

Transformational Teaching and Adolescent Self-Determined Motivation, Self-Efficacy, and Intentions to Engage in Leisure Time Physical Activity: A Randomised Controlled Pilot Trial

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Based on transformational leadership theory, we generate and test a teacher development intervention designed to modify physical education teachers' transformational teaching behaviors, and their adolescent students' self-determined motivation, self-efficacy, and intentions to be physically active. Using a randomised control group design (11 teachers, 286 students in the experimental group; 16 teachers, 395 students in the control group), the intervention involved a 1-day experiential workshop with a booster session 2 months later, and with post-test measurements at 2- and 4-months post-workshop. After controlling for baseline measures, adolescents in the intervention condition rated their teachers as displaying significantly higher levels of transformational teaching, and reported significantly higher levels of self-determined motivation, self-efficacy, and intentions to be physically active than those in the control group at the first post-test. Significant between-group differences in students' reports of transformational teaching and their own self-determined motivation remained at the second post-test measurement.

Keywords: adolescents, education, randomised controlled trial, social cognition, transformational leadership

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INTRODUCTION

Over the past two decades the study of transformational leadership has been extensive (Bass & Riggio, 2006). In a recent review, Barling, Christie, and Hopton (2010) reported that within the field of applied psychology more attention has been devoted to transformational leadership during this time than any other theory of leadership. Across a range of work contexts, transformational leadership is consistently associated with improved employee outcomes such as elevated self-efficacy (Avolio, Zhu, Koh, & Bhatia, 2004; Felfe & Schyns, 2002), commitment (Meyer, Stanley, Herscovitch, & Topolnytsky, 2002), intrinsic motivation (Piccolo & Colquitt, 2006), well-being (Arnold, Turner, Barling, Kelloway, & McKee, 2007), as well as performance (Judge & Piccolo, 2004). According to Bass (1997), transformational leadership theory represents a universal paradigm that transcends both organisational and national/cultural boundaries, with studies conducted in diverse business, military, government, and educational sectors. It is the potential applicability of transformational leadership to this latter context, namely *education*, to which we turn our attention in this study.

Transformational leadership involves behaviors that transcend one's own self-interests with the purpose of empowering, inspiring, and challenging others to achieve a higher level of functioning (Bass, 1997). Transformational leadership has most consistently been conceptualised as comprising four behavioral components or dimensions. *Idealized influence* takes place when leaders foster trust and respect among others, and model ethically desirable behaviors through the demonstration of personally held beliefs. *Inspirational motivation* involves the communication of high expectations, through which leaders inspire and energise others to achieve their goals. *Intellectual stimulation* involves encouraging others to see issues from multiple perspectives, and question their own and others' commonly held assumptions. Finally, *individualized consideration* takes place when leaders respond to the personal and psychological needs of others, and display a genuine sense of care and concern (Bass, 1997).

In the context of education, transformational leadership research has primarily centered on the influence of school principals' behaviors on teachers (e.g. Bogler, 2001; Koh, Steers, & Terborg, 1995; Ross & Gray, 2006), and not on the influence of teachers in relation to students' development and behavior. For example, in one study, Koh et al. (1995) examined the effects of school principals' behaviors in relation to teacher attitudes and student academic performance. They found that transformational behaviors by school principals was significantly related to improved teacher satisfaction, commitment, and citizenship behaviors, although transformational leadership among principals had no direct effect on measures of student performance. Koh et al. did not assess the effects of class teachers' behaviors on student

outcomes. Nevertheless, transformational leadership theory holds considerable potential for understanding the effects of teachers' behaviors in relation to the adaptive development of children and adolescents within school contexts. Extension of transformational leadership to teachers' transformational behaviors is predicated on the notion that irrespective of context, leadership is concerned with the processes through which individuals in a given social structure influence others to achieve some set of objectives (Northouse, 2001). Within the educational context, teachers are employees, and influencing others (i.e. students) reflects a core performance expectation.

Recent research by Beauchamp and his colleagues extended this conceptual framework to provide a basis for understanding the influence of school physical education teachers' transformational behaviors on adolescents' cognitive, affective, and behavioral outcomes (Beauchamp et al., 2010; Morton, Keith, & Beauchamp, 2010). Physical education teachers play a vital role in promoting health-enhancing behaviors (e.g. physical activity) among students, both during school hours and beyond (i.e. leisure time activity), and also support students' cognitive, social, and emotional development (Pate et al., 2006; Trudeau & Shephard, 2008). Physical activity in childhood and adolescence is not only related to a number of physical and mental health benefits among this population (Warburton, Nicol, & Bredin, 2006), but also predicts subsequent health status in adulthood (Menschik, Ahmed, Alexander, & Blum, 2008). In spite of the potential for schools more generally, and physical education teachers in particular, to positively influence adolescent involvement in health-enhancing behaviors, the prevalence of inactivity in North America among this population continues to grow (Cameron, Wolfe, & Craig, 2007; Shanklin et al., 2008). Thus, understanding how teachers, through displays of transformational leadership, potentially influence adolescent engagement in physical education/activity represents a particularly worthwhile research endeavor.

Initial research using focus groups and follow-up interviews within the context of school-based physical education revealed that teachers' use of transformational teaching behaviors (reported by students) was associated positively with students' cognitive (i.e. beliefs and attitudes towards physical education, motivation towards physical education and physical activity), affective (i.e. enjoyment of physical education, satisfaction with the teacher), and behavioral (in-class physical activity, leisure time physical activity) responses (Morton et al., 2010). In a subsequent study with 2,761 grade 8–10 adolescents using multilevel modeling procedures, Beauchamp et al. (2010) found that 19 per cent of the variance in adolescent positive affect and 11 per cent of the variance in adolescent self-determined motivation towards physical education classes was explained by adolescents' perceptions of their teachers' transformational behaviors. In both cases the majority of variance was explained at the individual level, although significant variance in affect and

motivation was also explained at the class level. This finding suggests that teachers may be able to foster (a) more autonomous motives and student enjoyment through their personal (individual-level) interactions with students, and (b) class (group-level) improvements in student motivation and affect via the development of a motivational climate of self-determination and enjoyment. Clearly, teachers' use of transformational behaviors is associated with more adaptive student behaviors. Thus, using a randomised control group design, the goal of this study is to design, implement, and evaluate an intervention program to enhance transformational teaching behaviors among physical education teachers.

ENHANCING TRANSFORMATIONAL TEACHING: THE PRESENT STUDY

A growing body of research within organisational psychology has consistently demonstrated that transformational leadership behaviors can be developed through intervention, and result in moderate to large effects in terms of improved attitudinal and behavioral responses among employees (Avolio, Reichard, Hannah, Walumbwa, & Chan, 2009). The overall purpose of this study was to test the efficacy of an intervention to enhance physical education teachers' transformational behaviors, as rated by their students (proximal outcome), and key social cognitions associated with physical activity involvement among adolescents (distal outcomes).

In terms of the study's proximal outcome, Kelloway and Barling (2000) presented a conceptual framework for delivering transformational leadership interventions that held particular relevance for this study. Kelloway and Barling's framework drew heavily on social learning theory (Bandura, 1986), and in developing transformational leadership interventions, emphasised the importance of demonstrating what transformational behaviors look like in practice, providing opportunities to carry out those transformational behaviors, and receiving feedback on the performance of those behaviors. Such an approach shares many similarities with action theory based training (Freese & Zapf, 1994), whereby leader trainees "learn by doing" (Freese, Beimel, & Schoenborn, 2003). Given findings that transformational behaviors can be fostered through short-term interventions that use this framework (Barling, Weber, & Kelloway, 1996), we predicted that following the intervention, physical education teachers in the experimental condition would be rated as being more transformational by their students relative to teachers in the control condition (Hypothesis 1).

It would avail little if we could design and implement interventions to enhance transformational behaviors if there was no subsequent improvement in followers' outcomes. Thus, we assess whether the intervention leads to changes in adolescents' self-determined motivation, self-efficacy beliefs,

and intentions to be physically active in their leisure time. From a conceptual perspective, Sheldon, Turban, Brown, Barrick, and Judge (2003) suggested that transformational leaders appeal to followers' values, provide concerted opportunities for them to feel autonomous (rather than feel controlled) and, as a result, followers tend to display more self-determined (or intrinsic) motivation (cf. Deci & Ryan, 1991). From an empirical perspective, research conducted within sport teams (Charbonneau, Barling, & Kelloway, 2001), and more recently in education contexts (Beauchamp et al., 2010), has provided support for these theoretical assertions. Nevertheless, both of these studies were correlational in nature, and research has yet to test the causal nature of these theoretical postulates using experimental designs. Because followers' self-determined motivation is associated with leaders' use of transformational leadership (Charbonneau et al., 2001), and self-determined motivation is a critical predictor of improved physical activity behaviors both within school physical education contexts (Lonsdale, Sabiston, Raedeke, Ha, & Sum, 2009; Standage, Duda, & Ntoumanis, 2006) and during out-of-school hours (Cox, Smith, & Williams, 2008), we focused on self-determined motivation as a distal outcome of the intervention. Specifically, we predicted that students in the intervention condition would report higher levels of self-determined motivation relative to students in the control condition (Hypothesis 2).

The second social cognition that we targeted as a distal outcome corresponded to adolescents' self-efficacy beliefs (Bandura, 1997). A vast amount of evidence suggests that across the lifespan, self-efficacy beliefs predict greater physical activity participation (McAuley & Blissmer, 2000). One of the key postulates outlined by transformational leadership theory is that when people lead through the demonstration of transformational behaviors, they empower others, instilling in them the confidence to accomplish required tasks (Bass, 1998). Kark, Shamir, and Chen (2003) found support for this hypothesis: When bank employees rated their manager as displaying higher levels of transformational leadership, they more closely identified with that leader, and subsequently reported improved feelings of empowerment. Using a field-based experimental approach, research has also provided support for this empowerment hypothesis (i.e. linking transformational behaviors to self-efficacy enhancement among others) within military settings (Dvir, Eden, Avolio, & Shamir, 2002). Thus, based on theory (Bass, 1998) and previous research with adults within occupational settings (Dvir et al., 2002; Kark et al., 2003), we predicted that school students in the intervention condition would display higher levels of self-efficacy beliefs to complete the requisite within-class physical activities relative to students in the control condition (Hypothesis 3).

The final social cognition that we targeted corresponded to students' intentions to take part in physical activity during their free time. To be optimally

effective, school-based physical education should promote physical activity participation outside of school hours (Pate et al., 2006). Consistent with tenets proposed by the theory of planned behavior (Ajzen, 1991), intentions to be physically active have been shown to prospectively predict physical activity behaviors among children and adolescents (Rhodes, MacDonald, & McKay, 2006). Furthermore, from the perspective of transformational leadership theory, when leaders display transformational behaviors, followers often exceed expectations (Bass & Riggio, 2006). Thus, we predicted that students in the intervention condition would report improved intentions to be physically active during their own leisure time (Hypothesis 4).

Taken together, the intervention is evaluated in terms of students' perceptions of their teachers' transformational behaviors, and students' social cognitions. In addition, we also conducted a process evaluation of the effects of the intervention. To do so, teachers in the intervention condition were interviewed to examine content ("what is done") and process ("how it is done") fidelity of program implementation, and the extent to which the intervention meets the needs of those involved (i.e. teachers; Dumas, Lynch, Laughlin, Smith, & Prinz, 2001; Plummer et al., 2007). Without any assessment of intervention fidelity, internal validity is potentially compromised (Dumas et al., 2001). Furthermore, as Plummer and colleagues (2007) note, process evaluations provide additional information on program outcomes, and ways in which they might be enhanced if there are program design or implementation problems. In this study, interviews with teachers were conducted following the second post-test assessment to enable an appraisal of the intervention and, where appropriate, further modify this for future initiatives (Collins, Murphy, Nair, & Strecher, 2005).

METHODS

Participants and Recruitment

After obtaining ethical and school board approval, 20 secondary schools from two school districts from the lower mainland of British Columbia (Canada) were randomly assigned to either the intervention or attention-control conditions (described below), and were subsequently invited to participate in this study. Potential schools were stratified by school district to ensure an equal number in each condition. Only physical education teachers of Grade 9 students were targeted for inclusion in this study for two primary reasons. First, it is mandatory in Canada for all grade 9 students to take part in physical education, and thus it was anticipated that a range of motivation-related cognitions and behaviors would be observed. It is also around this age (i.e. in the mid-teens) that notable declines in physical activity occur (Boreham & Riddoch, 2001). Eleven physical education teachers from seven

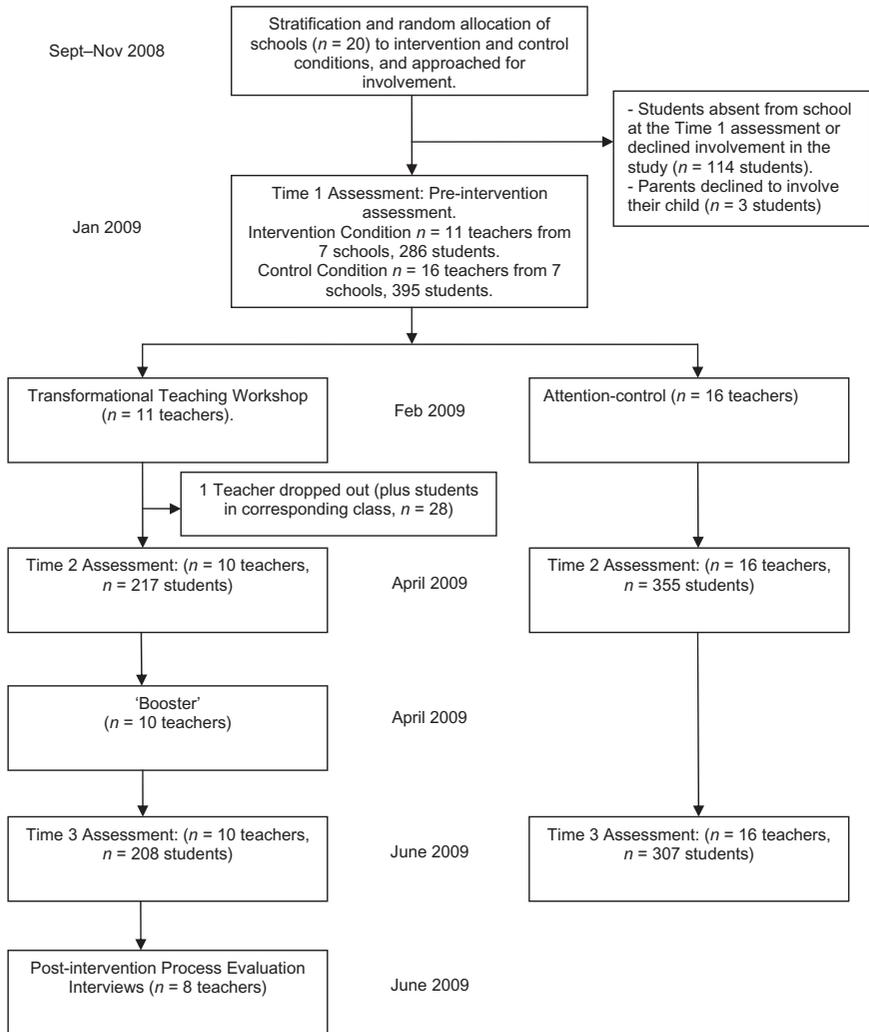


FIGURE 1. Participant flow through the study.

schools participated in the intervention condition, and 16 physical education teachers from seven schools participated in the control condition (see Figure 1). Eighteen of the 27 teachers were male and nine were female (M age = 41.33 years, $SD = 9.49$; range 24 to 56). Teachers had, on average, 14.65 years of teaching experience ($SD = 8.62$).

After teachers had agreed to participate in the study, students from their respective grade 9 classes were invited to participate as well (these classes

were selected with due consideration given to teachers' respective schedules/timetables). Only one grade 9 class per teacher was sampled. Passive consent was obtained from parents, who were provided the opportunity to opt their child out of the study, and active informed consent was provided by adolescents. In total, three children were opted out of the study by their parents. At baseline (Time 1), 286 (153 male, 132 female, and one did not specify gender) students from 11 classes (corresponding to the 11 teachers in the experimental condition; nine male, two female) were involved in the intervention condition, and 395 (180 male, 213 female; two did not specify gender) students from 16 classes (corresponding to the 16 teachers in the control condition; nine male, seven female) were involved in the control condition. The average age of students at baseline was 14.16 years ($SD = .39$).

Three months after the baseline measures were obtained (i.e. 2 months after the teacher training workshop), we conducted the first follow-up (Time 2) assessment. At this first follow-up, one teacher (and his class of 28 students) from the intervention condition had withdrawn from the study; a trainee teacher had been allocated to teach his grade 9 class, and as a result he was no longer teaching the class from which we collected data at baseline. Thus, at Time 2, 10 teachers remained in the intervention condition (along with 217 students), and the same 16 teachers comprised the control condition (along with 355 students). Two months later at the second follow-up (Time 3) assessment, all of these teachers remained in the study and 208 students from the intervention condition and 307 students from the control condition completed questionnaires for the final time (see Figure 1). To examine whether any differences existed based on those that did not complete the questionnaires at Time 2 and/or Time 3 versus those that did, we conducted a 2 (dropout versus retained at Time 2) \times 2 (dropout versus retained at Time 3) MANOVA with the four study variables as assessed at baseline (transformational teaching, intrinsic motivation, self-efficacy, intention) entered as dependent variables. The multivariate effect for Time 2 was non-significant, as was the multivariate effect for Time 3 ($p > .05$). Furthermore, the multivariate Time 2 \times Time 3 interaction was also non-significant ($p > .05$).

Study Design

The study involved a randomised controlled trial design. Following the randomisation and baseline assessment procedures described above, teachers in the intervention condition were invited to participate in a 1-day (lasting 7 hours) workshop that was scheduled to coincide with a regular in-service training day (referred to as a "Pro-D" day), as well as a subsequent booster session. This workshop occurred 1 month after the baseline measures were obtained (February 2009). Teachers in the control condition took part in parallel workshops offered by their respective school boards, involved the

same amount of contact time, and took place on the same day as the transformational leadership training workshop. It should be noted that the focus of those alternative workshops was unrelated to transformational leadership training (a point that was confirmed by our manipulation check at Time 2; see below). As such, the control procedures constituted an “attention-control” condition (i.e. same time spent training on the Pro-D day but the training did not focus on transformational leadership). We operationalised the control condition in this way so that the relative effects of the transformational teaching intervention could be compared to existing educational practices. Two months (Time 2) and 4 months (Time 3) after the workshop, we collected data on the same measures as at baseline. Immediately after the Time 2 assessment, teachers in the intervention condition participated in a booster session (see intervention description below). Within 2 weeks of the Time 3 assessment, teachers in the intervention condition were interviewed as part of the process evaluation procedures for the trial.

Transformational Teaching Intervention

The intervention was a modified version of Barling et al.’s (1996) transformational leadership training, and was consistent with guidelines established by Kelloway and Barling (2000) for developing transformational leadership interventions within organisational settings. Specifically, the intervention drew from a social learning perspective (Bandura, 1986) by emphasising that transformational leadership training should provide opportunities to (a) acquire conceptual knowledge concerning “what is meant by transformational leadership?”, (b) discuss and identify strategies for utilising transformational behaviors in teachers’ daily interactions with students, and (c) receive feedback on the potential application of these behaviors within teachers’ unique work contexts (Kelloway & Barling, 2000). From the perspective of effective knowledge translation, it has been suggested that interventions are most likely to translate into sustained practice if they are embedded within existing systems (Dzewaltowski, Estabrooks, & Glasgow, 2004). To this end, the delivery of a transformational leadership workshop, administered during a regularly scheduled district-wide school professional development day, was deemed to hold considerable potential from an ecological validity perspective (Shadish, Cook, & Campbell, 2002) especially given the ubiquity of such professional development courses for teachers.

The workshop was led by the second author, and began with teachers being invited to share their personal experiences with optimal (and sub-optimal) leadership and teaching behaviors. This was followed with a general discussion of the very best and worst behaviors exemplified by teachers and leaders. Teachers were then provided with an overview of the concepts of transformational leadership and its subcomponents (i.e. idealized influence, inspirational

motivation, intellectual stimulation, individualized consideration). Teachers watched several short video clips, were provided with a series of short stories (each of which depicted different transformational behaviors in action), and discussed how transformational leadership works in practice. Actual examples from educational, business, politics and sports contexts describing how each of these leadership styles affects others' behaviors were provided. Teachers were also provided opportunities to share their own experiences, and consider how the information they had learned could be applied to their daily interactions with students. The workshop ended with participants watching the movie, *12 Angry Men* (Fonda, Rose, & Lumet, 1957), after which they were invited to analyze and discuss the transformational leadership behaviors (or lack thereof) of the different characters of the movie. This served to integrate the material presented. Based on Kelloway and Barling's (2000) recommendations, teachers were encouraged to focus their efforts on changes in their everyday teaching behaviors. Two months after the workshop teachers were provided with a series of readings, as a "booster", to reinforce the principles covered within the workshop.

Measures

Transformational Teaching. Students' perceptions of their teachers' behaviors were assessed using the Transformational Teaching Questionnaire (TTQ; Beauchamp et al., 2010). The TTQ was developed specifically for use with adolescents and in school-based education contexts. The 16-item TTQ contains separate subscales designed to measure the four dimensions of transformational teaching, with four items per subscale. Items on the TTQ are prefixed with the stem "My physical education teacher . . ." with exemplar items including "acts as a person I look up to" (idealized influence), "is enthusiastic about what I am capable of achieving" (inspirational motivation), "encourages me to look at issues from different sides" (intellectual stimulation), and "recognises the needs and abilities of each student in the class" (individualized consideration). Responses are anchored on a 5-point rating scale from 0 (not at all) to 4 (frequently). Through use of multilevel confirmatory factor analytic procedures, Beauchamp et al. provided support for the factorial validity of the TTQ, with the most parsimonious operationalisation represented by a higher-order dimension of "transformational teaching", that is measured by scores derived from the four transformational teaching subscales. In this study, mean scores for the four subscales were first derived and were then summed to derive an overall score of transformational teaching (potential scores can range between 0 and 16). In the present study, the overall measure of transformational teaching (including all 16 items) was found to demonstrate sound reliability at each of the three assessment time points (Cronbach α Time 1 = .94, Time 2 = .96, Time 3 = .96).

Self-Determined Motivation. Student motivation was assessed using the intrinsic motivation subscale of the Perceived Locus of Causality (PLOC) scale (Goudas, Biddle, & Fox, 1994). This measure demonstrates sound reliability and factorial validity with adolescents (Standage et al., 2006). Like previous research within physical education contexts, items were prefaced by “I take part in this physical education class . . .”, and a 7-point item response was used that was anchored by 1 (strongly disagree) and 7 (strongly agree). Within the context of self-determination theory (Deci & Ryan, 1991), intrinsic motivation represents the most self-determined form of motivation and, in the PLOC, is assessed with four items (e.g. “because PE is exciting”). In the present study, the intrinsic motivation measure demonstrated acceptable reliability at each of the three assessment points (Cronbach α Time 1 = .90, Time 2 = .93, Time 3 = .93).

Self-Efficacy. Students’ self-efficacy beliefs were assessed using an adapted version of the academic self-efficacy subscale within the Patterns of Adaptive Learning Scales (Midgley et al., 2000). This instrument includes five items that are scored on a 7-point rating scale with anchors ranging from 1 (not at all true) to 7 (very true). Exemplar items include “I’m certain I can master the skills taught in PE class this year”, and “I can do even the hardest work in my PE class if I try”. In the present study, the self-efficacy measure was found to demonstrate acceptable internal consistency at each of the three assessment points (Cronbach α Time 1 = .93, Time 2 = .94, Time 3 = .96).

Intention. Students’ intentions to participate in physical activity during their free time over the ensuing 1-month period was assessed using Chatzisarantis, Biddle, and Meek’s (1997) widely used and psychometrically acceptable three-item instrument. Responses to each of the items were recorded on a 7-point scale, with anchors ranging from 1 (very unlikely) to 7 (very likely); an exemplar item includes “I am determined to exercise/play sport at least 3 times a week during the next month”. In the present study, the intention measure demonstrated good internal consistency at each of the three assessment points (Cronbach α Time 1 = .95, Time 2 = .95, Time 3 = .96).

Manipulation Check

One limitation of previous transformational leadership intervention studies (e.g. Barling et al., 1996) was the lack of a manipulation check ensuring that the nature of the intervention was consistent with transformational leadership. Thus, we invited all teachers to respond to a series of questions about transformational teaching at the Time 2 assessment to determine whether teachers’ knowledge of transformational teaching in the intervention condition was improved relative to those in the control condition. Consistent with

Sivanathan, Turner, and Barling (2011), we developed four short case studies, each of which reflected one of the transformational teaching dimensions.¹ Participants identified which of the four dimensions was represented in each case, through use of a multiple-choice response format.

Process Evaluation

The process evaluation component of this study drew from a qualitative social constructionist perspective (Schwandt, 2000) to understand the beneficial features and problematic components of the intervention in the teachers' own words. For this component of the intervention evaluation, all teachers who participated in the intervention (except for the one teacher who had withdrawn from the study) were invited to be interviewed using semi-structured interview procedures shortly after the Time 3 assessment. Eight out of the ten teachers who completed the intervention agreed to be interviewed (due to scheduling challenges at the end of the school year we were not able to interview the remaining two teachers). All interviews were conducted by the third author (who was not involved in the delivery of the workshop); teachers were asked to (a) recall the content of the intervention, (b) identify strengths and positive aspects of the intervention, (c) suggest ways in which the intervention could be improved, (d) identify how useful the workshop was to them, and (e) highlight aspects of their teaching that have changed as a result of the intervention. Where appropriate, probing and clarification cues were used to facilitate interviewer comprehension. Interviews lasted on average 25 minutes, were subsequently transcribed verbatim, and were inductively analyzed by the third author. Specifically, meaning units (Tesch, 1990) within the data were identified and clustered into conceptually meaningful themes. In addition, a process of peer-review was also used (Krippendorff, 2004), whereby the first author independently coded and clustered meaning units into the aforementioned themes. In any instances of disagreement, the two researchers entered a process of ongoing discussion until full consensus was obtained on the allocation of meaning units to higher order themes.

RESULTS

Manipulation Check

Initial examination of Levene's Test for Equality of variances revealed significant differences between the control and experimental groups ($F = 18.08, p < .001$) on the knowledge of transformational leadership, and

¹ Copies of these case studies are available from the first author upon request.

the subsequent *t*-test accounted for unequal variances. The results revealed that teachers in the intervention condition ($M = 3.70$, $SD = .48$) were significantly more knowledgeable about transformational teaching than those in the control condition ($M = 2.81$, $SD = 1.56$), $t(19.21) = 2.12$, $p < .05$.

Outcome Evaluation

Prior to conducting our main analyses, and in light of the fact that less than 2 per cent of the data were missing from all the study variables across all three time points, we replaced missing score values using their respective scale means (see Donner, 1982). Descriptive statistics, including unadjusted means, standard deviations, and intercorrelations among the study variables at all three time points are presented in Table 1.

Proximal Outcome Measures. To examine the effects of the intervention, we conducted separate ANCOVAs with the intervention condition as the independent variable, pre-test measures of transformational teaching as the covariate, and post-test measures (separate analyses for Time 2 and Time 3) of transformational teaching as the dependent variable.² The results revealed that at Time 2, teachers in the intervention condition were reported by students as displaying significantly higher levels of transformational teaching ($M = 11.64$, $SE = .16$) than teachers in the control condition ($M = 11.18$, $SE = .13$), $F(1, 566) = 5.52$, $p = .03$, $\eta^2 = .01$. Teachers in the intervention condition were also reported as displaying greater transformational teaching ($M = 11.92$, $SE = .18$) at Time 3 than those in the control condition ($M = 11.38$, $SE = .14$), $F(1, 508) = 5.41$, $p = .02$, $\eta^2 = .01$, again controlling for pre-intervention transformational teaching scores.

Distal Outcome Measures. To examine the effects of the intervention on students' social cognitions, we conducted two sets of MANCOVA; one for Time 2 and one for Time 3 outcomes after controlling for baseline levels, with (a) condition as the independent variable, (b) post-test measures of intrinsic

² We recognise that the data collected in this study were nested (students nested within classes). However, given the small sample size at Level 2 (Maas & Hox, 2005) in this pilot study, it would not have been feasible to analyze the data using multilevel modeling procedures. Indeed, after accounting for the one teacher who dropped out of the intervention condition by Time 2, only 10 teachers (and classes) comprised the intervention condition and 16 teachers (and classes) comprised the control condition. Parenthetically, the intra-cluster correlations (ICCs) for the study's dependent variables across both the intervention and control classes were as follows: Intrinsic Motivation (Time 1 = .0851, Time 2 = .1270, Time 3 = .1161); Self-Efficacy (Time 1 = .0299, Time 2 = .0513, Time 3 = .0424); Intention (Time 1 = .0754, Time 2 = .0908, Time 3 = .0726). For the transformational teaching construct (independent variable), the ICCs were .1440 (Time 1), .1925 (Time 2) and .1619 (Time 3).

TABLE 1
Unadjusted Means, Standard Deviations, and Intercorrelations among the Study Variables for the Intervention and Control Groups

| | Intervention | | Control | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
|------------------------------|--------------|------|---------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|--|
| | M | SD | M | SD | | | | | | | | | | | | | |
| <i>Baseline (Time 1)</i> | | | | | | | | | | | | | | | | | |
| 1. Transformational Teaching | 11.64 | 3.27 | 10.82 | 2.87 | — | | | | | | | | | | | | |
| 2. Intrinsic Motivation | 5.17 | 1.45 | 4.78 | 1.50 | .49 | — | | | | | | | | | | | |
| 3. Self-efficacy | 5.52 | 1.33 | 5.31 | 1.33 | .34 | .57 | — | | | | | | | | | | |
| 4. Intention | 5.73 | 1.57 | 5.26 | 1.64 | .25 | .44 | .53 | — | | | | | | | | | |
| <i>Post-test (Time 2)</i> | | | | | | | | | | | | | | | | | |
| 5. Transformational Teaching | 12.08 | 3.33 | 10.90 | 3.19 | .70 | .44 | .34 | .21 | — | | | | | | | | |
| 6. Intrinsic Motivation | 5.36 | 1.46 | 4.78 | 1.50 | .48 | .82 | .48 | .42 | .55 | — | | | | | | | |
| 7. Self-efficacy | 5.68 | 1.18 | 5.37 | 1.26 | .31 | .51 | .72 | .50 | .32 | .57 | — | | | | | | |
| 8. Intention | 5.90 | 1.45 | 5.40 | 1.63 | .26 | .48 | .54 | .61 | .30 | .50 | .60 | — | | | | | |
| <i>Post-test (Time 3)</i> | | | | | | | | | | | | | | | | | |
| 9. Transformational Teaching | 12.38 | 3.19 | 11.06 | 3.48 | .68 | .47 | .28 | .21 | .84 | .54 | .35 | .31 | — | | | | |
| 10. Intrinsic Motivation | 5.42 | 1.37 | 4.83 | 1.50 | .47 | .77 | .49 | .41 | .52 | .87 | .57 | .50 | .59 | — | | | |
| 11. Self-efficacy | 5.67 | 1.19 | 5.35 | 1.42 | .37 | .59 | .71 | .50 | .40 | .61 | .77 | .56 | .43 | .68 | — | | |
| 12. Intention | 5.86 | 1.40 | 5.38 | 1.74 | .25 | .43 | .53 | .61 | .33 | .48 | .55 | .73 | .28 | .46 | .53 | — | |

Note: All bivariate correlations are significant at $p < .001$.

motivation, self-efficacy, and intentions as dependent variables, and (c) pre-test measures of those social cognitions as covariates. The multivariate effect of the intervention at Time 2 was significant, $F(3, 523) = 3.19$, Wilks' Lambda = .98, $p = .02$. Subsequent ANCOVAs revealed that at Time 2, students in the intervention condition (a) were more intrinsically motivated ($M = 5.14$, $SE = .06$) than those in the control condition ($M = 4.95$, $SE = .05$), $F(1, 546) = 6.14$, $p = .01$, $\eta^2 = .01$, (b) had higher levels of self-efficacy ($M = 5.61$, $SE = .06$) than those in the control condition ($M = 5.44$, $SE = .05$), $F(1, 558) = 4.70$, $p = .03$, $\eta^2 = .01$, and (c) displayed higher intentions to be physically active in their free time ($M = 5.75$, $SE = .08$) compared with those in the control condition ($M = 5.55$, $SE = .06$), $F(1, 552) = 4.42$, $p = .04$, $\eta^2 = .01$.

In the second MANCOVA, with Time 3 measures of intrinsic motivation, self-efficacy, and intentions entered as dependent variables, and baseline measures as covariates, the overall multivariate effect was again statistically significant, $F(3, 475) = 3.51$, Wilks' Lambda = .98, $p = .02$. Subsequent univariate ANCOVAs revealed that students in the intervention condition reported significantly greater intrinsic motivation ($M = 5.21$, $SE = .07$) at Time 3 than those in the control condition ($M = 4.96$, $SE = .06$), $F(1, 495) = 7.92$, $p = .01$, $\eta^2 = .02$. However, after controlling for covariates, there was no significant difference in the self-efficacy beliefs or intentions of students in the two conditions ($p > .05$).

Process Evaluation

Intervention Relevance. Six of the eight teachers in the intervention condition emphasised that the intervention was of direct relevance to their work as teachers. One participant reported, "There is a good transfer . . . I guess the business world to almost anything, a leader's a leader, it doesn't matter where you are"; another stated, "The whole transformational leadership stuff that we had talked about seems to resonate with what I think about in terms of teaching and you know, getting to know the kids. It's not all about curriculum and stuff but it's about how I'm connecting with the individual kids within my classes." Another suggested, "I think it would be something that's worthwhile introducing to teachers before they get into practice 'cos I think if you can introduce that as part of the vernacular of education and these kinds of things then I think when you re-visit it at other stages in their careers then it's already there, they are speaking the language and they already are open to the ideas."

Intervention Utility. All eight teachers commented on the utility of the intervention. One teacher noted that "it just gave me different strategies or different ways or different ideas to communicate with my students and my

kids, so yeah, I was engaged the whole time. That's why I felt so happy to be there and learning so much from it because it just, you know, reinforced a lot of important things for me." Another reported, "It just made me take a real look at how I handle things and whether I'm doing them the right way or maybe there's a way I can do it better", while a third stated, "I thought it was great. I thought it was useful too, for me to reflect on how I teach, and I did bring that back . . . I think I took a lot away from it."

Several teachers also emphasised their concerted efforts to alter the way in which they interacted with their students as a direct result of the workshop. One teacher recalled, "I think, I'd sort of fallen into, you know, just so concerned about doing all the tasks that are involved in teaching. You know, I think my face-to-face time, one-on-one time with students has changed somewhat. I am more cognizant of trying to find out more about their personal lives and what they're doing." Similarly, another suggested that "it (the workshop) made you kind of think of getting everybody involved as opposed to the easy ones to work with . . . and critically, kind of look back on what and how you do it and maybe you walk in the next day and try to do one thing a little bit differently."

Follow-Up Support. Beyond commenting on the workshop's relevance and utility, the teachers in the intervention condition also offered suggestions to enhance future interventions. One issue noted by six of the eight teachers focused on providing follow-up support for the teachers once the workshop had ended and teachers were back in schools. One teacher noted, "I wrote notes, and I mean a lot of notes, to put it into practice. I think we need more time rather than just the one day, so that would possibly be something that we need, a follow up or something", while another suggested, "we have enough Pro-D days that it could be sort of a three-session thing, so it doesn't have to be all in one go".

Goal Setting and Self-Regulatory Considerations. Four of the eight teachers interviewed suggested that the intervention incorporate a formalised goal-setting component in order to direct teachers' efforts and facilitate greater self-regulation of their transformational teaching behaviors. One teacher suggested, "I think maybe trying to reduce it down into one or two things that you could say, 'that is something I don't do very much but I'd like to do it more' so then 'how can I do it more', 'what does that look like in the classroom' ". In a similar regard, another teacher remarked, "I wonder if we should have gone around and got people to write just two points about the main thing and then everyone could share them and say, like what are two things you are taking away from this today."

Additional Opportunities to Interact and Share Experiences. Five of the teachers suggested that while the workshop offered some opportunities for

teachers to interact and share ideas with others, this aspect of the workshop could be improved in any subsequent intervention. One teacher noted, "I think there was room for more discussion . . . You know, how would we actually implement it [transformational teaching] in a one-on-one situation or teacher and classroom setting?" Another stated, "That was a room full of interesting people. I would have liked to have had more of an opportunity to kind of, share more ideas."

DISCUSSION

The overall purpose of this study was to extend transformational leadership theory to the context of education, and develop and test the efficacy of an intervention for improving teachers' (transformational) behaviors and adolescents' social cognitions associated with improved physical activity involvement. Several findings are worthy of note. First, the results of this study provided support for Hypothesis 1, insofar as teachers in the intervention were found to display significantly higher levels of transformational teaching at both post-test assessments after controlling for baseline levels. The results also support Hypothesis 2, as students in the intervention displayed higher levels of intrinsic motivation at both post-test assessments relative to those in the control condition. The results provided partial support for Hypothesis 3, whereby self-efficacy was found to be higher among students in the intervention condition at the first post-test assessment, but not at the second post-test assessment. Finally, partial support was also derived for Hypothesis 4, with students in the intervention condition reporting improved intentions to be active in their free time relative to students in the control condition at the first post-test assessment, but not at the second post-test assessment. When taken together, these findings provide initial support for the viability of transformational leadership training with teachers.

To our knowledge, this study represents the first to test the application of transformational leadership theory to educational settings using an experimental design. While some research has examined the effects of transformational leadership within education settings, as previously highlighted, these studies have (a) primarily focused on the effects of principals' transformational behaviors in relation to teacher outcomes, (b) not targeted the transformational behaviors of teachers in relation to student outcomes, and (c) made use of non-experimental designs in which inferences regarding causality are somewhat limited (e.g. Bogler, 2001; Koh et al., 1995, Ross & Gray, 2006). To this end, findings from this study add to our understanding of the breadth of transformational leadership theory in relation to diverse domains of human functioning (Bass, 1997). From an external validity perspective, three findings are worthy of note. First, and consistent with the qualitative findings by Morton et al. (2010), the results of the current research suggest

that teachers' behaviors can be understood within a conceptual framework that directly parallels the (transformational) behaviors used by leaders within other workplace settings. Second, the results suggest that teachers' transformational behaviors are malleable and, as with leaders and managers in workplace settings (Barling et al., 1996; Dvir et al., 2002), can be enhanced through intervention. Finally, the results suggest that adaptive cognitions of adolescent school students can be enhanced through teacher training initiatives guided by transformational leadership theory.

It should be noted, however, that the effect sizes derived in the current research would be considered "small" (Cohen, 1992). That said, it remains important first to establish whether an effect can be derived from a specific intervention, and subsequently to improve and extend the procedures to *maximise* those effects (Shadish et al., 2002). In line with this, it is noteworthy that the improved responses derived from the intervention in this study are consistent with the tenets of transformational leadership theory (Bass, 1997, 1998; Bass & Riggio, 2006), were statistically significant, and when considered together with the qualitative process evaluation findings provide a solid foundation to examine the effects of transformational leadership training with teachers in future research. Specifically, teachers in the intervention condition reported that they found the workshop to be directly "relevant" to their work as teachers and also practically "useful", while also representing a novel approach to considering their teaching behaviors.

Nonetheless, several limitations to the study should be recognised. Indeed, both the process and outcome evaluation findings derived in this study highlight a series of issues that should be considered in future research. First, the most compelling test of theory would be to ascertain the extent to which transformational leadership training (with teachers) affects the subsequent *behaviors* of their students. This was not addressed in the current study. The results of this study provided preliminary evidence to suggest that the behaviors of teachers can be enhanced through such training. The results also suggest that students' intentions to be physically active in their free time can be enhanced. However, we did not assess actual behavioral responses derived from students. Given the critical role that intention plays in influencing subsequent behavior (Rhodes et al., 2006), together with the fact that past research has consistently found transformational leadership to influence employee behavior (Barling et al., 2010), we suggest that transformational teaching behaviors would be related to improved effortful behavior among students both within physical education classes and also outside of those classes (i.e. leisure time). Previous qualitative research provides support for these two propositions (Morton et al., 2010), and future research should assess, again within the framework of a randomised experimental design, whether changes in teachers' transformational behaviors are associated with changes in adolescents' behaviors.

A second limitation relates to the fact that we did not include any assessment of intervention implementation among the teachers in the intervention conditions after the workshop. From the perspective of implementation fidelity, Carroll and colleagues (2007) highlight that the uptake of any intervention depends on the responsiveness (i.e. participant engagement) of those receiving the intervention. It is plausible to suggest that teachers who were motivated to make use of the strategies/behaviors covered within the workshop would be more likely to derive changes in their own behavior than those teachers who were less engaged. In this study, we did not include any measure of teacher engagement and thus are unable to ascertain (other than through the qualitative responses of teachers) the extent to which teachers actively sought to utilise transformational behaviors in their daily interactions with students.

A second limitation corresponds to the intervention itself, and the need to refine the workshop to include specific components that might facilitate the maintenance of behavioral change after the workshop has concluded. Specifically, through the process evaluation interviews that were conducted as part of this study, teachers in the intervention condition suggested that in future we (a) provide teachers with greater support after the workshop has finished, (b) enable teachers to specify a series of goals through which to implement the target transformational behaviors, (c) provide greater opportunities for teachers to interact with others in the workshop, share their ideas, and discuss potential challenges, and (d) provide additional training opportunities, perhaps by delivering the intervention over a series of workshops (i.e. increased dose). When considered alongside the outcome evaluation findings, it is noteworthy that while changes in teacher behavior and student motivation remained at the second post-test assessment, by this time there were no longer any differences between the experimental and control conditions in terms of students' self-efficacy beliefs and intentions to be physically active. This would suggest that efforts designed to maintain and build upon those earlier gains would appear necessary.

Thus, future research is clearly warranted that tests the effects of an enhanced intervention that helps teachers to self-regulate their use of transformational behaviors once they are back in school. Self-regulation is defined as a goal guidance process that involves personal monitoring and implementation of change and maintenance mechanisms that are aimed at task-specific outcomes (Maes & Karoly, 2005). Maes and Karoly outlined a three-component intervention framework to support self-regulation efforts. This included (1) goal-selection and construal, (2) active goal pursuit, and (3) goal attainment and maintenance processes. Consistent with the information derived from the process evaluation interviews, future transformational leadership intervention research in school settings should devote greater attention to address these goal-guidance processes. The use of workbooks (Gortmaker

et al., 1999), telephone-assisted counselling (Estabrooks et al., 2009), or internet-based support (Napolitano et al., 2003) could all be useful in this process.

Future research that examines the predictive utility of the transformational teaching construct in relation to student engagement and academic accomplishment in other school-based subject areas (e.g. sciences, mathematics, languages) and also across the developmental spectrum including younger and older students alike is also warranted. As one example, although we did not assess transactional forms of teacher behavior, characterised by behavioral monitoring and the provision of contingent feedback/rewards (see Bass, 1997), it would be interesting to assess whether transformational forms of teaching *augment* the effects of transactional teaching in explaining adaptive student responses and learning (Bass & Riggio, 2006).

In conclusion, the current study contributes both to applied and educational psychology. Transformational leadership theory has come of age (Barling et al., 2010), and the results of this study add to the burgeoning evidence that transformational leadership theory represents a universal paradigm that can be applied across diverse domains of human functioning (Bass, 1997). In doing so, the possibility that transformational leadership theory may be used to inform human development in educational contexts, and enhance students' physical health and learning before they enter the workplace, represents a new and exciting set of research questions.

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