator to Spillover

To test Hypothesis 4, three hierarchical multiple linear regression equations were calculated to predict spillover to home driving behaviors. The first analysis assessed Time 2 spillover, with Step 1 controlling for the training condition, Step 2 adding proactive personality and baseline motivation, and Step 3 including the interaction of proactive personality and

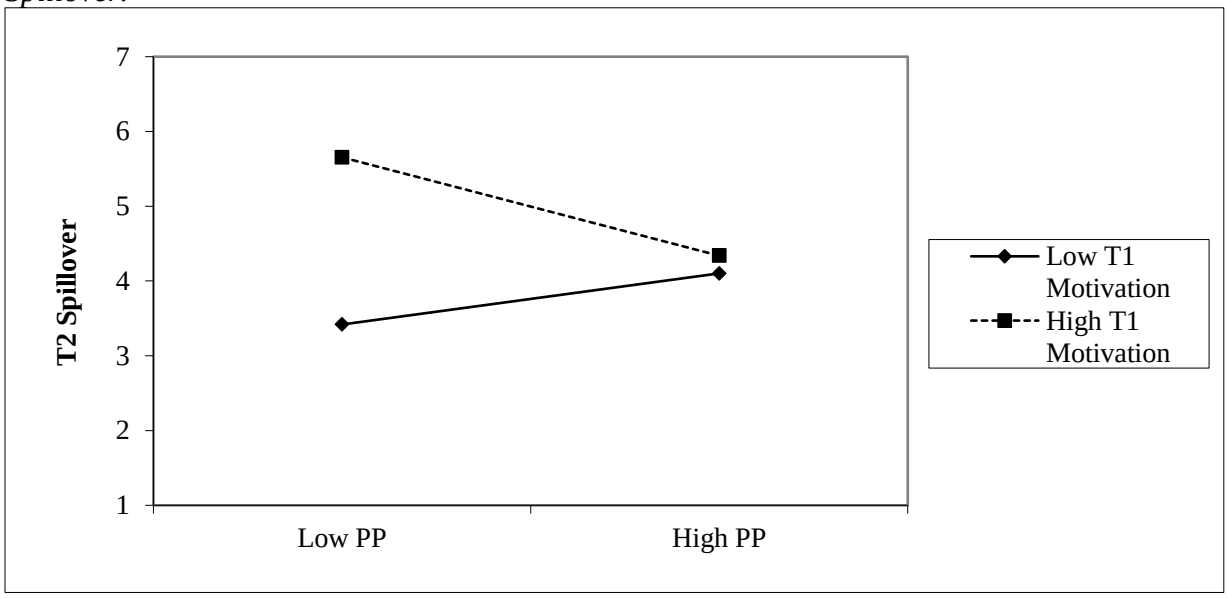
baseline motivation. This predictive model (see Table 4) showed a marginally significant effect on Time 2 spillover $F(4,44) = 2.18$, $p = .087$, $R^2 = .17$. Similarly, the interaction of proactive personality and baseline motivation showed marginal significance in explaining additional variance in spillover at Time 2 ($\beta = -.26$, $p = .077$, $\Delta R^2 = .06$). Additionally, these findings revealed a strong main effect of baseline motivation on Time 2 spillover ($\beta = .34$, $p = .035$), which may have accounted for the marginal significance of the interaction variable. Although the interaction effect was nonsignificant, I did examine it further because it was significant at $p < .10$ and there may have been statistical significance with a larger sample size with greater statistical power. Contrary to my hypothesis, further analysis of the interaction effect (see Figure 2) revealed that participants with low proactive personality and high motivation reported the highest levels of Time 2 spillover. This model also predicted Time 3 spillover, $F(4,43) = 3.13$, $p = .024$, $R^2 = .22$, however the interaction of proactive personality and baseline motivation did not explain additional variance in Time 3 spillover ($\beta = .20$, $p = .205$, $\Delta R^2 = .03$). Therefore, these results fail to support Hypothesis 4, that participants high in motivation and proactive personality would show the greatest increases in eco-driving spillover.

Table 4
Hierarchical Multiple Regression Analysis Predicting Time 2 Spillover with Baseline Motivation as a Moderating Variable.

	Time 2 Spillover	
Predictor	ΔR^2	β
Step 1	.00	
Training Condition		-.06
Step 2	.10	
Training Condition		-.06
Proactive Personality		.01
Baseline Motivation		.31
Step 3	.06	
Training Condition		-.04
Proactive Personality		-.08
Baseline Motivation		.34*
Proactive Personality x Baseline Motivation		-.26
Total R^2	.17	

Note. $*p < .05$.

Figure 2
Interaction effect of Proactive Personality and Baseline Motivation in Relation to Time 2 Spillover.



To assess the interaction effect of Time 3 motivation and proactive personality on spillover at Time 3, a final set of regression equations were calculated (see Table 5). These

analyses included the training condition in Step 1, proactive personality and Time 3 motivation in Step 2, and the interaction of proactive personality and Time 3 motivation in Step 3. Together, this model predicted Time 3 spillover, $F(4,43) = 3.21$, $p = .022$, $R^2 = .23$, and the interaction of proactive personality and Time 3 motivation explained variance in Time 3 spillover beyond the variables included in Steps 1 and 2 ($\beta = .30$, $p = .038$, $\Delta R^2 = .08$). Further analysis of the interaction effect (see Figure 3) revealed that participants with high proactive personality and high Time 3 motivation reported higher levels of Time 3 spillover than those with high levels of proactive personality and low levels of Time 3 motivation. However, those with low proactive personality and low Time 3 motivation showed similar levels of spillover, and this significant interaction appears to be primarily driven by those with low motivation and high proactive personality reporting the lowest levels of work-to-home spillover of eco-driving behaviors. Although these results support the prediction that the effect of proactive personality on Time 3 spillover will be moderated by motivation, they fail to demonstrate that those high in proactive personality and motivation would show the greatest increase in spillover. Therefore, Hypothesis 4 was not supported.

Table 5

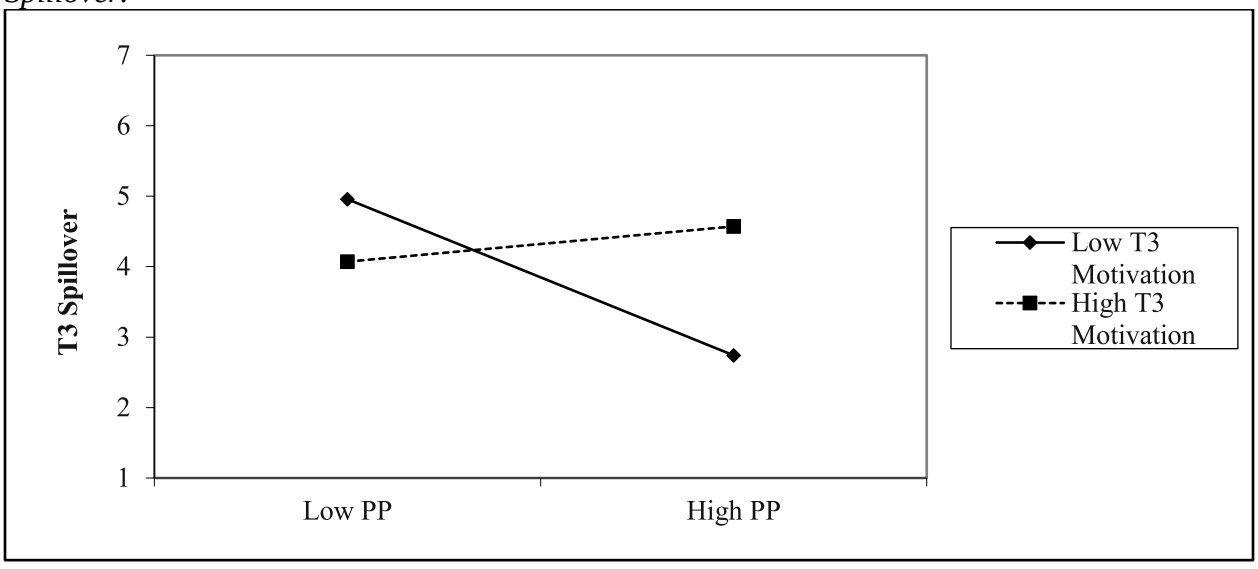
Hierarchical Multiple Regression Analysis Predicting Time 3 Spillover with Time 3 Motivation as a Moderating Variable.

	Time 3 Spillover	
Predictor	ΔR^2	β
Step 1	.01	
Training Condition		.08
Step 2	.14*	
Training Condition		.05
Proactive Personality		-.34*
Time 3 Motivation		.22
Step 3	.08*	
Training Condition		.03
Proactive Personality		-.28
Time 3 Motivation		.18
Proactive Personality x Time 3 Motivation		.30*
Total R^2	.23*	

Note. $*p < .05$.

Figure 3

Interaction effect of Proactive Personality and Time 3 Motivation in Relation to Time 3 Spillover.



Discussion

The present study has multiple implications for organizations that employ fleet drivers, adding depth to our understanding of the personal characteristics that influence changes in eco-driving behaviors. In particular, these findings suggest the need for a comprehensive approach to training needs assessments, which can supply organizations with more information about how to best promote eco-driving among specific groups of individuals and provide insight into how the negative impacts of high proactivity for certain behavioral outcomes can be assuaged. Considering that organizations in the United States, on average, spend upwards of $125 billion per year on training (Paradise, 2007), it is of utmost importance to optimize investment in employee development.

Consistent with previous research linking proactive personality and motivation with participation in developmental activities (Major et al., 2006), the interaction of proactive personality and baseline eco-driving motivation on Time 3 eco-driving behaviors suggests that organizations may benefit from assessing these traits within their existing employees before implementing eco-driving interventions. In particular, proactive personality, a trait that has been positively related to extra-role behaviors (Seibert, Kraimer, & Crant, 2001), may be an especially helpful trait to assess before implementing a training program that is focused on eco-driving, which may consist of behaviors that exist beyond the scope of normal job expectations. Additionally, considering the strong main effect of eco-driving motivation on eco-driving behaviors and spillover, along with the significant moderating effect of eco-driving motivation, it would behoove organizations to also incorporate measures of motivation that are specific to the proposed subject of training when developing a training needs assessment.

Furthermore, assessing the individual differences of proactive personality and eco-driving motivation may improve a company's investment in training by providing accommodations for those who are low in these traits. For example, organizations that cultivate a climate supportive of eco-driving prior to engaging employees in training may find improved training outcomes for those employees who are not already high in motivation. Additionally, learners who are low in motivation, a factor that has been positively correlated with eco-driving behaviors in past research (Mansfield, et al., 2016), may require additional intervention to increase motivation. For example, organizations may focus more effort on better portraying the benefits of eco-driving and providing situational cues both during and after the training that encourage the transfer of eco-driving knowledge from the training context to the job, such as timely feedback, goal-setting, and support from supervisors. Finally, those who are low in proactive personality may benefit from behavioral modeling training (Bandura, 1986) that focuses on proactivity, such as autonomous behavior and initiative-taking (Bateman & Crant, 1993).

Additionally, a thorough understanding of employee's dispositions may help organizations to customize the learning experience based on intrinsic differences (Crant, 1995). Although employees with high levels of proactive personality and motivation may thrive within the training context of a relatively passive eco-driving campaign, people with other tendencies may respond more positively to other training methods. For example, on-the-job training may be more beneficial for employees who require higher levels of accountability while the social context of in-person classroom lectures may be more suitable others. The selection of a training format based on employee dispositions, therefore, may save time and money by providing learning experiences that play to the strengths of the learners.

Interestingly, when motivation was low, proactive personality was negatively related to work-to-home spillover of eco-driving behaviors. This negative relationship may be explained by Hobfoll's (1989) Conservation of Resources theory. Hobfoll (1989) defined resources as objects (e.g., material possessions), conditions (e.g., marriage, tenure), personal characteristics (e.g., personality, attitude), and energies (e.g., knowledge, finances, time) that people value and strive to accumulate. The threat of loss, or the actual loss of resources, often due to excessive demands placed on employees, will result in stress, strain, and the depletion of personal resources (Hobfoll, 2002). Using COR theory as a guide, those who are high in proactive personality may focus their resources more narrowly on behaviors they are motivated to perform, and thus eschew spending resources on other behaviors. However, this relationship was partially mitigated by high motivation. That is, those high in motivation and proactive personality did not show the same negative effect in the non-work domain. Drawing on these results, organizations that encourage the development of personal resources by providing motivational encouragement and support, particularly for those high in proactive personality, may be able to realize the benefits of proactive personality while reducing its potential negative consequences to other domains.

Potential Limitations

As previously stated, the lack of significant findings regarding the main effect of proactive personality on eco-driving behaviors may have resulted from the small sample sizes of matched responses from Time 1 to Time 2 and from Time 1 to Time 3. Another contributing factor to the lack of correlation between proactive personality and eco-driving behaviors was most likely the main effect of eco-driving motivation. In particular, the large effect sizes for Time 1 and Time 2 eco-driving motivation may have absorbed a large percentage of the variance

in eco-driving behaviors. Further, the average scores of proactive personality (M = 5.45, SD = .78) and eco-driving behaviors at Time 1 (M = 5.40, SD = .85), Time 2 (M = 5.70, SD = .79) and Time 3 (M = 5.78, SD = .88) were somewhat high, relative to their 7-point scales, and possibly introduced a ceiling effect by inhibiting the ability to detect a significant correlation between these two variables. Despite these limitations, interactions were shown to influence multiple outcome variables, albeit in some cases in the opposite direction of what was anticipated. Additionally, the self-report questionnaires with Likert-type scales used in this study are inherently subjective and may not have reflected actual driving behaviors. To address these issues, future studies may benefit from the recruitment of a larger pool of participants, the use of different scales that are able to more finely distinguish among those high in proactive personality and eco-driving behaviors, and the incorporation of objective measures of eco-driving such as fuel usage, braking and acceleration patterns, and real-time emissions testing. Finally, considering that the majority of participants were white males employed at public sector organizations in the Pacific Northwest, the inclusion of a more diverse demographic makeup in both public and private sector organizations across various cultures may enhance future generalizability.

Future Research

To enhance our understanding of the relationship between proactive personality and eco-driving training transfer, future research may build on the findings of this study by recruiting larger samples to increase statistical power and by analyzing other potential moderating variables. For example, proactivity's effect on eco-driving training success may be dependent upon other personality factors, such as conscientiousness. Likewise, contextual variables such as supervisor and peer support may also play a significant role in the training transfer for highly

proactive people. Moreover, others may find it helpful to analyze the same variables with different training formats such as in-person classroom lectures, programmed instruction, driving simulators, or hands-on training. Finally, longitudinal studies encompassing both shorter and longer time periods may also more accurately assess eco-driving training success and decay.

Additionally, the unexpected negative relationship between proactive personality and work-to-home eco-driving spillover found in this study may also have implications for future research. While this negative correlation could have been a random incident due to the small sample size in this study, this finding also suggests that proactive people may, for some reason, experience lower rates of spillover compared to others. This finding could be expanded to determine if the spillover of other pro-environmental behaviors from work to home are also negatively related to proactive personality, such as recycling, composting, and energy-saving practices. Similarly, it may be beneficial to investigate the spillover effect between these different pro-environmental behaviors based on personality. For example, it may be helpful to know if recycling is positively related to eco-driving. Finally, this line of research may be expanded to investigate potentially similar negative effects of proactive personality under various conditions of low motivation, such as contexts wherein the training material is focused on mundane and repetitive tasks, the transfer of training does not result in personal benefit, or where there is a lack of understanding regarding the incentive to learn.

Conclusion

The predictive potential of proactive personality and eco-driving motivation suggests that individual differences among employees are related to the success of training interventions. Additionally, the proactive personality and motivational constructs used in this study may inform training needs assessments, ensuring that existing employees with low proactive personality or

motivation are provided additional training tools. Furthermore, the negative relationship found between proactive personality and spillover to home driving behaviors when motivation was low reinforces the importance of creating organizational climates that foster motivation. Taken together, this study highlights the importance of considering the dispositional makeup and behavioral tendencies of employees within the context of training, and identifies two factors important factors for organization to consider when promoting eco-driving behaviors.

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