

1 **Transformational Teaching, Self-Presentation Motives, and Identity in Adolescent**

2 **Female Physical Education**

3

4 **Re-submitted, 2018**

Abstract

This study examined whether teachers' use of transformational teaching behaviours within physical education (PE), as perceived by adolescent girls, would predict girls' moderate-vigorous physical activity (MVPA) via mediated effects of physical activity self-presentation motives, physical activity identity and PE class engagement. Self-report data were acquired at two time points, one week apart, from 273 Scottish high school girls in grades S1-S3 ($n_{S1} = 91$; $n_{S2} = 108$; $n_{S3} = 74$). Significant predictive pathways were found from transformational teaching to girls' MVPA via mediated effects of acquisitive self-presentation motives and physical activity identity. Results are discussed in relation to existing literature and future research directions.

Keywords: leadership, exercise identity, impression motivation, impression construction, physical activity

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21 Globally, the prevalence estimate of physical inactivity among adolescent females
22 exceeds 80% (Hallal, Andersen, Bull, Guthold, Haskell & Ekelund, 2012). Scotland, in which
23 the present study was conducted, recently ranked as least successful in tackling sedentary
24 behaviour and encouraging participation in physical activity among 38 countries in an
25 international study of physical activity levels among youth (Active Healthy Kids, 2016). A
26 significant decrease in female physical activity after age 11 has been identified (Active
27 Healthy Kids Scotland, 2016), with government figures further showing that almost half
28 (47%) of females aged 13-15 years are insufficiently active when assessed against the
29 recommended physical activity guidelines (The Scottish Government, 2015). The Scottish
30 Government has invested £3 million domestically per annum in recent years to increase
31 physical activity in those furthest from meeting national guidelines, including adolescent girls
32 (The Scottish Government, 2014). Inactivity levels among Scottish children and adolescents,
33 however, has been found to be stable over a five-year period of funding (The Scottish
34 Government, 2015).

35 Systematic reviews indicate a paucity of effective strategies to increase child and
36 adolescent physical activity across a variety of environments (Metcalf, Henley, & Wilkin,
37 2012; Morton, Atkin, Corder, Suhrcke, & Van Sluijs, 2016). Metcalf et al. (2012), for
38 example, have asserted that there is “strong evidence that physical activity interventions have
39 had only a small effect (approximately 4 minutes more walking or running per day) on
40 children’s overall activity levels” (p. 1). Specific to adolescent girls, a recent review has
41 highlighted the potential effectiveness of school-based interventions underpinned by theory to
42 positively change adolescent girls’ physical activity (Owen, Curry, Kerner, Newson &
43 Fairclough, 2017). While extant interventions are primarily concerned with behavioural

44 interventions (Metcalf, et al., 2012; Owen, et al., 2017), and given the limited effect exhibited
45 by these, the present work aims to examine the basis for a novel, theory-based psychosocial
46 intervention. The work draws together constructs previously identified as predictors of
47 physical activity, including physical activity identity (Rhodes, Kaushal, & Quinlan, 2016)
48 and physical activity self-presentational motives (Howle, Dimmock, Whipp, & Jackson,
49 2015a; Howle, Jackson, Conroy, & Dimmock., 2015) which we propose may be shaped by
50 transformational teaching behaviour (Beauchamp et al., 2010).

51 The notion of transformational teaching is underpinned by Transformational Leadership
52 Theory (Bass, 1985); an unstudied theory within school-based physical education (PE) until
53 relatively recently (Morton, Keith & Beauchamp, 2010; Beauchamp & Morton, 2011).
54 Transformational leaders aim to “empower and inspire others, transcend one’s own self-
55 interests and give others the confidence to achieve higher levels of functioning” (Beauchamp
56 et al. 2010, p. 1124). The construct is conceptualised as incorporating four dimensions
57 (Beauchamp & Morton, 2011). *Inspirational motivation* involves leader communication
58 aimed at inspiring and energising followers towards achieving higher standards and goals.
59 *Idealised influence* takes place when a leader is able to gain trust, respect and admiration
60 amongst followers via expression of personal beliefs and ethical behaviour. *Intellectual*
61 *stimulation* takes place when a leader promotes consideration of issues from different
62 perspectives, while also challenging commonly held assumptions and promoting alternative
63 ways of thinking. *Individualised consideration* involves catering to individual needs,
64 recognising individual achievements and showing care and concern for the individual.

65 The study of transformational behaviours within an adolescent PE context has provided
66 findings which mirror those found in an organisational context (Morton et al. 2010;
67 Beauchamp et al. 2014): namely, students who perceive their teachers to be using such
68 behaviours tend to score higher on adaptive response measures relating to their PE class

69 engagement. These adaptive responses occur across domains of functioning, including those
70 that are cognitive (e.g., motivation and positive attitudes towards being physically active),
71 affective (e.g., reporting pleasure while being physically active) and behavioural (e.g.,
72 engaging in sufficient physical activity both within PE class and outside of school during
73 leisure-time). Given the amount of time adolescents spend within a school-based context, and
74 specifically the influence that PE teachers have on childrens' self-efficacy, feelings of
75 support and motivation (Beauchamp et al., 2011; Beauchamp, et al. 2014; Morton et al.,
76 2016), evidence suggests that PE teachers' transformational teaching behaviour is a viable
77 area to target in seeking to address the issue of adolescent female insufficient activity. If
78 adolescent girls' physical activity thoughts and patterns can be positively changed, these
79 changes may persist into adulthood and promote significant long-term health benefits (Due et
80 al., 2011; Loprinzi, Cardinal, Loprinzi & Lee, 2012).

81 As suggested in a narrative study with adolescent girls (Knowles, Niven & Fawkner,
82 2013), unfavourable thoughts, emotions and self-presentational concerns have negative
83 implications for girls' interest in physical activity involvement. Self-presentation is
84 characterised by motivation to control how one's self is regarded by others (impression
85 motivation) and the avenues used to create one's desired image (impression construction;
86 Leary & Kowalski, 1990). Recent advancements in the literature have proposed a 2x2
87 framework of self-presentation to conceptualise different impression management strategies
88 individuals may be motivated to employ within a PE setting (Howle, Dimmock et al., 2015a;
89 Howle, Jackson et al., 2015). The framework draws from existing theoretical perspectives
90 focused on interpersonal motivation and behaviour, including the approach-avoidance
91 paradigm (Elliot, 2008) and agency-communion principles (Bakan, 1966). Conceptualisation
92 of self-presentation motives based on approach notions have been termed *acquisitive motives*
93 (a desire to present oneself in a way to gain social approval) and avoidance notions have been

94 termed *protective motives* (a desire to present oneself in a way to avoid social disapproval;
95 Arkin, 1981). *Agentic* and *communal* motives refer, respectively, to individuals' preference to
96 orient their self-presentational focus on skill and task mastery or on social relationships and
97 interconnectedness.

98 The 2x2 framework of self-presentation in physical activity settings (Howle, Dimmock
99 et al., 2015a; Howle, Jackson et al., 2015) proposes four impression management motives
100 (see Howle, Jackson et al., 2015 for a full overview). *Acquisitive-agentic* motives focus on a
101 desire to gain social approval via others' perceptions of their physical skill and task mastery
102 (e.g. drawing attention to one's competence on a drill in front of classmates). *Acquisitive-*
103 *communal* motives focus on a desire to gain social approval via others' perceptions of their
104 social relationships and interconnectedness (e.g. being friendly and encouraging to fellow
105 classmates). *Protective-agentic* motives focus on a desire to avoid social disapproval via
106 others' perceptions of their physical skill and task mastery (e.g. withdrawal from physical
107 activity participation). Finally, *protective-communal* motives focus on a desire to avoid social
108 disapproval via others' perceptions of their social relationships and interconnectedness e.g.
109 hesitation to interact with classmates). Motives are conceptualised as situation and context
110 specific, accounting for individuals who endorse multiple motives at any one time, which
111 could differ momentarily in type and/or strength dependent on context (Howle, et al. 2016).

112 Empirically the 2x2 self-presentation framework has been used with students in PE
113 settings, and has found a positive association between stronger endorsement of acquisitive
114 self-presentation motives (both agentic and communal) and PE class engagement (both
115 emotional; e.g. enjoyment, and behavioural; e.g. increased participation; Howle, Dimmock, et
116 al. 2015a). Around half of the 301 students in their sample were characterised by strong
117 motive endorsement, suggesting that self-presentation emerged as a prominent drive for
118 students. Additionally, having higher confidence in creating a desired image relating to

119 physical appearance and competency (self-presentational efficacy) or in initiating and
120 maintaining relationships (social efficacy) within a PE class was later found to be associated
121 with stronger endorsement of acquisitive-agentive or acquisitive-communal self-presentation
122 motives, respectively (Howle, Dimmock, et al. 2015b). Collectively, research seems to
123 suggest that facilitation of strong acquisitive-agentive and acquisitive-communal self-
124 presentation motives could be achieved by targeting students' confidence beliefs. Given that
125 previous research has indicated that transformational teaching positively and significantly
126 impacts upon adolescents' self-efficacy and PE class engagement (Beauchamp et al., 2011),
127 teachers' use of transformational teaching behaviour may also positively influence the
128 adoption of acquisitive self-presentation motives for physical activity.

129 Endorsement of protective motives (both agentive and communal) has previously been
130 shown to be unrelated to PE class engagement (Howle, Dimmock, et al. 2015a). However, in
131 line with theoretical expectations, protective motives are said to align with avoidance
132 behaviours (e.g. withdrawal from physical activity Elliot, 2008) which would suggest an
133 impending negative association with PE class engagement in the current study. Howle and
134 colleagues (2016) provided mixed evidence for this, finding a negative and non-significant
135 association, and a negative and significant association respectively between protective-
136 agentive motives and performance on a physical activity task via personal task goals in two
137 separate studies. Consequently, there is a need to further understand the role and impact of
138 self-presentation motives on physical activity engagement, and the possible mediators that
139 may influence this relationship (Howle, et al. 2015a).

140 One such concept is the notion of identity (i.e., who one is), which is of importance in
141 understanding self-presentational processes. According to Leary and Kowalski's (1990) two-
142 component model, individuals are biased in modifying behavioural strategies to act
143 consistently with a *desired image and identity*; however, the reverse is also true. That is,

144 individuals also seek to avoid acting consistently with an undesired image and identity (e.g.
145 protective self-presentational motives). It has been theorised that individuals have multiple
146 identities as part of a multi-dimensional self-concept that can be activated depending on one's
147 view of belonging in a given group, societal role, or context (Burke, 2006). With respect to
148 adolescent girls specifically, work from Scotland has shown that girls are less likely than
149 boys to see physical activity as integral to their identities (Sport Scotland, 2006) and tend to
150 place little value in physical activity and often see it as a "boys' thing" (Knowles, Niven &
151 Fawkner, 2013).

152 Identity theory has been used to explore the basis of commitment and future physically
153 active behaviour as a consequence of acting consistently with a salient identity (Stryker &
154 Burke, 2000). A strong physical activity identity has been found to predict adherence to
155 regimens of physical activity (Anderson & Cychosz, 1995; Anderson, Cychosz & Franke,
156 1998), moderate the intention-behaviour relationship (Rhodes et al., 2016) and predict overall
157 behavioural consistency and frequency of being physically active (Strachan, Brawley, Spink
158 & Jung, 2009). Therefore, there appears to be merit in influencing behaviour associated with
159 facilitating an identity associated with a desired image (i.e. acquisitive-agentic and
160 acquisitive-communal self-presentation motives) as opposed to an undesired image (i.e.
161 protective-agentic and protective-communal self-presentation motives).

162 The purpose of the current study was to evaluate a novel conceptual framework by
163 exploring the strength and nature of associations between adolescent girls' physical activity
164 behaviour and teachers' transformational teaching behaviours, as perceived by girls, via
165 mediated effects of physical activity self-presentational thoughts, their physical activity
166 identity and PE class engagement. The testing of a model that conceptually integrates these
167 variables as a predictive network has not yet been undertaken. In light of research evidence,
168 we hypothesised that: 1) positive direct effects would be observed from transformational

169 teaching behaviours to both acquisitive self-presentational motives, physical activity identity
170 and PE class engagement; 2) teachers' transformational teaching behaviours would have a
171 positive effect on girls' moderate-vigorous physical activity (MVPA) via mediated effects of
172 self-presentation motives (i.e. both acquisitive motives only), physical activity identity and
173 PE class engagement; 3) positive direct effects would be observed from both acquisitive self-
174 presentational motives to physical activity identity and PE class engagement; 4) negative
175 direct effects would be observed from both protective self-presentational motives to PE class
176 engagement; 5) positive direct effects would be observed from physical activity identity to
177 PE class engagement and MVPA and from PE class engagement to MVPA.

178 **Method**

179 **Participants**

180 A total of 352 adolescent girls in the first three years of study (S1-S3) at a Scottish
181 Secondary School responded to a questionnaire given out during Time 1 data collection. Due
182 to drop-out between Time 1 and Time 2 data collection ($n = 37$), unreliable data ($n = 28$, e.g.
183 answering questions in a pattern, getting a friend to complete the questionnaire) and
184 excessive missing data ($n = 16$, e.g. at least one or more complete scales unanswered), data
185 from a total of 273 participants (representing approximately 57% of the overall female S1-S3
186 population within the school) were used for analysis: S1 ($n = 91$; $M_{\text{age}} = 11.75$ years; $SD_{\text{age}} =$
187 $.46$), S2 ($n = 108$; $M_{\text{age}} = 12.71$ years; $SD_{\text{age}} = .45$), and S3 ($n = 74$; $M_{\text{age}} = 13.64$ years; SD_{age}
188 $= .51$). Comparison of baseline measurements from time 1 data collection between participant
189 drop-outs versus non-drop outs suggests there was no significant difference (A-A: $F[1,307] =$
190 $1.824, p = .178$; A-C: $F[1, 307] = 1.316, p = .252$; P-A: $F[1,307] = .154, p = .695$; P-C:
191 $F[1,306] = .117, p = .732$; TTQ: $F[1,307] = 1.090, p = .297$; EIS: $F[1,307] = .387, p = .534$).

192 The majority of participants self-identified as Scottish, English, or British ($n = 264$;
193 96.7%), while the remaining participants self-identified as Pakistani ($n = 5$; 1.8%), Irish ($n =$

194 2; 0.7%), Canadian ($n = 1$; 0.4%) or Indian ($n = 1$; 0.4%). This school involved in the
195 investigation resulted from a recent merger of two secondary schools into a single new
196 facility. Of the participants, 182 came from the earlier secondary schools ($n_{\text{school1}} = 151$ girls,
197 55% of complete responses; $n_{\text{school2}} = 31$ girls, 11% of complete responses), while 91 (33% of
198 complete responses) were in their first year of secondary school. According to the Scottish
199 Index of Multiple Deprivation, the area in which the current school resides is among the most
200 deprived areas in Scotland (top 20%) across all measured domains including income, health,
201 access to services, crime and housing, employment, and most importantly education (Fife
202 Health and Social Care Partnership, 2016).

203 **Measures**

204 ***Transformational Teaching.*** The 16-item Transformational Teaching Questionnaire
205 (TTQ) is the first adolescent-focused measure to be developed for assessing teacher
206 behaviour within a PE context (Beauchamp et al., 2010). Participants responded on a 5-point
207 Likert scale from 0 (*Not at all*) to 4 (*Frequently*) across four dimensions: *idealised influence*
208 (e.g. “Acts as a person that I look up to”), *inspirational motivation* (e.g. Demonstrates that
209 s/he believes in me”), *intellectual stimulation* (“Creates lessons that really encourage me to
210 think”) and *individualised consideration* (“Shows that s/he cares about me”). Evidence from
211 Beauchamp and colleagues (2010) supports content validity of the measure and adolescents,
212 PE teachers and physical activity experts were included in the development of scale items.
213 Subsequent consequential validity was demonstrated by generating a Flesch (1948)
214 readability score of 78.6 which is regarded as ‘fairly easy’ and appropriate for use with
215 students possessing a reading age of grade 4 level (age 9-10) and above.

216 Transformational leadership has been conceptualised through its distinct behavioural
217 dimensions or as a global construct (e.g., Beauchamp, et al. 2010). Employing a
218 differentiated approach is typically optimal (Arthur, Bastardo, & Eklund, 2017), however

219 global conceptualisations are appropriate for use during early examination phases of research
220 questions and/or when relatively complex models are being tested (Arthur & Tomsett, 2014).
221 Given the novelty of the current research and the complex multiple serial mediational model
222 being testing, it was decided that a global conceptualisation of transformational leadership
223 was appropriate. Beauchamp and colleagues (2010) found comparable support in factorial
224 validity analyses when TTQ data were modelled as a global, $\chi^2(208) = 2994.077, p < .001,$
225 CFI = .920, TLI = .907, RMSEA = .069, SRMRwithin = .041, or second-order
226 multidimensional construct, $\chi^2(201) = 2258.410, p < .001,$ CFI = .940, TLI = .928, RMSEA
227 = .061, SRMR = .037. Adequate fit indices were obtained when TTQ data was modelled as a
228 global construct in the present study, $\chi^2(100) = 230.538, p < .001,$ CFI = .940, TLI = .928,
229 RMSEA = .069, SRMR = .044. The composite reliability of the global Transformational
230 Teaching latent variable in this study was .93.

231 ***Self-Presentation Motives for Physical Activity.*** The 16-item Self-Presentation
232 Motives for Physical Activity Questionnaire (SMPAQ; Howle, Dimmock, et al., 2015a)
233 measures self-presentation motives across four dimensions relative to desired presentation
234 during PE. Each question was preceded by the stem “Right at this moment in time, thinking
235 about my PE class, I am focusing my attention on...”: *Acquisitive-Agentive* (A-A; e.g.
236 “Having others admire me for my physical ability during PE activities”), *Acquisitive-*
237 *Communal* (A-C; e.g. “Having others view me as friendly”), *Protective-Agentive* (P-A; e.g.
238 “Avoiding others viewing me as incompetent during PE activities”) and *Protective-*
239 *Communal* (P-C; e.g. “Avoiding others viewing me as someone who works poorly with
240 others”). Participants responded on a 7-point Likert scale from 1 (*strongly disagree*) to 7
241 (*strongly agree*). Confirmatory factor analysis (CFA) of SMPAQ data from the present study
242 indicated an adequate fit for four-factor model, $\chi^2(98) = 238.084, p < .001,$ CFI = .932, TLI =

243 .917, RMSEA = .072, SRMR = .061. Composite reliability of the four latent variables were:
244 A-A = .84, A-C = .88, P-A = .83 and P-C = .77.

245 The SMPAQ was deemed adequate for use in the present study because valid and
246 reliable data had been obtained previously from similar-aged high school students during
247 initial validation of the scale (Howle, Dimmock, et al., 2015a). During this initial testing,
248 acceptable composite reliability coefficients (i.e., ranging from .82 to .88) were observed,
249 suggesting that distinctive features of self-presentation motives are assessed by the scale
250 dimensions. Convergent validity was also demonstrated, with acquisitive-motives positively
251 predicting PE class engagement.

252 ***Physical Activity Identity.*** The 9-item Exercise Identity Scale (EIS; Anderson &
253 Cychosz, 1994) was used in this investigation as an operationalization of the Physical
254 Activity Identity. This measure assesses how strongly girls view themselves as physically
255 active exercisers (e.g., “I consider myself an exerciser”). Reliable and valid data have been
256 collected using the scale from college students (Anderson & Cychosz, 1994) and adult
257 populations (Anderson, Cychosz & Franke, 1998). This measure was deemed to be an
258 appropriate measure of identity for use with adolescent girls after consideration of the Flesch-
259 Kincaid reading difficulty index, which indicated a readability age of 8.5 using the Grade
260 Level. Participants responded on a 7-point Likert scale, from 1 (*Strongly disagree*) to 7
261 (*Strongly agree*). Test–retest reliability has been observed for items in this scale ($\alpha = .94$ and
262 $.93$, respectively; Anderson & Cychosz, 1995). Similarly, the composite reliability in this
263 study was $.92$. Adequate fit indices were observed in confirmatory modelling of EIS data in
264 the present study, $\chi^2(27) = 79.958, p < .001, CFI = .958, TLI = .944, RMSEA = .085, SRMR$
265 $= .035$.

266 ***Engagement.*** A 10-item, PE specific engagement questionnaire (Shen, McCaughtry,
267 Martin, Fahlam & Garn, 2012) was used in the present study to gauge the behavioural (focus,

268 participation, attention, e.g., “I tried hard to do well in my PE class”) and emotional
269 (enjoyment, interest, e.g., “When I was in my PE class, I felt good”) engagement of girls
270 within PE. Participants responded on a 7-point Likert scale, from 1 (*not at all*) to 7 (*very*
271 *much*). The behavioural and emotional subscales of engagement were highly correlated ($r =$
272 $.84$), and were modelled as a single latent factor with correlated errors among items with
273 overlapping content. While normally engagement has been conceptualised as a two-factor
274 model, CFA results from the present study showed comparable results for a global, $\chi^2(28) =$
275 57.090 , $p < .001$, CFI = .986, TLI = .977, RMSEA = .062, SRMR = .024, and a two-factor
276 model $\chi^2(29) = 56.843$, $p < .001$, CFI = .986, TLI = .979, RMSEA = .059, SRMR = .024.
277 The composite reliability of the global engagement latent variable was .94.

278 Data have previously been obtained using this instrument from school children
279 (Skinner, Furrer, Marchand, & Kindermann, 2008), and later high school girls (Shen et al,
280 2012). Test-retest reliability has been observed for items in this scale (behavioural: $\alpha = .71$
281 and $.72$ respectively, emotional: $\alpha = .83$ and $.84$ respectively; Skinner et al., 2008). A CFA
282 conducted by Shen and colleagues (2012) yielded adequate model fit indices of instrument
283 items (CFI > .96, SRMR < .04, RMSEA < .04), and high Cronbach’s alphas (.84 and .87 for
284 behavioural and emotional engagement respectively), demonstrating validation support for
285 the internal consistency of the scale.

286 ***Moderate-Vigorous Physical Activity.*** A modified version of the Godin Leisure-Time
287 Questionnaire (GLTEQ; Godin & Shephard, 1985) was used to assess girls’ self-reported
288 number of mild, moderate, and vigorous bouts of physical activity within a week. This
289 questionnaire was modified by the addition of a statement which asked participants to *include*
290 within-class physical activity during PE in their responses, as well as leisure-time physical
291 activity. The score was assessed using metabolic equivalents (METs), calculated via the
292 formula: (strenuous x 9) + (moderate x 5). In line with literature which suggests that mild

293 activity does not have a tangible effect on health (Godin, 2011;), only MVPA was calculated
294 for analysis: >24 units indicating an active individual, 14-23 units indicating a moderately
295 active individual, and <14 units indicating an insufficiently active individual.

296 **Procedure**

297 The current study was granted ethical approval by the School of Sport Research
298 Committee at the lead author's institution. The Secondary School head teacher expressed his
299 willingness for the school to be involved via a letter of intent. All participants were under the
300 age of 16, therefore the parents/guardians of all girls were given a letter providing full
301 disclosure of study procedures one week prior to data collection, and an option to withdraw
302 their child from the study was provided via an opt-out form. A total of 20 withdrawal slips
303 were returned from parents, and subsequently 20 girls were excluded from the study. For the
304 remaining participants, data were acquired at two time points, one week apart.

305 *Time 1.* Research was conducted during PE classes over the course of one week. A total
306 of 15 girls declined participation in the study during the informed consent process.

307 Remaining participants were given a pre-packed envelope containing the questionnaire
308 (demographics, TTQ, SMPAQ and EIS). Participants were asked to provide their names for
309 the purpose of matching Time 1 and Time 2 responses, therefore completed questionnaires
310 were sealed in the envelope provided and dropped in a box to ensure confidentiality.

311 *Time 2.* One week subsequent to Time 1, researchers returned to the school for Time 2
312 collection of GLTEQ and PE class engagement data. Given that the study purpose involved
313 prediction of physical activity, the 1-week duration between data collection time points
314 allowed for the minimum 7-day recall of leisure-time physical activity required to complete
315 the GLTEQ (Godin, 2011; Godin & Shephard, 1985) while also minimising recall bias and
316 ensuring forward prediction (i.e. appropriate time-sequencing) occurred on the prediction of
317 GLTEQ scores using Time 1 data. PE class engagement and GLTEQ data were obtained via

318 questionnaire during three dedicated assemblies (one per year group). Participants were asked
319 to drop their completed questionnaires in a designated box.

320 **Analysis**

321 SPSS was used to generate descriptive statistics and Pearson inter-correlations for all
322 variables. Structural equation modelling (SEM) in Mplus version 7.4 (Muthén & Muthén,
323 1998-2015) was used to analyse model direct and indirect effects on the basis of the robust
324 maximum likelihood (MLR) estimator. Maximum likelihood estimation was used to manage
325 the small amount of data missing at the item level (0.4% - 5.9% missing across variables; M
326 = .88%, $SD = 1.08%$). Model fit was assessed using the robust chi-square test, the
327 comparative fit index (CFI), the Tucker-Lewis index (TLI), the standardized root mean
328 square residual (SRMR), and the root mean square error of approximation (RMSEA). Values
329 $>.90$ for CFI and TLI, $<.80$ for SRMR, and $<.60$ for RMSEA were generally deemed
330 supportive of acceptable model fit (Hu & Bentler, 1999; Marsh, Hau, & Wen, 2004). Year
331 (e.g. S1-S3) was specified as a covariate in relation to all study variables to control for the
332 effect of year on predictive pathways from transformational teaching behaviours to girls'
333 MVPA. The effects of nesting of students within classes were not controlled in the current
334 analyses due to an overlap of PE teachers across classes (i.e., girls rated only their current PE
335 teacher, but some reported concurrent exposure to more than one PE teacher in their classes),
336 and a large class number to low participant number ratio. We acknowledge the issue of
337 potential nesting effects and lack of multi-level modelling as a limitation of our analyses. In
338 line with previous literature (Howle, Dimmock, et al., 2015a), self-presentational subscales
339 had reasonably high inter-correlations. Our initial modelling of data occurred without self-
340 presentational subscale disturbances being freed to covary. Post-hoc exploration of
341 modification indices revealed these covariance constraints were a major source of model
342 misfit. Therefore, due to the expected conceptual inter-relatedness, and because there was no

343 expectation that transformational teaching scores would completely account for the shared
344 variance in the prediction of each of those subscales, residual errors from the regression of
345 transformation teaching on the four self-presentation subscales was allowed to covary.

346 **Results**

347 Descriptive statistics for study variables (by year and total sample) are provided in
348 Table 1. Table 2 provides the inter-correlations among study variables across the entire
349 sample. Significant, positive associations were observed between transformational teaching
350 and acquisitive self-presentation motives (A-A: $r = .42$; A-C: $r = .38$), physical activity
351 identity ($r = .41$), PE class engagement ($r = .50$) and MVPA ($r = .17$). MVPA was
352 significantly and positively associated with physical activity identity ($r = .32$) and class
353 engagement ($r = .28$). Non-significant, low correlations with MVPA were observed for all
354 self-presentation motives, with the exception of a low but significant and positive association
355 with A-A ($r = .13$). PE class engagement was significantly and positively associated with
356 acquisitive self-presentation motives (A-A: $r = .35$; A-C: $r = .37$), however small non-
357 significant correlations were observed with both protective self-presentation motives.

358 Figure 1 provides an overview of the model tested, including standardised coefficients
359 for the observed effects. Adequate fit of the model to the data was observed: $\chi^2_{(1293)} =$
360 2135.035, $p < .001$, CFI = .90, TLI = .89, SRMR = .05, RMSEA = .05. Controlling for year,
361 all significant pathways were consistent with expectations: pathways from transformational
362 teaching through both acquisitive self-presentation motives and physical activity identity to
363 MVPA were all significant. Pathways from physical activity identity to MVPA were
364 significant; however, the pathway from PE class engagement to MVPA only trended toward
365 being significant ($p = .054$). Non-significant pathways between all acquisitive and protective
366 self-presentation motives and PE class engagement was observed. With regards to protective
367 motives, this may not be surprising in light of comparable findings from Howle and

368 Colleagues (2015a). However, as with the non-significant pathway between PE class
369 engagement and MVPA, the prediction of PE class engagement on acquisitive motives may
370 follow a similar explanation given the significant and moderate correlation between
371 acquisitive motives and physical activity identity (A-A: $r = .60$; A-C: $r = .50$). Therefore, this
372 is an important relationship to consider when interpreting the current results and the non-
373 emergence of acquisitive motives as a predictor of PE class engagement.

374 All indirect pathways were tested, and considerable support for our mediation
375 hypotheses was observed, in particular, in the significant indirect effects of transformational
376 teaching behaviour on girls' MVPA through both acquisitive motives and physical activity
377 identity (A-A and EIS: $.06[.02]$, $p < .05$; A-C and EIS: $.02[.01]$, $p < .05$), and physical
378 activity identity alone ($.04 [.02]$, $p < .05$). The indirect effect from transformational teaching
379 to girls' MVPA via engagement ($.05 [.03]$, $p = .06$) was not significant, but indicated a trend
380 that provided interesting potential support as well.

381 Discussion

382 The purpose of the current study was to evaluate a novel conceptual framework by
383 exploring the strength and nature of the associations between teachers' use of
384 transformational teaching behaviours (Beauchamp et al., 2014) as perceived by adolescent
385 girls and their subsequent engagement in MVPA, as mediated by variables previously
386 implicated as significant predictors of MVPA. These specific mediators included physical
387 activity identity (Rhodes et al., 2016), physical activity self-presentational thoughts (Howle,
388 Dimmock et al., 2015a; Howle, Jackson et al., 2015) and PE class engagement. The
389 modelling of these variables (as depicted in Figure 1) accounted for 14% of the variance in
390 self-reported MVPA, comparable to another study evaluating youth physical activity (14.7%;
391 Heitzler, Lytle, Erickson, Barr-Anderson, Sirard & Story, 2010) and Beauchamp and
392 colleagues (2014) who accounted for 16% of variance in leisure-time physical activity and

393 almost 19% of variance in within-class physical activity. Positive direct effects were
394 observed from teachers' transformational teaching behaviours to both self-presentational
395 acquisitive motives (A-A: .44[.06], $p < .005$; A-C: .38[.06], $p < .005$), physical activity
396 identity (.14[.06], $p < .05$) and PE class engagement (.36[.06], $p < .005$), providing novel
397 insights and full support for hypothesis 1. Significant predictive pathways were shown in
398 directions consistent with our second hypothesis that transformational teaching behaviours in
399 PE would have an effect on girls' subsequent MVPA via mediated effects from acquisitive
400 self-presentation motives and physical activity identity, and directly via physical activity
401 identity (see Figure 1). However, study results did not find any effect of teachers'
402 transformational teaching behaviours on MVPA via PE class engagement, directly or
403 indirectly (i.e. via acquisitive self-presentation motives). Therefore, there was only partial
404 support for hypothesis 2.

405 Positive direct effects were observed from both acquisitive self-presentation motives to
406 physical activity identity, but not to PE class engagement, contrary to previous findings (e.g.
407 Howle, Dimmock et al., 2015a). Significant simple correlations among the acquisitive self-
408 presentation motives and physical activity identity (i.e., r s from .50 to .60) were observed,
409 and provide useful context around these findings. Identity, but not the acquisitive self-
410 presentation variables, provided a unique contribution to the multivariate prediction of
411 engagement (beyond common shared variance) in the model. Acquisitive-motives have
412 previously been observed to have indirect effects on behaviour through constructs such as
413 task goals (Howle, et al. 2016), a finding in line with the approach/ avoidance paradigm
414 wherein motives shape goals, which in turn shape behaviour. Identity is implicated in
415 behavioural consistency enactments with specific roles (Stryker & Burke, 2000) and these
416 results extend our understanding of *how* acquisitive self-presentation motives may impact
417 upon girls' engagement in MVPA. That is, if girls adopt acquisitive self-presentation

418 motives, this may positively impact upon their subsequent strength of physical activity
419 identity, which in turn has positive consequences for their overall consistency of physical
420 activity engagement. This is reinforced by the significant indirect effect in which teachers'
421 transformational teaching behaviours and MVPA are mediated by acquisitive self-
422 presentation motives and physical activity identity (A-A and EIS: .06[.02], $p < .05$; A-C and
423 EIS: .02[.01], $p < .05$). Thus, partial support of hypothesis 3 was found in the current study.
424 With regards to the relationship between protective self-presentation motives and PE class
425 engagement, previous literature has been mixed (Howle, et al. 2015a; Howle, et al. 2016). In
426 the present study, no significant pathway was observed between these variables, falsifying
427 hypothesis 4 and adding to findings from Howle and Colleagues (2015a).

428 Finally, partial support for hypothesis 5 was observed via a positive direct effect from
429 physical activity identity to girls' PE class engagement, however there was no direct effect
430 between PE class engagement to MVPA. The unique contribution by identity to the
431 prediction of MVPA (i.e. over and above the contribution of engagement) appears to be large
432 enough beyond the level of shared variance between the predictors to be significant. As
433 expected, and in line with previous literature (Rhodes et al., 2016), physical activity identity
434 was found to positively predict adolescent girls' physical activity. Furthermore, physical
435 activity identity positively predicted girls' behavioural and emotional engagement within PE
436 class which, although a novel finding, may not be surprising in light of previous research
437 which show similar predictions of physical activity adherence (Anderson & Cychosz, 1995;
438 Anderson et al., 1998), the intention-behaviour relationship (Rhodes et al., 2016) and
439 behavioural consistency and frequency (Strachan et al., 2009).

440 **Limitations and Future Directions**

441 The current research has several strengths that include expanded knowledge in the areas
442 of transformational leadership, self-presentation motives, physical activity identity and

443 physical activity in adolescent girls, and the modest and fairly typical amount of variance
444 accounted for with regards to MVPA (14%). However, there are also limitations that warrant
445 future investigation. Within the current study, girls were asked to self-report on class-time PE
446 engagement, while measurements of physical activity intensity and MVPA were more broadly
447 focused, encompassing both within-class and leisure-time physical activity. Consequently,
448 the activity and engagement measures are not cleanly aligned. This could present another
449 account of why engagement was a non-significant predictor in the present study and could be
450 improved upon in the future by the use of measures that align more precisely.

451 Secondly, we operationalized transformational leadership as a global construct; an
452 approach that has been described as somewhat crude (c.f., Arthur et al., 2017; Arthur &
453 Tomsett, 2014). Although this approach was justified in the current research given the
454 complex nature and novelty, future research is required to test whether some of the different
455 transformational leader behaviours have different relationships with the outcomes variables
456 examined. Whilst we took steps to limit the impact of common method variance by using a
457 prospective design where the outcome variables were collected one week after the
458 independent variables, some of the pathways in our model may be more susceptible to
459 common method effects. Thus, future research could examine the relationship between the
460 self-report variables included in the current research longitudinally by employing a longer
461 time period between the collection of each of the serial mechanisms, and/or by employing
462 additional data collection intervals to accrue more accurate time-specific data.

463 Another limitation was that multi-level analysis was not used. The level 2 sample size
464 obtained was such that it precluded this, thus necessitating the involvement of more schools
465 to ascertain a sufficient sample. However, it was considered that the inclusion of additional
466 schools would introduce another confound to the data. Therefore, future research should seek
467 to involve larger level 2 samples in order to properly account for the complex data structure.

468 Additionally, steps should be taken to control for the issue of complex nesting effects
469 within analyses and potential confounds to study results. Kavussanu, Boardley, Jutkiewicz,
470 Vincent and Ring (2008) found that more experienced athletes who were exposed to more
471 than one coach had higher standards and expectations of coaches (similar to our participants
472 who were exposed to multiple PE teachers), thus this could also be a consideration for future
473 research.

474 A highlighted but untapped potential area of interest in the current study was related to
475 physical activity and the effect of the low socioeconomic status of the area in which the
476 current research was conducted. To date, inconsistent evidence on the effect of
477 socioeconomic status on physical activity has precluded any comprehensive evaluation of the
478 current state of literature for adolescents in particular (Stalsberg & Pedersen, 2010).
479 Nonetheless, Stalsberg and Pedersen (2010) did find evidence to suggest that a number of
480 studies indicated that physical activity engagement was significantly lower in areas with a
481 low socioeconomic status. In the current study, however, extracurricular PE activities after
482 school were suggested by PE teachers to be a popular and vital aspect of girls' lives to
483 combat issues of deprivation such as lack of access to amenities. While this information was
484 provided anecdotally, current results in the form of similar physical activity scores across S1
485 to S3 (Table 1) may provide some initial support for this idea. Nonetheless, while the school
486 used in the current study was within a low socioeconomic area, not all students were from a
487 low socioeconomic background. It is possible that this heterogeneity could have implications
488 for physical activity engagement, thus further research may consider the complex and
489 potentially confounding relationship of such deprivation statistics by controlling for these in
490 future research.

491 In terms of future intervention delivery, our expectation is that it may well take the
492 form of a workshop, as guided by existing successful transformational leadership

493 interventions (e.g., Beauchamp, et al. 2011; Hardy et al., 2010) and consistent with rigorous
494 intervention development guidelines (e.g., focus groups, interviews and multi-stakeholder
495 workshops; MRC, 2006). This approach would determine the length, number, format and
496 content of workshops to best suit PE teachers.

497 **Conclusions**

498 The present study shows evidence of significant pathways between transformational
499 teaching, physical activity identity and self-presentation motives, which in turn significantly
500 predicted MVPA. As a preliminary study that provides the first investigation of how these
501 constructs interact in a PE context, these are encouraging results. We hope that the novel
502 insight provided by these findings may be used to inform subsequent longitudinal efforts to
503 increase levels of physical activity within adolescent girls. In addition, the effects observed
504 provide indication of real-world application, and subsequently this knowledge can be carried
505 forward in the development, modelling, and feasibility testing of a new intervention to
506 address insufficient adolescent female physical activity.

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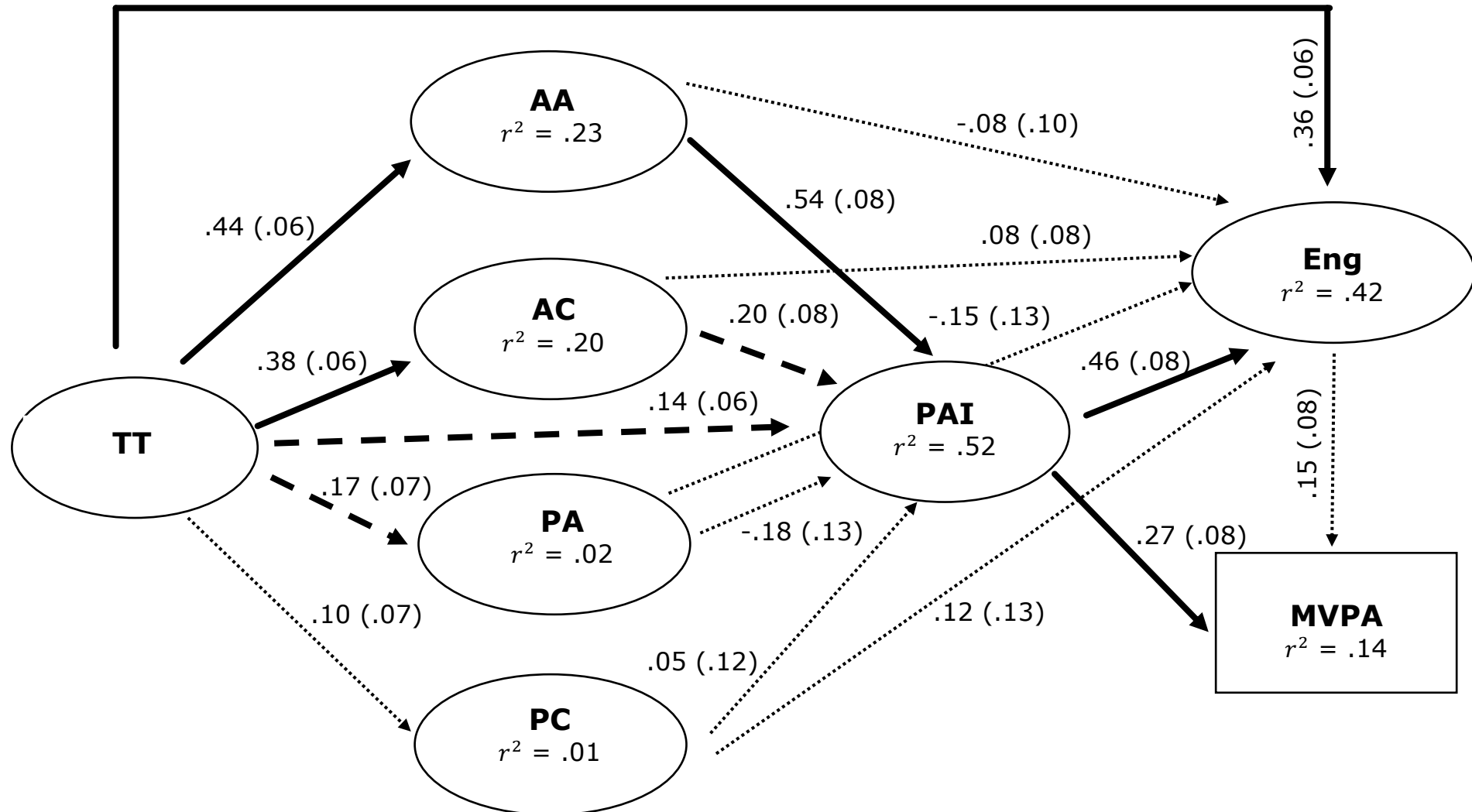


Figure 1. Latent model with year covariate used for structural equation analysis. *Note.* *TT*: transformational teaching; *A-A*: acquisitive agentic; *A-C*: acquisitive communal; *P-A*: protective agentic; *P-C*: protective communal; *PAI*: physical activity identity; *Eng*: engagement; *MVPA*: moderate-vigorous physical activity. Parameter results are shown in the format estimate (standard error), with variance explained (r^2) underneath construct headings. Dotted lines indicate non-significance; thick lines indicate significance; dashed lines $\leq .05$, solid lines $\leq .005$. Inter-correlations among SMPAQ constructs, and ‘year’ which was specified as a covariate on all variables are not shown to avoid cluttering of the diagram.

Table 1. Descriptive statistics of demographics and measured variables across school year (grade)

Data	School Year (Grade)						Total (n = 273)	
	S1 (n = 91)		S2 (n = 108)		S3 (n = 74)		Mean	SD
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age	11.75	.46	12.71	.45	13.64	.51	12.60	.87
Weight (kg)	45.95	8.55	46.15	7.44	57.36	12.19	48.46	10.03
Height (cm)	155.38	9.00	159.91	6.85	162.69	5.24	158.84	7.95
TT	3.20	.54	3.18	.66	2.75	.77	3.07	.68
PAI	4.45	1.37	4.14	1.51	3.60	1.54	4.10	1.50
A-A	4.46	1.36	4.28	1.50	3.71	1.18	4.19	1.40
A-C	5.91	1.03	5.65	1.19	5.06	1.58	5.58	1.30
P-A	4.13	1.42	4.27	1.48	4.06	1.44	4.17	1.45
P-C	3.81	1.77	4.26	1.63	3.88	1.53	4.01	1.66
Eng	5.94	1.07	5.94	1.11	5.37	1.21	5.79	1.15
MVPA (METs)	31.70	20.21	32.47	19.99	31.92	22.25	32.07	20.63

Note. TT: transformational teaching; A-A: acquisitive agentic; A-C: acquisitive communal; P-A: protective agentic; P-C: protective communal; PAI: physical activity identity; Eng: PE class Engagement; MVPA: MVPA recorded in METs using GLTEQ. Maximum score for TT=4. Maximum score for PAI, A-A, A-C, P-A, P-C and Eng=7.

Table 2. Pearson correlations of all measured variables

	1	2	3	4	5	6	7	8
1. TT	1.00							
2. PAI	.41**	1.00						
3. A-A	.42**	.60**	1.00					
4. A-C	.38**	.50**	.58**	1.00				
5. P-A	.15*	.21**	.41**	.38**	1.00			
6. P-C	.07	.15*	.30**	.32**	.63**	1.00		
7. Eng	.50**	.53**	.35**	.37**	.08	.09	1.00	
8. MVPA (METs)	.17**	.32**	.13*	.07	.06	.07	.28**	1.00

Note. TT: transformational teaching; PAI: physical activity identity; A-A: acquisitive agentic; A-C: acquisitive communal; P-A: protective agentic; P-C: protective communal; Eng: PE Class Engagement; MVPA: MVPA recorded in METs using GLTEQ.
 $p^* \leq .05$, $p^{**} \leq .005$.