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Evaluating a Team Building Intervention in a Youth Exercise Setting

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The purpose of this study was to examine the relationship between the mechanisms in an established team building (TB) activity intervention and cohesion, its proposed outcome as well as conduct a process evaluation of the intervention in a youth exercise setting. Participants (N = 100, 13–17 years) were members of school-based exercise clubs randomly assigned to either a TB or control condition. In the TB condition, trained leaders implemented an established TB protocol (Carron & Spink, 1993). Results revealed a positive association between the specified mechanisms in the TB intervention and the proposed outcome of task cohesion. The evaluation of the intervention also revealed that the TB components were implemented as prescribed, and the intervention appeared to be appropriate for a youth setting.

Keywords: team building, evaluation, cohesion, exercise, youth

A growing body of evidence has highlighted the benefits of group-based interventions in enhancing individual adherence in exercise settings (Burke, Carron, Eys, Ntoumanis, & Estabrooks, 2006; Dishman & Buckworth, 1996). In terms of group approaches, the psychological intervention of team building (TB) has been associated with exercise adherence in different populations including young adults (Carron & Spink, 1993; Spink & Carron, 1993) and the elderly (Watson, Martin Ginis, & Spink, 2004). In these instances, the TB interventions were designed to improve adherence by enhancing group cohesiveness (cf. Newman, 1984).

Although recognition of the positive relationship between TB and exercise adherence is important, examining why interventions such as this work has been heralded as vital, be it in the area of health behaviors generally (cf. Glanz, 2002; Weinstein, 2007), or physical activity, specifically (Baranowski, Anderson, & Carmack, 1998). To date, minimal research has addressed this important issue in the TB activity literature, be it in sport or exercise. Within the sport context, studies have been conducted examining the perceptions of both athletes (Dunn & Holt, 2004; Holt & Dunn, 2006) and coaches (Newin, Bloom, & Loughead, 2008) participating in season-long TB interventions. Collectively, a number of benefits of TB were identified across these studies including enhancement of group cohesion. However, the specific mechanisms within the TB protocols were not empirically examined. Similarly, there are currently no studies in the exercise setting that have systematically evaluated the mechanisms within a TB intervention.

Among existing TB models, Carron and Spink (1993) developed a TB conceptual framework for an exercise setting that has been endorsed by others for its more systematic and scientific approach to group interventions (Brawley & Paskevich, 1997). At the core of this TB model is the expectation that the intervention will produce a more unified (i.e., cohesive) group. This model, which has been described elsewhere (Carron & Spink, 1993), presents the group in the form of a linear model containing inputs, throughputs, and outputs. Within this TB model, the salient outcome is identified as group cohesion, and it is considered to be the desired output or product of three categories: group environment, group structure, and group processes. The group environment and group structure (inputs) are proposed to influence group processes (the throughput),

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which in turn, contribute to the development of cohesion (output).

Within the three categories outlined in the conceptual model, a number of attendant factors (i.e., mechanisms) have been identified as contributing to the enhancement of cohesion within an exercise setting. These include highlighting group distinctiveness (group environment), fostering group norms and individual positions (group structure), and increasing communication/interaction and individual sacrifices (group processes). The rationale for the inclusion of these specific factors in the model has been outlined elsewhere (Carron & Spink, 1993), and the interested reader is directed there for further information.

Although the overall TB framework and intervention have been found to be associated with the perceptions of cohesion within exercise groups (e.g., Carron & Spink, 1993, 1995; Spink & Carron, 1993), the relationship of the identified mechanisms linking the intervention and cohesion, has yet to be examined. The paucity of research evaluating this specific TB conceptual framework specifically, and TB interventions in exercise and sport settings generally, is surprising given the suggestion of Brawley and Paskevich (1997) over a decade ago identifying the need to evaluate TB programs in the activity setting. They presented a number of reasons for this need, including the fact that evaluation would help to clarify relationships (i.e., key mechanisms) between the independent and dependent variables within the interventions, which they identified as a key problem limiting the generalizability of findings from previous TB interventions (Brawley & Paskevich, 1997).Thus, the main purpose of the current study was to examine the relationship between the five TB factors identified as mechanisms in the Carron and Spink (1993) model and the proposed outcome of task cohesion in a youth exercise setting.

The focus on task cohesion flows from the fact that the TB model to be examined in this study has been substantively and empirically linked with task cohesion in past exercise settings (Carron & Spink, 1993, 1995; Spink & Carron, 1993). Specifically, exercise participants exposed to this TB intervention, which targets the task aspect of cohesion, have expressed significantly higher perceptions of task cohesion (i.e., individual attractions to group task; ATG–Task) than participants in control conditions (Carron & Spink, 1993, 1995; Spink & Carron, 1993). Based on the assumption that the TB factors in this model should impact task cohesiveness, it was hypothesized that the five manipulated TB factors would be positively associated with task cohesion.

The rationale for selecting a youth sample was twofold. First, findings from one study examining this TB intervention in a sport setting (Newin et al., 2008) found that TB improved the ability of the team to work together as a unit to achieve its goals, thus providing initial support for the appropriateness of Carron and Spink's (1993) TB conceptual framework to foster task cohesion in a youth population. Second, given the issue of the low number of youth meeting the recommended activity guidelines for healthy growth and development (Craig & Cameron, 2004), and the ineffectiveness of many physical activity interventions targeting youth (Baranowski et al., 1998), evaluation of this group-based intervention in a youth setting appeared warranted.

In addition to examining the relationship between the proposed mechanisms and the proposed mediator-task cohesion, the study also included a process evaluation of the implementation of the TB intervention and a standardized exercise program. One key aspect of the process evaluation involved the assessment of the implemented TB component. It was hypothesized that exercise club participants exposed to the TB intervention program would identify the presence of the five manipulated TB factors within their group to a greater extent than those participants in the control condition. Site observations also were conducted by researchers during the intervention to provide a further evaluation of the implementation of the TB component. In this study, the intervention also was strengthened by the inclusion of a standardized exercise component, to control for possible effects resulting from the actual exercise program itself. This additional component also was evaluated by direct observation.

Method

Study Participants

Participants included 141 male and female youth (mean age = 15.5; *SD* = 1.07) who

volunteered to participate in 12 newly formed school-based exercise clubs. Participants were recruited by the leaders of the exercise clubs, who were teachers at the participating schools. Teachers were recruited using several strategies that included flyers, emails, and a presentation at a year-end athletic board meeting. A total of 12 teachers (nine men and three women) from 12 different schools in different communities volunteered to direct an exercise club outside of school hours as a part of a research study. Each teacher was responsible for recruiting the participants from their respective schools. Recruitment by the teachers uniformly involved classroom announcements and posters displayed in the schools. This study was approved by the University Institutional Ethics Review Board and the relevant school boards. Parental consent was required for participants under the age of 18 years. Participants who returned the consent forms (e.g., parental consent, participant assent) were promised a sport drink. However, participants and parents were informed that there were no rewards or other compensation for participation or completion of the exercise program.

Research Design

The intervention study was a quasi-experimental field experiment employing a 2 (condition: TB–Control) × 2 (time: pre/post intervention) repeated-measures design, with time as the within-group factor. The intervention included two main components—a standardized exercise program that was common to both conditions and a TB component unique to the TB condition.

Experimental Conditions

Common element of the intervention protocol—Standardized exercise program. After recruitment, all 12 leaders completed an individual 1-hr training session conducted at their respective schools by one of the researchers. The purpose of this initial session was to instruct the leaders in the implementation and delivery of a standardized exercise program. In addition, the leaders were provided with a program guide and CD outlining a series of exercises that they were to deliver in their club during each session. Specific exercises were provided for 24 different sessions (i.e., 24 sessions represents the length of the study).

In addition to exposure to the exercises and instruction on how to deliver them, the leaders were provided with a format to deliver the exercises for each class session that was standardized as follows—warm-up exercises (10 min), energy systems exercises (20 min), dynamic strength training exercises (20 min), and cool down exercises (10 min). Within 1 week of receiving the training, the leaders initiated the exercise clubs in their respective schools using the prescribed exercises and session format. The standardized exercise program was delivered by the leader in the gymnasium or an adjacent room in each school over a 60-min session that met three times per week outside of school hours.

All leaders delivered the first six sessions (labeled baseline), which was followed by a pretest assessment (see Figure 1). These six sessions were similar to the run-in period conducted in a randomized control trial. This period served a valuable role in ensuring that participants were in a group setting prior to the introduction of the TB intervention as well as provided the opportunity to gather baseline observations. Following the assessment, the schools were randomly assigned to the intervention or the control condition. Of the 12 original schools, two were eliminated from the randomization. One was excluded because the leader withdrew from the study during the baseline period and the other was excluded because of an inconsistency in protocol administration during the baseline period (i.e., the leader did not show up for all sessions). The randomization procedure resulted in five schools being assigned to the TB condition and five to the control condition. Although exercise club leaders were aware that they were part of a research study, they were unaware that there were two conditions or of their specific assignment to condition.

In total, 122 youth (58 male, 64 female; $M = 15.5$ years) from the remaining 10 schools were randomly assigned by school to the TB ($n = 65$ participants) or control ($n = 57$ participants) condition. Of the 122 youth randomized to the two conditions, the 100 (TB = 52, control = 48) individuals who completed the full intervention were included in the analysis. After randomization, the leaders (four men, one women) in the control condition were contacted

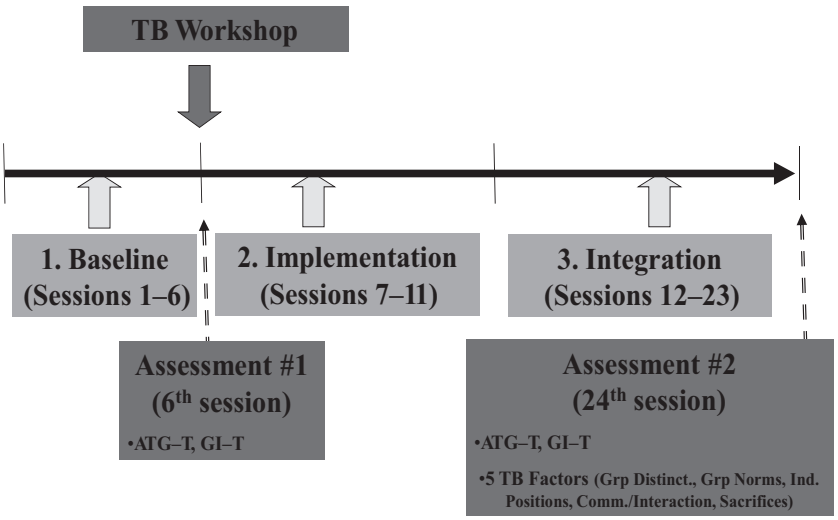

Figure 1. Team building (TB) intervention design and timing of process measures. ATG–T = individual attractions to group task; GI–T = group integration-task; Grp Distinct. = group distinctiveness; Grp Norms = group norms; Ind. Positions = individual positions; Comm./Interactions = communication/interaction.

by telephone by the researchers. The call was an attempt to control for possible attention-placebo effects. The leaders were asked to discuss how the club was progressing, and to identify if there were any problems where the researchers might be of assistance. No problems were reported at this time. The control leaders were instructed to continue to conduct their remaining 18 sessions using the exercise protocol that they had used in the first six sessions. In addition, leaders in the control condition also were told that site visits would be conducted wherein individuals would be coming to their class to monitor the implemented exercise protocol. The control leaders were not informed about the TB session or protocol.

Unique feature of the intervention—TB component. The five leaders (four men, one women) assigned to the TB condition were invited to attend a TB workshop (see Figure 1 for a timeline). Leaders were informed that the session would focus on TB principles that they could implement with their respective clubs. All those contacted agreed to attend.

Consistent with the TB model developed by Carron and Spink (1993), a four-stage process involving an introductory, a conceptual, a practical, and an intervention stage was utilized. The first three stages took place at a workshop led by one of the researchers. The fourth stage took place at each of the five respective exercise club sites. A detailed explanation of how this particular TB intervention model has been implemented in another activity setting has been outlined elsewhere (Carron & Spink, 1993).

A key component in the practical stage of the TB workshop was the development of task-oriented TB strategies that the leaders would use in their fitness clubs to develop cohesion. This was done by targeting the five factors outlined in Carron and Spink's (1993) TB model, and included in the group structure category—group norms and individual positions, in the group environment category—distinctiveness, and in the group processes category—individual sacrifices and communication/interaction. For each of these five factors, leaders were presented with an operational definition and an accompanying research-based rationale as to why the factor was included in the TB model. For instance, group distinctiveness was defined as aspects related to the group's immediate environment or the appearance of group members themselves. The justification for including group distinctiveness presented to leaders suggested that stronger perceptions of cohesiveness develop when something in the group environment is somehow

made distinct, which leads members to develop a stronger sense of "we" and more readily distinguish themselves from nonmembers of the group (i.e., "they"; Tajfel & Turner, 1979). Specific examples also were offered to the TB leaders. For group distinctiveness, the examples provided to leaders included the possibility of creating a group name for the exercise club or selecting a theme song for a specific component of the workout such as the warm-up or cool-down segments.

Each leader then developed a TB protocol tailored to the unique characteristics of his or her physical activity club using the five TB factors in the model as the template. Specifically, the TB protocol was designed to include the specific strategies the instructors felt would be most effective to enhance group cohesiveness within their respective exercise club. The rationale for allowing leaders to develop their own strategies rather than using one standardized one was twofold. First, as leaders are likely to differ in personality and preferences, a strategy that might be effectively implemented by one leader might not be by another one. Second, de Charms' (1976) origin-pawn research suggested that motivation is enhanced when individuals are given greater control over personal behavior, and this would best be accomplished by allowing leaders to select their own strategies. Examples of specific strategies suggested by leaders are presented in Table 1. Prior to departing the workshop, each instructor provided the researcher with a copy of the final TB protocol that would be implemented. The leaders were informed that site visits would be conducted to monitor the protocol that each had provided. In addition, the leaders were told not to discuss their protocol with any of the others until the study had been completed.

Table 1
TB Intervention Strategies Identified by the Leaders

Category	Example of intervention strategies used
Group environment	
Distinctiveness	Develop a group name
	Have group music
	Handout bracelets for the group
	☺Hand stamp for attending each session
	Make up codes names for participants
	Group water bottles
Group structure	
Group norms	Buddy system for attendance
	Have a window of time to start
	Attendance sign-in book with time
	Minigroup competition for lateness and attendance
	Point system for attendance/punctuality
	Secret weekly workout partner—"guardian angel" to monitor work ethic or attendance
Individual positions	Participants have a "home" or set pattern/formation for warm-up and/or cool down
	Students draw a number which represents the order of participants for warm-up and cool-down; the participants maintain the order but they rotate through leading the exercises
	Ab buddies
	Rotate/switch participant leaders for warm-up and/or cool-down
Group processes	
Interaction/communication	Encouragement on performing activity offering peer/partner feedback on effort or exercise technique
	Pair up with different participants for each activity offer fitness tips
Individual sacrifices	Arranging for an alternative ride to/from school
	Talk to group members outside of the club (e.g., in the hallway, in the community)
	Dominant person letting someone else take the lead or have first choice of the equipment
	Negotiate start time or finishing time of the workout sessions
	Secret ballot: Write down sacrifices participants have made for the group and sacrifices they have noticed other members have made for the group

As noted above, the final stage of the TB program took place in the actual club setting. In an effort to enhance fidelity in the delivery of the intervention, the TB intervention was divided into two distinct phases: implementation (Sessions 7 to 11) and integration (Sessions 12 to 23; see Figure 1). In the five-session implementation phase, the leaders were told to introduce the five TB factors on consecutive days as follows: Day 1, group distinctiveness; Day 2, individual positions; Day 3, interaction and communication; Day 4, group norms; and Day 5, individual sacrifices. Further, the leaders were told to focus on the specific TB factors during the 10-min warm-up and 10 minute cool-down segments of the workouts. This step was done to ensure the protocol was delivered consistently. Also, by using class time for the delivery of the TB factors, contact time with participants remained consistent across both conditions. In the integration phase, the leaders were instructed to reinforce the TB factors delivered during the implementation phase, over the remaining 13 sessions.

Measures

Baseline demographics. Prior to randomization (i.e., sixth session), baseline demographic information, including age, sex, and preference for being active with others in a group setting, was obtained. To assess the latter, participants were asked, "Do you enjoy being active with others in a group setting?" ([ ] yes [ ] no [ ] no preference).

Baseline physical activity. The Modified Activity Questionnaire for Adolescents (MAQ–A; Aaron et al., 1995) was used to assess participants' self-reported baseline physical activity. Although the original measure was designed to evaluate an adolescents' physical activity over the past 12 months, a modified version of the instrument was used in this study to assess an adolescent's physical activity level over the past month. Participants were asked to identify and provide information pertaining to the duration (i.e., the number sessions per week, the average number of minutes per session over the last month) and intensity of any physical activities they had participated in the past month. Based on this information, the level of energy expended (kilocalories expended per kilogram of body weight per day, KKD) was then calculated for each activity. The individual activity values were then summed to provide indications of a participant's baseline level of physical activity/energy expenditure (KKD). The MAQ–A has been found to a reliable and valid measure of physical activity with adolescents (Aaron et al., 1995).

Assessment of cohesion. Perceptions of cohesion were assessed using the two task cohesion subscales (ATG–T, GI–T) of the Group Environment Questionnaire (GEQ; Carron, Widmeyer, & Brawley, 1985). As the items in the GEQ were written for sport teams, the items were modified slightly to reflect the exercise context. Internal consistency values for this modified version have been shown to be similar to those reported for the original sport measure (Carron & Spink, 1992). Further, given the younger sample used in this study, the wording and understanding of the items in the modified questionnaire were pilot tested with a younger adolescent sample and found to be acceptable (Bruner & Spink, 2006). The four ATG–T and five GI–T items were scored on a 9-point Likert scale on a scale ranging from 1 (*strongly disagree*) to 9 (*strongly agree*). The items for each factor were summed with higher scores representing greater task cohesion. An examination of the task cohesion subscales in this study revealed alphas ranging from .68 to .78 for ATG–Task (pre-, posttesting) and from .59 to .65 for GI–Task (pre-, posttesting). Given the low alphas for GI–Task ($<.70$; Nunnally, 1978), and the fact that ATG–Task has been the task subscale most associated with this TB model in the past (Carron & Spink, 1993, 1995; Spink & Carron, 1993), GI–Task was deleted from further analysis. Consistent with previous recommendations (see Carron & Spink, 1993), cohesion was assessed after the baseline period but prior to the implementation of the intervention (i.e., Session 6), as well as at the conclusion of the intervention (i.e., Session 24; see Figure 1).

Intervention Manipulation Check

Assessment of participant perceptions.

Assessment of TB factors. Perceptions of the manipulated TB factors were assessed using five single items developed for this study. For example, to assess group distinctiveness, club participants responded to the statement, "A dis-

tinctive environment was developed within the physical activity club" using a scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The remaining four items evaluated the presence of the other manipulated TB factors. Assessment of the five TB factors was done at the end of the intervention.

Participant perceptions of TB protocol. An assessment of the participant's perceptions of the TB strategies was conducted at the conclusion of the intervention (Session 24). To assess perceptions of the delivery of the TB strategies, participants were provided with a questionnaire that asked them to indicate whether they had observed the presence of any one of 25 TB strategies. This list of 25 strategies was generated from all those proposed by the five TB leaders at the TB workshop. If any of the 25 strategies was perceived as present, participants were then asked to indicate the level of presence on a scale ranging from 1 (*rarely present*) to 7 (*always present*). For example, to assess the TB strategy of group name, participants were asked if a group name was [ ] absent or [ ] present in their club, and if present, to rate it on a scale ranging from 1 (*rarely present*) to 7 (*always present*).

External observations.

External observations—TB protocol. In an effort to further evaluate the implementation of the TB protocol, visits to each of the 10 sites were conducted by two researchers during the integration phase. At each site visit, two observers used a standardized master sheet containing 17 of the 25 TB strategies collectively generated by the leaders during the TB workshop. Only 17 TB strategies were assessed because the other 8 strategies could not be directly observed by the researchers during class time (e.g., arranging for alternative ride to/from club, talk to group members outside of club).

During the site visits, each observer independently observed and recorded the presence of the TB strategies (e.g., switching partners with each activity) outlined on the master sheet. Following each session, the two observers met to discuss and compare their observations. After the discussion and resolution of differences, the observations recorded for each site were compared with the TB protocol that each leader had developed during the TB training session.

External observations—Standardized exercise program. During each site visit, two researchers also independently evaluated the implementation of the standardized exercise program. Specifically, the researchers assessed the structure and time allotted to each of the four elements of the program (e.g., warm-up, dynamic systems, energy systems, cool-down). Following the session, the researchers met to discuss and compare their observations of the exercise program implementation.

Data Analysis Plan

Main analysis. To address the first hypothesis examining the possible relationship between the five manipulated TB factors and the proposed outcome of cohesion, a hierarchical regression was planned in which baseline values of task cohesion (ATG–T) were entered at the first step, condition (experimental vs. control group) was entered at the second step, and the TB factors were entered at the third step to predict perceptions of task cohesion (ATG–T) at the end of the intervention.[1]

Intervention manipulation check. To address the second hypothesis, a discriminant function analysis (DFA) was conducted wherein the five TB factors as perceived by the participants were entered as predictors of condition membership (TB, control). The objective of DFA is to predict group membership from a set of predictors (Tabachnick & Fidell, 2007). In DFA, interpretation is focused on the pattern of differences among the predictors as a whole, which differs from a traditional MANOVA, in which greater emphasis is placed on examining which dependent variables are associated with group differences (Tabachnick & Fidell, 2007). To assess the effectiveness of the delivery of the intervention, descriptive statistics were used to evaluate the participant's and researcher's perceptions of the TB strategies and the delivery of the standardized exercise program.

[1] We recognize the potential for nesting of participants within exercise clubs. However, the low number of participants at the 10 sites did not meet the recommended sample necessary to estimate the intercept or slope parameters for each site (Patterson & Goldstein, 1991), so analysis was conducted at the individual level.

Results

Baseline Demographics

As expected owing to the randomization, a comparison of selected school (e.g., eligible participants, school size, % of student participants), teacher (e.g., years at school, teaching experience), and participant demographic information (e.g., age, sex, baseline physical activity, preference for being active with others) revealed no significant differences between the two conditions (all *p*s $> .05$; see Tables 2 and 3). Of note, participants in both groups reported a high preference (>90%) for being active with others in a group setting (see Table 2).

Baseline physical activity. In general, participants self-reported being very physically active at baseline (mean activity level = 9.08 KKD; see Table 2).

Comparability of Cohesion in TB and Control Conditions at Baseline

A comparison of the TB and control groups at the conclusion of the baseline period revealed no differences in terms of task cohesion, ATG–T, $t(98) = 1.49$, $p > .05$.

Main Analysis

Cohesion. Results from the hierarchical regression analysis revealed that baseline ATG–T significantly predicted follow-up ATG–T, $F(1, 97) = 10.83$, $p < .01$, and accounted for 10% of the total variance. Higher ATG–T baseline scores were associated with higher follow-up values for ATG–T ($\beta = .32$). The addition of condition at the second step added significant variance over and above baseline ATG–T, $\Delta F(1, 96) = 5.20$, $p < .05$, and accounted for an additional 5% of the total variance. Results for condition ($\beta = .22$) indicated that those in the TB condition reported greater ATG–T cohesion, after controlling for baseline ATG–T scores. The final step of the regression, which involved the addition of the five manipulated TB factors to the predictive equation, significantly improved the prediction of ATG–T at the conclusion of the intervention, $\Delta F(5, 91) = 3.33$, $p < .01$, and accounted for an additional 13% of the total variance. The overall model was significant, $F(7, 91) = 5.02$, $p < .001$. Results for the full model revealed that communication/interaction ($\beta = .28$, $p < .01$) was the lone significant predictor of ATG–T, with those reporting more communication/interaction also reporting greater perceptions of ATG–T (see Table 4).

Intervention Manipulation Check

TB factors between-groups. Results from the DFA revealed that the five TB factors (group distinctiveness, group norms, individual positions, communication/interaction, sacri-

Table 2
Sample Demographics

Demographic variable	Total sample	TB[a]	Control[b]	Adherers[c]	Drop outs[d]
Age (years)	15.51 (1.07)	15.40 (1.10)	15.63 (1.03)	15.47 (1.08)	15.68 (1.04)
13	2 (1.6%)	1 (1.5%)	1 (1.8%)	2 (2.0%)	0 (0.0%)
14	21 (17.2%)	14 (21.5%)	7 (12.7%)	18 (18%)	3 (13.6%)
15	39 (32.0%)	22 (33.8%)	17 (29.8%)	32 (32%)	7 (31.8%)
16	33 (27.0%)	14 (21.5%)	19 (33.3%)	27 (27%)	6 (27.3%)
17	27 (22.1%)	14 (21.5%)	13 (22.8%)	21 (21%)	6 (27.3%)
Sex					
Male	58 (47.5%)	36 (55.4%)	22 (38.6%)	47 (47.0%)	11 (50.0%)
Female	64 (52.5%)	29 (44.6%)	35 (61.4%)	53 (53.0%)	11 (50.0%)
Baseline physical activity level					
KKD	9.08 (8.43)	7.93 (7.36)	10.38 (9.39)	9.30 (8.57)	8.07 (7.86)
Enjoy being active with others in a group setting					
Yes	109 (90.8%)	58 (90.6%)	51 (91.1%)	90 (91.8%)	19 (86.4%)
No	2 (1.7%)	1 (1.6%)	1 (1.8%)	2 (2.0%)	0 (0%)
No preference	9 (7.5%)	5 (7.8%)	4 (7.1%)	6 (6.1%)[e]	3 (13.6%)

Note. $N = 122$. TB = team building; KKD = kilocalories expended per kilogram of body weight per day.
[a] $n = 65$. [b] $n = 57$. [c] $n = 100$. [d] $n = 22$. [e] Denotes two missing participants.

Table 3
School Demographics

School	Condition[a]	*N*	School size	Eligible students	Participation rate (%)	Leader teaching experience[b]	Leader at school[b]
1	1	19	265	170	11.1	15	15
2	1	15	183	51	29.4	28	14
3	1	13	350	350	3.7	1	1
4	1	10	350	350	3.5	15	9
5	1	8	130	52	15.4	3	2
6	2	13	200	75	17.3	5	2
7	2	18	166	60	30.0	31	31
8	2	10	212	104	9.6	9	7
9	2	6	245	64	9.4	2	2
10	2	10	209	175	5.7	18	8
Overall		12.2	231.0	145.1	13.5	12.7	9.1
TB		13	255.6	194.6	12.6	12.4	8.2
Control		11.4	206.4	95.5	14.4	13.0	10.0

Note. $N = 10$. Team building (TB) $n = 5$; control $n = 5$.
[a] TB = 1; control = 2. [b] Given in years.

fices) assessed at the conclusion of the intervention significantly discriminated between those in the TB versus the control groups, Wilks' $\lambda(5) = .598$, $p < .001$. The canonical correlation was .634, indicating that the five factors accounted for 40.2% of the variance. An examination of the standardized discriminant function coefficients (see Table 5) revealed that the TB factor of group distinctiveness was the strongest predictor of group membership. Overall, a total of 79.8% of the participants were correctly classified. Of those placed in the TB group, 84.6% were correctly classified and of those placed in the control group, 74.5% were classified correctly.

External observations and participant perceptions—TB protocol. An evaluation of the implementation of the TB component included both the direct observations of researchers (interrater reliability = 97%) and the perceptions of the participants. In terms of the former, site visit observations revealed that TB sites implemented an average of 6.6 ($SD = 2.61$) out of an average of 10.0 ($SD = 1.41$) TB strategies across the five sites. There also was evidence that some of the TB strategies were being implemented unintentionally in the control sites, but to a lesser extent ($M = 2.2$, $SD = 0.84$). A further comparison between the researchers' observations and the intended protocols within the

Table 4
Summary of Hierarchical Multiple-Regression Analysis of Group, Baseline ATG–T, and the Five TB Factors Predicting ATG–T

Variables entered	*R*	R^2	R^2 change	Significant *F* change	Significant *F* model
1. ATG–T Baseline	.32	.10	.10	.001	.001
2. Group	.38	.15	.05	.025	.000
3. Group distinctiveness, group norms, individual positions, communication/interaction, individual sacrifices	.53	.28	.13	.008	.000

Note. Overall model, $F(7, 91) = 5.02$, $p < .001$. Beta weights and p values for the predictors in the overall model are as follows: ATG–T baseline = .15, $p = .14$, group = .09, $p = .45$, group distinctiveness = .03, $p = .80$, group norms = .14, $p = .15$, individual positions = .03, $p = .80$, communication/interaction = .28, $p = .01$, individual sacrifices = .09, $p = .35$. ATG–T = individual attractions to group task; TB = team building.

Table 5
Discriminant Function Analysis of TB Factors by Group

TB factor	Sample *M* (*SD*)	TB *M* (*SD*)	Control *M* (*SD*)	Standardized discriminant function coefficients
Group distinctiveness	5.2 (1.77)	6.2 (.94)	4.1 (1.81)	.95
Group norms	5.0 (1.50)	5.4 (1.14)	4.5 (1.69)	.12
Individual positions	4.9 (1.57)	5.1 (1.49)	4.8 (1.67)	–.26
Communication/interaction	6.0 (1.07)	6.2 (1.01)	5.8 (1.10)	–.08
Individual sacrifices	5.4 (1.65)	5.9 (1.37)	4.8 (1.76)	.30

Note. TB = team building.

TB sites revealed that 89% of the leader-identified TB protocol strategies were being implemented as intended, with values ranging from 75% to 100% across the five sites.

An assessment of the participant's perceptions of the TB protocol components (averaged across the five TB sites) revealed that 81% of the TB protocol strategies were perceived to be present by the participants in the TB groups. In comparison, only 21% of the other TB protocol strategies (i.e., TB strategies not identified for a given TB site) were perceived as present by the TB participants. Further, when TB protocol strategies were viewed as present by the TB participants, they were perceived with an average frequency of 5.43 (0.33). By contrast, the unintentional implementation of the other TB protocol strategies at each TB site were perceived by participants much less frequently ($M = 3.86$, $SD = 0.45$).

Consistent with the findings that TB strategies also were observed by the researchers at the control sites, control participants reported perceiving 43% of the TB strategies being implemented at the control sites (averaged across all five control sites), with an average frequency of 3.97 (0.71).

External observations—Standardized exercise component. Based on the researchers' observations at the site visits, it was concluded that all instructors had implemented the standardized exercise program correctly in terms of content and duration as specified in the program booklet.

Discussion

This study is the first, to our knowledge, to evaluate the mechanisms designed to increase cohesion in an established, conceptually driven TB model (e.g., Carron & Spink, 1993; Spink & Carron, 1993; Watson et al., 2004). Findings offered support for the first hypothesis as the five manipulated TB mechanisms collectively contributed to the prediction of the proposed outcome of task cohesion (ATG–Task) after controlling for baseline levels of task cohesion and group membership. In addition to offering support for the key TB mechanisms housed within Carron and Spink's (1993) TB conceptual framework, the findings address calls to clarify relationships (i.e., key mechanisms) between the independent and dependent variables within TB interventions (Brawley & Paskevich, 1997). Furthermore, the results provide researchers and practitioners with helpful information to enhance our understanding of why this particular TB intervention might work.

An important goal of intervention research (cf. Baranowski et al., 1998; Brawley & Paskevich, 1997) is a better understanding of the key processes contributing to the changes in the proposed outcome. Although previous research in exercise and sport settings using this TB model have examined the effects of the overall intervention on the proposed outcome of cohesion (e.g., Carron & Spink, 1993; Estabrooks & Carron, 1999; Newin et al., 2008; Spink & Carron, 1993; Watson et al., 2004), this study extends this to include the examination of the relationship between the actual mechanisms (e.g., five TB factors) used in the intervention and the proposed outcome (e.g., task cohesion).

Although the TB factors collectively contributed unique variance to cohesion in the present study, a closer look revealed that the best predictor of cohesion was communication/interaction. The emergence of communication/interaction may not be surprising given the substantial support for its significant contribution to the development of cohesion within both the group dynamics (Festinger, 1950; Zander, 1982) and

sport psychology (Sullivan & Feltz, 2003; Widmeyer & Williams, 1991) literature.

An examination of the beta weights revealed that the remaining four TB factors (i.e., group distinctiveness, group norms, individual positions, and individual sacrifices) did not appear to contribute individually to the prediction task cohesion (ATG–Task). Although these results are perplexing, some possible explanations are as follows. First, it may simply be the case that these four TB factors are less important in developing task cohesion. Second, given the fact that the TB model suggests that three of these four factors are seen as inputs (i.e., they are part of the group environment and group structure) that influence communication/interaction (i.e., the throughput), it is possible that the latter construct subsumed most of the variance from these inputs. Third, it also is possible that these four factors are less important because of the youth sample examined. Given that this was the first attempt to evaluate an intervention of this type, future research is necessary to determine the plausibility of these speculations.

In addition to the examination of the proposed mechanisms within the intervention, a process evaluation of the two key aspects of the intervention (i.e., TB component and standardized exercise program) also was undertaken. In the present study, evaluation of the group-based intervention from the perspective of both participants and researchers indicated that the two distinct components were implemented as prescribed.

The TB evaluation findings provided support for the second hypothesis as the five manipulated TB factors housed within the TB conceptual framework differentiated participants in the TB and control groups. The results also lend empirical support for the inclusion of these five TB factors within Carron and Spink's (1993) TB conceptual model, as the five TB factors collectively contributed unique variance in the prediction of task cohesion (ATG–T) after controlling for baseline values of task cohesion and group membership (TB or control). The fact that the factor of group distinctiveness appeared to contribute most to the discriminant function equation may not be too surprising. Similar to previous research exploring group distinctiveness in other settings (cf. Cialdini et al., 1976), strategies to enhance the distinctiveness of each group were often visible and tangible for the TB participants. For example, examination of the list of TB strategies generated by the leaders reveals the items identified in this category were very visible (e.g., group music, group water bottle—see Table 1), which supports greater visibility as a possible explanation for the emergence of group distinctiveness.

From an interventionist's perspective, both the standardized exercise component and the TB component were implemented as instructed as evidenced by the consistency of findings between the study participants and the direct observations by the researchers of the intervention. This speaks to the fidelity of the implementation of the intervention on the part of the exercise instructors within the youth exercise setting.

To build on this research, several future directions should be considered. First, given the preliminary nature of the findings, further research should probe into the aspects of the group and the TB factors that youth find most appealing in comparison to adult exercise samples. Second, future TB evaluation research may wish to examine the potential sequential nature of the proposed meditational processes in Carron and Spink's (1993) conceptual framework. Within this model, the group factors (environment, structure, processes) are presented linearly. The desired outcome of cohesion is assumed to be influenced directly by group processes (throughputs) and indirectly by the group environment and group structure (inputs). The findings of this study would appear to support the recommendation for further research into the potential temporal nature of the model, as communication/interaction (an identified process and throughput in the model) was the most meaningful predictor of task cohesion.

Given that this was a field study, it is not without its limitations. One pertains to the generalizability of the study findings. The participants were youth who were motivated to be active. Given the need to consider the population and context in activity studies (see Baranowski et al., 1998), replication of the findings in activity settings in which it may be assumed that motivation for being active may not be as high (e.g., physical education class) is recommended. Moreover, the exercise preferences of the sample also may limit the generalizability of the results. As reported, over 90% of the participants in both conditions reported prefer-

ring to be active with others in a group setting. Given that exercise preferences have been identified as important in another activity study examining psychosocial correlates (Wilson & Spink, 2009), prompts the question of whether preference for being active with others or alone might interact with the TB protocol. This awaits further research.

A second set of limitations relates to the measures used in the study. The task cohesion measures exhibited lower reliabilities. This may have been due to the negative wording of some of the items in the measures or the sample examined. Recent research examining changes to the wording of several questions on the GEQ from negative to positive has found improvements in the reliability of the measure (Eys, Carron, Bray & Brawley, 2007). Despite efforts to modify and pilot the task cohesion measure (Bruner & Spink, 2006), the appropriateness of the measure with the sample also may have been an issue. Future researchers may wish to evaluate task cohesion using the newly developed Youth Sport Environment Questionnaire (YSEQ; Eys, Loughead, Bray, & Carron, 2009). Unlike the measure of cohesion used in this study (GEQ; Carron et al., 1985), the YSEQ has been psychometrically constructed and validated using a youth sample.

Another limitation may have been the use of single items to evaluate the five TB factors. However, it is worth noting that single item measures have been found to possess high reliability and validity as well as increased feasibility and practicality in the assessment of other psychosocial constructs (e.g., satisfaction, stress; Dolbier, Webster, McCalister, Mallon, & Steinhardt, 2005; Elo, Leppanen, & Jahkola, 2003). Further, the single items used in this study appeared to be clear enough to capture what was intended by the measure, as suggested by the participants' high perceptions of the TB items (81%), as well as the items being related to their constructs as predicted. An additional limitation concerns the level of scrutiny of the TB strategies used. In this study, each TB instructor was empowered to select the TB strategies the instructor felt were most appropriate for his or her exercise club. Although the rationale for giving the instructors autonomy over the TB strategies implemented at their site (rather than having one uniform TB protocol for the five TB sites) was grounded in previous literature in organizational and educational psychology (Cartwright & Zander, 1968; de Charms, 1976), the specific strategies selected to target task cohesion were not subjected to specific feedback from TB experts.

Although acknowledging these limitations, the study also possesses a number of strengths. This study represents the first, to our knowledge, to examine the relationship between the specific TB mechanisms within Carron and Spink's (1993) TB conceptual framework and the proposed group outcome of cohesion. Second, the study design is unique as it involved the implementation of two separate components in the intervention (1) TB protocol and (2) standardized exercise program. The inclusion of a standardized exercise program for both conditions represented an improvement in design from previous research using this model, and permitted an examination of the TB conceptual framework on task cohesion. This builds on past research in which the best that could be concluded was that cohesion effects were associated with a combination of the TB protocol and the exercise program (Carron & Spink, 1993). In addition, the study addressed the relative absence of evaluation in the TB activity literature (Brawley & Paskevich, 1997). Further, the study considered multiple perspectives (i.e., participants, researchers) when examining and evaluating the implementation of the two distinct components of the intervention. The evaluation of the intervention revealed that the TB protocol was consistent with the theoretical framework guiding the intervention and appropriate for a youth sample. Another strength of the study was the inclusion of a baseline or run-in period at the onset of the intervention. The addition of a run-in period provided an opportunity for baseline assessment as well as participants a chance to be in an established group setting prior to the intervention. In concert, these strengths advance theory and science-based practice in the development and implementation of successful group-based interventions targeting youth.

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