Anderson, A.G., & Lavallee, D. (2008). Applying the theories of reasoned action and planned behavior to athlete training adherence behavior. *Applied Psychology, 57*, 304-312.

Abstract
The ability of the Theories of Reasoned Action (TRA) and Planned Behavior (TPB) to predict training adherence to training in a group of athletes (N = 46; M age=20.2, $S.D.$=3.7 years) who had recently been introduced to a new strength and conditioning training regimen was investigated. Hierarchical multiple regression analyses indicated that the TPB was superior to the TRA in predicting training behavior and accounted for 24% of variance in adherence to training (F (2, 43) = 8.20, $p < .01$) with perceived behavioral control contributing independently. Perceived behavioral control appeared to be more important in determining adherence in early stages of training. These results suggest that the TPB and TRA offer theoretical frameworks to examine adherence to new training regimens, and that they may be used to direct interventions to increase training adherence.

Applying the Theories of Reasoned Action and Planned Behavior to Athlete Training Adherence Behavior

Recently within the United Kingdom (U.K.) Institutes of Sport have been established to service the needs of and support elite athletes. These Institutes provide invited athletes with new opportunities to access the services and facilities they need to compete at the highest level (U.K. Sport, 2005). Athletes making an upward transition in their sport will be faced with new demands and experiences (Salmela, Young, & Kallio, 2000). For example, in the U.K. strength and conditioning has been identified as an Institute priority service and in some sports the introduction of strength and conditioning training represents a major change in training behavior. Athletes from all countries may find difficulties adjusting and adhering to training programs that, in some instances, differ considerably in type and volume from their previous training. Indeed, previous research has indicated that elite athletes' adherence to fitness training programs can be poor (Palmer, Burwitz, & Smith, 1998).

Although there is considerably research examining adherence to health-related exercise in general populations (e.g., see Hagger, Chatzisarantis, & Biddle, 2002 for recent review) there has been limited research focusing on the unique performance-focused training behavior of elite level athletes. The studies that have been conducted in this area have used versions of the theory of reasoned action (TRA; Ajzen & Fishbein, 1980) and the theory of planned behavior (TPB; Azjen, 1991) as a basis to theoretically investigate athletes' adherence to physical training (Mummery & Wankel, 1999; Palmer, Burwitz, Dyer, & Spray, 2005; Palmer, Burwitz, Smith, & Borrie, 2000; Theodorakis, Goudas, Bagiatis, & Doganis, 1991).

The TRA and TPB have been used to predict behavior in a number of settings. The basis of the TRA is that intentions to engage in a behavior are the most proximal and strong determinants of that behavior. Intentions are influenced by an individual's perception of the social pressures put on her by important others to perform or not perform the behavior (subjective norm) and attitude towards the behavior, which are determined by an individual's beliefs regarding the outcomes of the behavior and her evaluation of these outcomes (Ajzen, 2004). From the TRA, Ajzen (1991) proposed the TPB by adding the construct of perceived behavioral control, which is a person's belief in their ability and control to execute a behavior. Perceived behavioral control was added to the model to help explain intentions and behavior when volitional control may be challenged.

Studies applying these theories to athlete training behavior have reported that the TPB can predict up to 45% of variance in intention to train, however it has accounted for only a small amount of variance in actual training behavior (Mummery & Wankel, 1999; Palmer et al. 2005). Further, in their study Mummery and Wankel reported that intention was the only construct to independently contribute to the prediction of behavior in swimmers. Perceived behavioral control did not independently influence the prediction of behavior, which could suggest that the volitional control of the swimmers to undertake their training was not being challenged (Ajzen, 1991), perhaps because they were heavily involved in their sport (length of time competing M = 5.7 years; training time per week M = 15.1 hours) and training had become habitual.

The overall aim of this study was to extend the limited current research examining the usefulness of the TRA and TPB as models to predict training adherence behavior, by focusing on a group of athletes who have recently introduced additional strength and

conditioning training into their current regimens. On the basis of previous research it was hypothesized that intention to adhere would be the biggest predictor of adherence to training.

Method

Participants

Participants were 27 males and 19 females (M = 20.2, SD = 3.7 years) from a range of sports who responded to an initial mailing to 100 athletes, and for whom the researchers had a full set of training attendance data. Each participant had been selected into an Institute or squad in which supervised strength and conditioning training with free weights was an element. Prior to their selection into the squad none of the athletes had participated in supervised strength and conditioning training with free weights on a regular basis, and at the time of the study the participants had been involved in this type of training for a relatively limited period of time (M =10.7; SD = 8.0 months).

Measures

All participants completed a questionnaire designed to address demographic information and the relevant TRA and TPB constructs, which were developed following the recommendations of Ajzen (2004) and adhered to the principle of compatibility. All responses were scored on a scale of -3 to +3 and a number of items were reversed to avoid response acquiescence. The target adherence behavior was defined as attendance at supervised strength and conditioning sessions in a weight room for a 7-week period and the strength and conditioning coach maintained a week-by-week record of the percentage of sessions attended each week out of prescribed sessions. The measure of adherence was based on an average weekly attendance over the 7-week period, as used in previous

exercise studies. Two questions were included on the questionnaire to identify each athlete's intention to adhere to the prescribed strength and conditioning training in the next 7 weeks (e.g., “I plan to follow the assigned strength and conditioning training in the weight room in the next 7-weeks”). Perceived subjective norm was assessed through the average of athletes’ responses to three statements (e.g., “People who are important to me think I should follow the strength and conditioning program in the weight room in the next 7 weeks”). Perceived behavioral control was obtained by taking the mean of the four items designed to assess the participant’s perceptions of their ability to perform the behavior under investigation (e.g., “I believe I have the ability to follow the prescribed strength and conditioning training program in the weight room in the next 7 weeks”). Attitude towards training behavior was assessed by the participants responding to the statement “For me to follow the prescribed strength and conditioning program in the weight room in the next 7 weeks would be” on 12 semantic differential scales, which consisted of the adjective pairs as used by Mummery and Wankel (1999) (e.g., unimportant-important, dull-exciting).

Procedure

The questionnaire, a letter detailing the procedures, and a stamped addressed envelope were mailed to each athlete one week prior to the commencement of the recorded 7-week training period. The participants were invited to complete and return the questionnaire if they consented to participating in the study. The strength and conditioning coaches received a training log and were asked to record attendance for each participant over the 7-week period.

Data Analyses

Descriptive statistics were calculated for each of the constructs. A Pearson correlation matrix of all independent variables was calculated so that the possibility of multi-collinearity in the data could be examined prior to undertaking hierarchical multiple regression analyses to examine the influence of attitudes, subjective norm, and perceived behavioral control on training behavior. Although this sample size is small it still reaches the recommended ratio of participants to independent variables for a multiple regression (i.e., at least 5:1; Ntoumanis, 2001).

Results

Table 1 shows descriptive statistics for all variables, including mean, standard deviations and inter-correlations, and multi-collinearity was not evident. A two-step hierarchical multiple regression analysis was performed to test the predictions of the TRA and TPB on training behavior**.** Intention was entered on the first step of the regression and attitude and subjective norm were entered on the second step. Results (see Table 2) indicated that intention accounted for 6.4% of the variance in behavior ($\beta = .29$; 95% C.I. .02; 18.3), and this was significant ($F(1, 44) = 4.08$, $p < .05$). Adding attitude and subjective norm failed to significantly improve the prediction of behavior.

****Tables 1 and 2 here****

The TPB was tested by entering intention in step 1, perceived behavioral control in step 2, and attitude and subjective norm in step 3 of the regression. Adding perceived behavioral control on step 2 significantly improved ($F(1, 43) = 11.3$, $p < .01$) the prediction of behavior to 24% ($\beta = .48$, 95% C.I. 6.2; 24.6) and this model was also significant ($F(2, 43) = 8.20$, $p < .01$), although only perceived behavioral control contributed independently.

Adding subjective norm and the measure of attitude failed to significantly improve the prediction of training behavior (R^2 adj=.21), although this model was also significant (F = 3.9, $p < .01$). It should be noted that there was some evidence of possible heteroscedasticity in the data, which could weaken this analysis.

Discussion

The purpose of this study was to examine the usefulness of the TRA and TPB to increase understanding of and predict athlete's adherence to strength and conditioning training that has recently been added to current training. The findings of this study indicate that both the TRA and TPB significantly predict training adherence, although TPB appears to provide a better model for understanding adherence to new strength and conditioning training. The TRA and TPB both suggest that intention is the strongest predictor of behavior that is within volitional control. However, the findings of this study showed that intention significantly predicted only 6.4% of variance in adherence to training. This percentage is less than Mummery and Wankel (1999) who reported that intention predicted 10 to 15% of variance in swimmer's training adherence, and considerably less than the 19% to 38% shared variance between intentions and behavior reported in other areas (see Sutton, 1998 for review). However, this finding is consistent with Palmer et al. (2005).

The finding that intention has only a small association with new training behavior indicates that additional factors not included in this study may also be related to behavior or mediating the intention-behavior relationship. For example, it is possible that the intention-behavior relationship is weaker than would have been expected because 7-weeks elapsed between assessing intention and the final measure of adherence, during which intentions may have changed (Ajzen, 1991; Sutton, 1998). Additionally, as noted by Palmer et al

(2005) the athletes may have started out with good intentions but were unable to convert these intentions into actual behavior.

The hypothesis that intention is the strongest determinant of training behavior was not supported, because the addition of perceived behavioral control significantly increased the prediction of variance in adherence behavior to 24% and indicates that perceived behavioral control may be more influential than intentions in predicting adherence to recently introduced strength and conditioning training behavior. This result suggests that the TPB is a better predictor of new training behavior than TRA, but this finding differs from Mummery and Wankel (1999) and Palmer et al. (2005) who reported that perceived behavioral control did not directly predict training behavior.

It has been suggested that perceived behavioral control becomes important in predicting behavior when volitional control is incomplete and barriers exist to prevent the individual from engaging in the behavior (Ajzen, 1991; Verplanken, Aarts, & Knippenberg, 1997; Yang-Wallentin, Schmidt, Davidov, & Bamberg, 2003). The athletes in this study had only recently entered a program of additional training and might not yet have perceived it to be completely under their control (see Table 1). It is likely that the athletes in this study were still dealing with barriers to training (e.g., time-management, travel problems). In contrast, the swimmers in the Mummery and Wankel (1999) study had been involved in training for a considerable period of time (> 5 years) and the behavior may have become a habit. Habitual behavior is likely to be guided by automatic cognitive processes triggered by situational cues rather than elaborate decision-making, thus reducing the influence of perceived behavioral control (Aarts, Verplanken, & Knippenberg, 1998). In short, perceived behavioral control could be particularly influential in predicting training behavior

when it is a new behavior and not yet under the volitional control of the athlete (Yang-Wallentin et al., 2003). Future research could aim to investigate the changing role of perceived behavioral control as time involved in training increases. Finally, in line with the TPB, attitudes and subjective norm did not significantly contribute to the prediction of behavior, although the regression model remained significant.

In this study the TPB model predicted 25% of variance in training behavior, which although this is greater than previous studies (e.g., Mummery & Wankel, 1999; Palmer et al., 2005), it is still relatively modest. A possible explanation for the relatively small variance in training behavior predicted in this study may partly be due to a level of incompatibility between the outcome behavior and the predictor variables. In this study the target behavior was defined as a percentage of attendance at strength and conditioning sessions. However, consistent with Mummery and Wankel the measurement of the predictor variables referred to only 'following' or 'doing' the prescribed strength and conditioning program rather than a specific percentage. Consequently, participants may have interpreted this statement liberally (e.g., completing 30% of sessions constituted following the program). Future research should ensure that measurement of the predictor variables refers to a specific amount of training.

Limitations of this study include the small sample size and not assessing past behavior. Research in other areas (e.g., physical activity; Hagger et al., 2002) have highlighted the value of examining past behavior in predicting future behavior. Further, the response rate to the study was only 45% and because no data was collected from those who did not respond, it was not possible to compare between respondents and non-respondents. Therefore, it may be that the results of this study are not representative but based on a

biased sample of respondents who were sufficiently motivated to reply. Future research should aim to make comparisons between respondents and non-respondents.

Nevertheless, this study adds to the limited research in the area of training adherence in athletes by investigating adherence to a recently introduced strength and conditioning training program, in an ecologically valid setting. The findings provide support for the superiority of the TPB over the TRA as a framework for understanding the antecedents of adherence training behavior. The construct of perceived behavioral control appears to be more important than intention in predicting adherence in the early stages of a new training approach. This could suggest that coaches and practitioners may aim to increase athletes' perceptions of control over their training in order to increase adherence. Although it should be noted that this strategy would only be effective if athletes' perceptions of control approximated their actual control over training. Further research is required to replicate these findings with a larger sample and extend the area by investigating the role of past behavior on perceived behavioral control, and whether perceived behavioral control changes over time.

References

Aarts, H., Verplanken, B., & Knippenberg, A. V.(1998). Predicting behavior from actions in the past: Repeated decisions making or a matter of habit. *Journal of Applied Social Psychology, 28,* 1355-1374.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50,* 179-211.

Ajzen, I. (2004). *Constructing a TPB questionnaire: Conceptual and methodological considerations.* Retrieved May 6, 2004, from University of Massachusetts, Icek Ajzen Website: http://wwwunix.oit.umass.edu/~aizen/tpb.html.

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior.* Englewood Cliffs, NJ; Prentice-Hall.

Hagger, M.S., Chatzisarantis, N.L.D., & Biddle, S J.H. (2002). A meta-analytic review of the Theories of Reasoned Action and Planned Behavior in physical activity: Predictive validity and the contribution of additional variables. *Journal of Sport & Exercise Psychology, 24,* 3-32.

Mummery, W.K., & Wankel, L.M., (1999). Training adherence in adolescent competitive swimmers: An application of the theory of planned behavior. *Journal of Sport & Exercise Psychology, 21,* 313-328.

Ntoumanis, N. (2001). *A step by step guide to SPSS for sport and exercise studies.* London: Routledge.

Palmer, C.L., Burwitz, L., Dyer, A., & Spray, C. (2005). Endurance training in elite junior netball athletes: A test of the theory of planned behavior and a revised theory of planned behavior. *Journal of Sports Sciences, 23,* 277-288.

Palmer, C.L., Burwitz, L., & Smith, N.C. (1998). Adherence to aerobic training programmes in junior elite netball players. *Journal of Sports Sciences, 16,* 99-100.

Palmer, C.L., Burwitz, L., Smith, N.C., & Borrie, A. (2000). Enhancing fitness training adherence of elite netball players: An evaluation of Maddux's revised Theory of Planned Behavior. *Journal of Sports Sciences, 18,* 627-641.

Salmela, J.H., Young, B.W., & Kallio, J. (2000). Within-career transitions of the athlete-coach-parent triad. In D. Lavallee and P. Wylleman (Eds.), *Career transitions in sport: International perspectives* (pp. 181-193). Morgantown, WV: Fitness Information Technology.

Sutton, S. (1998). Predicting and explaining intentions and behavior: How well are we doing? *Journal of Applied Social Psychology, 28,* 1317.

Theodorakis, Y., Goudas, M., Bagiatis, K., & Doganis, G. (1991). Reasoned action theory and the prediction of training participation in young swimmers. *British Journal of Physical Education, 10,* 10-13.

Verplanken, B., Aarts, H., & Knippenberg, A.V. (1997). Habit, information acquisition, and the process of making travel mode choices. *European Journal of Social Psychology,* 27, 539-560.

U.K. Sport (2005). *U.K. Sport Institute Central Services Team.* Retrieved May 6, 2005 from http://www.uksport.gov.uk.

Yang-Wallentin, F., Schmidt, P., Davidov, E., & Bamberg, S. (2003). Is there any interaction effect between intention and perceived behavioral control? *Methods of Psychological Research Online, 8,* 127-157.

Table 1: Descriptive statistics and inter-correlations for measures related to TRA and TPB

	Total attendance	Intention	Subjective norm	Perceived behavioral control	Attitude
Attitude	.30*	.29*	.23	.52**	-
Perceived behavioral control	.52**	.42**	.39**	-	-
Subjective norm	.23	.36*	-	-	-
Intention	.29*	-	-	-	-
Total attendance	-	-	-	-	-
Mean	75.02	2.56	2.20	2.16	2.07
SD	30.02	0.95	1.08	0.94	0.77

*p<.05; **p<.01

Table 2

Summary of Hierarchical Regressions to Test Ability of TRA and TPB to Predict Training Behavior

	Training behavior			
	β	R	R^2	Adj R^2
TRA				
Step 1				
Intention	.29*	.29	.09	.06*
Step 2				
Intention	.20			
Attitude	.20			
Subjective norm	.03	.35	.12	.06
TPB				
Step 1				
Intention	.29*	.29	.09	.06*
Step 2				
Intention	.09			
Perceived behavioral control	.48**	.53	.28	.24**
Step 3				
Intention	.08			
Perceived behavioral control	.48**			
Attitude	.00			
Subjective norm	.01	.53	.28	.21**

Note. TRA R^2 = .06 for Step 1; Δ R^2 = .03 for Step 2; TRB R^2 = .09 for Step 1; Δ R^2 = .19 for Step 2; Δ R^2 = 0 for Step 3

*p<.05; **p<.01