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9 An Investigation of the Relationships Between the Teaching Climate, Students' Perceived  
10 Life Skills Development and Well-Being Within Physical Education

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## Abstract

Background: Both education policies and curriculum documents identify the personal development of students as a key objective of modern education. Physical education in particular has been cited as a subject that can promote students' life skills development and psychological well-being. However, little research has investigated the processes by which physical education may be related to students' development of life skills and their psychological well-being.

Purpose: Using Benson and Saito's (2001) framework for youth development theory and research, this study explored the relationships between the teaching climate, students' perceived life skills development within physical education, and their psychological well-being.

Participants and setting: Participants were 294 British physical education students ( $M_{\text{age}} = 13.70$ , range = 11–18 years) attending six secondary schools in Scotland and England. On average, these male ( $n = 204$ ) and female ( $n = 90$ ) students took part in physical education classes for 2.35 hours per week.

Data collection: The data were collected via a survey which assessed perceived teacher autonomy support, participants' perceived life skills development within physical education (teamwork, goal setting, time management, emotional skills, interpersonal communication, social skills, leadership, and problem solving and decision making), and their psychological well-being (self-esteem, positive affect, and satisfaction with life).

Data analyses: The preliminary analysis used descriptive statistics to assess how participants scored on each of the study variables and correlations to assess the relationships between all variables. The main analysis sought to test Benson and

50 Saito's (2001) framework using a series of mediation models which were tested  
51 via non-parametric bootstrapping analysis.

52 Findings: This study demonstrated that students perceived they were developing  
53 the following life skills through physical education: teamwork, goal setting, time  
54 management, emotional skills, interpersonal communication, social skills,  
55 leadership, and problem solving and decision making. Overall, the results  
56 supported Benson and Saito's (2001) framework for youth development theory  
57 and research. In all analyses, perceived teacher autonomy support was  
58 positively related to participants' perceived life skills development within  
59 physical education and their psychological well-being. Participants' total life  
60 skills development was related to all three psychological well-being indicators –  
61 providing support for the 'pile-up' effect (Benson 2006). Total life skills  
62 development also mediated the relationships between perceived teacher  
63 autonomy support and participants' psychological well-being.

64 Conclusion: The findings suggest that perceived teacher autonomy support,  
65 along with total life skills development, are related to participants' psychological  
66 well-being. Interpretation of the results suggest that physical education teachers  
67 should integrate autonomy supportive behaviors into their teaching (e.g., provide  
68 choice in activities and encourage students to ask questions) as they are  
69 associated with young people's development of multiple life skills and their  
70 psychological well-being.

71 *Keywords:* positive youth development; personal and social development;  
72 developmental assets; psychosocial assets; transferrable skills.

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## 75 **Introduction**

76 To maintain its valued position within education, it is necessary for physical education (PE)  
77 to highlight its ‘educationally beneficial outcomes for students, across a range of domains’  
78 (Kirk 2013, 978). A beneficial outcome of PE, which has been highlighted by the United  
79 Kingdom Department of Education (2013), is students’ personal development. Throughout  
80 the world, the personal development of students is seen as a key curricular aim of PE  
81 (Hardman 2011). Recently, personal development has been conceptualised in terms of the  
82 life skills young people may learn through PE (Goudas 2010). Life skills are defined as the  
83 skills that are required to deal with the demands and challenges of everyday life (Hodge and  
84 Danish 1999). Examples include teamwork, goal setting, leadership, and communication  
85 skills. Such life skills can be viewed as individual capital which enhance young people’s  
86 educational attainment, quality of life, and future economic prosperity (Bailey et al. 2013).

87 PE has been proposed as an ideal setting for the development of life skills (Goudas  
88 2010). Like youth sport, it is likely that the interactive, social, and emotional nature of PE  
89 provides opportunities for development (Danish et al. 2004; Hellison, Martinek, and Walsh  
90 2008; Fraser-Thomas, Côté, and Deakin 2005). This view is supported by research which  
91 shows that young people do learn specific life skills through PE. For instance, qualitative  
92 research focusing on student-centred models of learning – such as the Sport Education Model  
93 and Cooperative Learning – has found that these forms of PE can teach students the  
94 following life skills: teamwork, communication, social skills, leadership, and problem solving  
95 and decision making (Dyson, Griffin, and Hastie 2004; Smither and Zhu 2011). Life skills  
96 programmes implemented within PE have also shown that students can learn goal setting and  
97 problem solving skills (Goudas and Giannoudis 2008). The present study focused on eight  
98 particular life skills: teamwork, goal setting, time management, emotional skills,  
99 interpersonal communication, social skills, leadership, and problem solving and decision

100 making. These are the most commonly cited life skills which young people are purported to  
101 learn through sport/PE (Johnston, Harwood, and Minniti 2013) and can be measured using  
102 Cronin and Allen's (2017) Life Skills Scale for Sport.

103         Learning individual life skills as well as multiple life skills is important for young  
104 people's development. In this regard, Benson (2006) suggested that the more strengths a  
105 young person possesses, the better off they will be on a variety of additional outcomes – this  
106 has been termed the 'pile-up' effect or hypothesis. An extensive review of the youth  
107 development research supports the idea of a 'pile-up' effect, with the total number of  
108 strengths young people possess being positively associated with academic, behavioural, and  
109 psychological outcomes (Scales et al. 2016). Such findings fit with the untested proposition  
110 that the more life skills or individual capital a young person accumulates through physical  
111 activity, the more likely they will develop positively (Bailey et al. 2013). Within the youth  
112 sport literature, a great deal of research involving participants, coaches, and parents has  
113 suggested that young people develop an array of life skills through their sports participation  
114 (see Johnston et al. 2013 and Holt et al. 2017 for review articles). Additionally, research has  
115 consistently shown that coaches can use a variety of strategies to help athletes develop their  
116 life skills (Pierce, Gould, and Camiré 2016). In contrast to youth sport, far less research has  
117 investigated life skills development within PE or the role teachers' play in students' life skills  
118 development. This is surprising given that PE – like youth sport – is another ideal setting for  
119 young people to develop their life skills (Goudas 2010).

120         Despite the importance of students' personal development within PE (United  
121 Kingdom Department of Education 2013), little is known about the antecedents or outcomes  
122 of life skills development within PE. Therefore, the present study investigated a mediation  
123 model whereby the teaching climate was related to students' life skills development; which,  
124 in turn, was related to their psychological well-being. This model tested Benson and Saito's

125 (2001) framework for youth development theory and research, which proposes that youth  
126 development inputs (e.g., the teaching climate) serve to develop young people's strengths  
127 (e.g., their life skills), and the development of these strengths helps promote young people's  
128 well-being. Benson and Saito (2001: 143) proposed this conceptual framework for youth  
129 development theory and research in order to 'guide the systematic inquiry necessary to guide,  
130 shape, refine, and fuel the [positive youth development] approach'. Using this framework,  
131 researchers can investigate the three key aspects of positive youth development: the  
132 developmental climate, life skills development, and well-being. More importantly,  
133 researchers can investigate the links between these three aspects of positive youth  
134 development. Benson and Saito's (2001) framework is similar to recently proposed models  
135 of positive youth development through sport (Holt et al. 2017) and life skills transfer from  
136 sport to other life domains (Pierce et al. 2016). Specifically, these models also propose that  
137 the developmental climate is related to participants' life skills development and, in turn, life  
138 skills development is related to other positive outcomes. The current study was the first to  
139 test such the framework within the context of PE.

#### 140 ***Teacher Autonomy Support and Students' Perceived Life Skills Development***

141 Within PE, the teacher plays a key role in young people's development (Bailey et al. 2013).  
142 The current study investigated if perceived teacher autonomy support was positively related  
143 to participants' life skills development. Autonomy support is part of self-determination  
144 theory (Ryan and Deci 2000) and refers to the PE teacher: adopting a student's perspective,  
145 providing choice in the activities, acknowledging students' feelings and perspectives,  
146 providing opportunities for initiative taking and independent work, and avoiding behaviours  
147 that seek to control students (DeMeyer et al. 2016). According to self-determination theory,  
148 taking part in any activity can have positive effects on people's development when combined  
149 with autonomy support (Ryan and Deci 2000); whereas, controlling behaviours can have

150 detrimental effects (Reeve, Deci, and Ryan 2004). Several studies have found that PE  
151 teacher autonomy support is related to a range of positive effects including greater student  
152 engagement (De Meyer et al. 2016), autonomous motivation (Standage and Gillison 2007),  
153 and leisure-time physical activity (Chatzisarantis and Hagger 2009). Thus, one would expect  
154 teacher autonomy support to be positively related to students' life skills development. Taking  
155 a self-determination theory perspective, Hodge, Danish, and Martin's (2013) conceptual  
156 framework for life skills interventions suggests that an autonomy supportive climate should  
157 satisfy needs for autonomy, competence, and relatedness; which, in turn, will lead to the  
158 development of life skills. Conversely, one would assume based on previous studies within  
159 PE (e.g., De Meyer et al. 2016) that a controlling climate and frustration of the needs for  
160 autonomy, competence, and relatedness would have negative effects on students' life skills  
161 development. Looking at life skills development from a "positive youth development"  
162 perspective, we chose only to assess autonomy support. Additionally, this study focused on  
163 the autonomy support aspect of self-determination theory as the primary objective of the  
164 study was to test Benson and Saito's (2001) framework for youth development theory and  
165 research – as opposed to fully testing the tenets of self-determination theory.

166 Previous studies have shown that autonomy support is related to a range of positive  
167 outcomes for young people. For instance, a study with British youth sport participants found  
168 that coach autonomy support was positively related to participants developing personal and  
169 social skills, cognitive skills, goal setting, and initiative (Cronin and Allen 2015). Interview-  
170 based research by Flett, Gould, Griffes, and Lauer (2013) found that effective American  
171 youth sport coaches use autonomy support to promote life skills development in their  
172 athletes. PE and sport studies have also shown that autonomy support is positively associated  
173 with young people's psychological well-being; namely, their self-esteem (Standage and  
174 Gillison 2007), positive affect and satisfaction with life (Smith, Ntoumanis, and Duda 2007).

175 Extending such research, the current study investigated whether perceived life skills  
176 development mediates the relationships between perceived autonomy support and students'  
177 psychological well-being – as suggested by Benson and Saito's (2001) framework for youth  
178 development.

### 179 *Students' Perceived Life Skills Development and Their Psychological Well-Being*

180 It is well-established that regular physical activity can have a positive effect on young  
181 people's psychological well-being (Bailey 2012). According to Benson and Saito's (2001)  
182 framework, the life skills young people learn through physical activity are positively related  
183 to their psychological well-being. Like previous research (e.g., Standage and Gillison 2007;  
184 Smith, Ntoumanis, and Duda 2007), the present study focused on the psychological well-  
185 being indicators of self-esteem, positive affect, and satisfaction with life. Self-esteem was  
186 defined as 'a person's evaluation of, or attitude toward, him- or herself' (Pyszczynski et al.  
187 2004, 435); positive affect is 'the extent to which an individual experiences pleasurable  
188 engagement with the environment' (Crawford and Henry 2004, 246); and satisfaction with  
189 life was defined as 'a global assessment of a person's quality of life according to his/her  
190 chosen criteria' (Shin and Johnson 1978, 478).

191 Research with university students suggests that at least some of the eight life skills  
192 should be positively associated with these psychological well-being indicators. To begin  
193 with, goal attainment (Judge et al. 2005), time management (Bond and Feather 1988),  
194 emotional skills, social skills (Riggio, Throckmorton, and DePaola 1990), communication  
195 (McCroskey and Richmond 1990), and leadership (Bass 1990) have been positively related to  
196 students' self-esteem. Self-concordant goals – goals which are of interest and value to a  
197 person – (Sheldon and Elliot 1999) and emotional skills (Brackett and Mayer 2003) have  
198 been positively associated with students' positive affect. Lastly, goal attainment (Judge et al.  
199 2005), emotional skills (Bastian, Burns, and Nettelbeck 2005), and social skills (Segrin and



200 Taylor 2007) have been positively related to students' life satisfaction. Research with 11–18  
201 year old youth sport participants who took part in 38 different sports, has also shown that  
202 total life skills development and some individual life skills are related to participants' self-  
203 esteem, positive affect, and satisfaction with life (Cronin and Allen Preprint). Within PE, the  
204 present study was the first to test the relationships between students' perceived life skills  
205 development and their psychological well-being.

### 206 *The Present Study*

207 The overall purpose of this study was to examine if students perceived they were developing  
208 life skills through PE and investigate the antecedents and outcomes of life skills development.  
209 The first aim was to examine whether students were developing the eight life skills within  
210 PE. It was expected that participants would report developing these life skills, as previous  
211 studies have indicated that young people can learn these life skills when engaging in certain  
212 forms of PE (e.g., Dyson, Griffin, and Hastie 2004; Goudas and Giannoudis 2008; Smither  
213 and Zhu 2011). The second aim was to assess whether perceived autonomy support was  
214 positively related to each of the eight life skills. Based on the findings of previous youth  
215 sport studies (e.g., Cronin and Allen 2015; Flett et al. 2013), it was anticipated that this  
216 hypothesis would be supported. The third aim was to investigate whether developing each of  
217 the life skills – along with the range of life skills (i.e., the 'pile-up' effect) – was positively  
218 related to participants' self-esteem, positive affect, and satisfaction with life. Based on  
219 research in youth sport (Cronin and Allen Preprint), it was expected that total life skills  
220 development and some individual life skills would be related to each of the psychological  
221 well-being indicators. The final aim was to assess the proposition that students' perceived  
222 life skills development would mediate the relationships between perceived autonomy support  
223 and students' psychological well-being. Based on Benson and Saito's (2001) framework and  
224 research supporting the framework (Scales et al. 2016) – along with the propositions of

225 various models of youth development through sport (e.g., Holt et al. 2017; Pierce et al. 2016)  
226 – it was expected that this hypothesis would be supported.

## 227 **Method**

### 228 *Participants*

229 In total, a convenience sample of 294 British PE students ( $M_{\text{age}} = 13.70$ ,  $SD = 1.52$ , age range  
230 = 11–18 years) completed measures of perceived teacher autonomy support, life skills  
231 development through PE, and psychological well-being. The sample comprised of male ( $n =$   
232 204) and female ( $n = 90$ ) students drawn from six secondary schools in Scotland and  
233 England. Although the pedagogical approach of the teachers was not assessed, we believe  
234 that the PE context would have been indicative of the ‘typical’ PE teaching environment  
235 experienced by British students. These students took part in PE for an average of 2.35 hours  
236 per week ( $SD = .99$ ). Within the sample, 37.4% of students took part in sport outside of PE,  
237 whereas 62.6% did not take part in sport outside of PE. Those that took part in sport  
238 participated in between 1–6 sports ( $M_{\text{sports}} = 1.33$ ,  $SD = 1.21$ ) for an average of 4.51 hours per  
239 week ( $SD = 3.49$ ).

### 240 *Procedures*

241 Following approval from the university’s ethics committee, PE students were recruited via  
242 local schools. Prior to students completing any surveys, informed consent was obtained from  
243 either the student (if > 16 years) or the student’s parent or guardian (if < 16 years). Students  
244 completed the survey – which contained 80 questions in total – after the researcher gave a  
245 standardised introductory statement which explained the purpose of the study, that neither  
246 their name nor their teacher’s name was required, there was no right or wrong answers, and  
247 all information would be confidential. The survey took approximately 15–20 minutes to  
248 complete.

### 249 *Measures*

250 *Teacher Autonomy Support.* Perceived autonomy support was assessed with a modified  
251 version of the 6-item Sport Climate Questionnaire (Deci 2001). In line with previous  
252 research (e.g., Standage and Gillison 2007), we amended items to target the PE context.  
253 Example items include ‘I feel understood by my teacher’ and ‘My teacher listens to how I  
254 would like to do things.’ Each item is rated on a 7-point scale ranging from 1 (*Strongly*  
255 *disagree*) to 7 (*Strongly agree*). The scale has previously displayed adequate reliability and  
256 validity within PE (Lim and Wang 2009). With the current sample, the scale displayed a  
257 reliability coefficient of .95, which is above the .70 criteria necessary for adequate reliability  
258 (Nunnally and Bernstein 1994).

259 *Life Skills Development.* The 43-item Life Skills Scale for Sport (Cronin and Allen  
260 2017) was used to measure students’ perceived life skills development through PE. The  
261 content validity, factorial validity, internal consistency reliability, and test-retest reliability of  
262 this scale was supported by Cronin and Allen (2017). As the measure was originally  
263 developed for youth sport, we adapted the scale by changing the item stem to ‘PE classes  
264 have taught me to...’ Example items include: *teamwork* (7 items; ‘work well within a  
265 team/group’), *goal setting* (7 items; ‘set challenging goals’), *time management* (4 items;  
266 ‘manage my time well’), *emotional skills* (4 items; ‘use my emotions to stay focused’),  
267 *interpersonal communication* (4 items; ‘speak clearly to others’), *social skills* (5 items; ‘get  
268 involved in group activities’), *leadership* (8 items; ‘organise team/group members to work  
269 together’), and *problem solving and decision making* (4 items; ‘think carefully about a  
270 problem’). Participants responded on a 5-point scale ranging from 1 (*Not at all*) to 5 (*Very*  
271 *much*). Each of the subscales and total life skills displayed adequate internal consistency  
272 reliability: teamwork (.87), goal setting (.93), time management (.92), emotional skills (.90),  
273 interpersonal communication (.87), social skills (.90), leadership (.93), problem solving and  
274 decision making (.91), and total life skills (.97).

275 As this was the first use of the LSSS within PE, it was important to assess the factor  
276 structure of the scale using confirmatory factor analysis (CFA), exploratory structural  
277 equation modelling (ESEM) and bifactor analysis. The following models were tested in  
278 Mplus (Version 7.4; Muthén and Muthén 1998–2015) based on the robust maximum  
279 likelihood (MLR) estimator: an eight-factor CFA model, a second-order CFA model, a first-  
280 order CFA model, a bifactor CFA model, an ESEM model, a higher-order ESEM model, and  
281 a bifactor ESEM model. For a complete description of the procedures used to test these  
282 models, see Appleton et al. (2016). Model fit was assessed using the  $\chi^2/df$  ratio, RMSEA,  
283 CFI, and TLI values. A  $\chi^2/df$  of less than 3.0 was indicative of adequate fit (Tabachnick and  
284 Fidell 2007). In line with Marsh, Hau, and Wen's (2004) recommendations, an RMSEA  
285 value of less than .08 or .05 represented a reasonable or close fit to the data respectively;  
286 whereas, CFI and TLI values greater than .90 or .95 indicated acceptable and excellent fit  
287 respectively. Competing models were compared using procedures outlined by Morin, Arens,  
288 and Marsh (2016). Similar fit is evident when changes are  $< .015$  for the RMSEA,  $< .01$  for  
289 CFI, and  $< .01$  for TLI. Lower values for the Akaike Information Criteria (AIC), Bayesian  
290 Information Criterion (BIC), and sample size adjusted BIC (ABIC) are indicative of better  
291 model fit (Appleton et al. 2016). Full results from the testing of these models are contained  
292 within Tables A–E of the supplementary materials. The first-order CFA model was the only  
293 model to display a poor fit, which indicated that one overriding factor is not appropriate to  
294 represent all 43 life skills items. All other models displayed an adequate fit. Comparison of  
295 the fit indices, information criteria and correlations between subscales showed that the ESEM  
296 models best represented the data, as compared to the CFA models. The ESEM model and  
297 higher-order ESEM model provided the best representation of the data according to the fit  
298 indices, information criteria, and factor loadings. With the bifactor CFA and ESEM models,  
299 all items loaded significantly onto a general life skills factor, which indicated that the eight

300 subscales could also be combined to calculate a total life skills score. In sum, the statistical  
301 analyses provided evidence for the factorial validity of the LSSS within PE.

302 *Self-esteem.* Self-esteem was measured using the general-self subscale of the Self-  
303 Description Questionnaire II (Marsh, Parker, and Barnes 1985). Five items of the subscale  
304 are phrased positively (e.g., ‘Most things I do, I do well’) and five items are written to reflect  
305 low self-esteem (e.g., ‘Overall, I am a failure’). Students responded on a scale ranging from  
306 1 (*False*) to 7 (*True*). The reliability of this subscale has been supported with adolescents  
307 (Adie, Duda, and Ntoumanis 2010). The reliability coefficient was .84 for the current  
308 sample.

309 *Positive Affect.* Students’ positive affect was assessed using the positive subscale of  
310 the Positive and Negative Affect Schedule (Watson, Clark, and Tellegen 1988). This 10-item  
311 scale asks participants to rate how a word (e.g., ‘inspired’ or ‘active’) describes their feelings  
312 ‘in general.’ Students rated the extent to which they feel that way on a scale ranging from 1  
313 (*Very slightly or not at all*) to 5 (*Extremely*). This scale has displayed adequate reliability and  
314 factorial validity with adolescents (Crocker 1997). With the current sample, the scale  
315 displayed a reliability coefficient of .93.

316 *Satisfaction With Life.* Satisfaction with life was measured using the Satisfaction  
317 With Life Scale (Diener et al. 1985). This 5-item scale asks participants to indicate their  
318 agreement with certain statements (e.g., ‘I am satisfied with life’). Students responded on a  
319 scale ranging from 1 (*Strongly disagree*) to 7 (*Strongly agree*). This scale has displayed  
320 adequate factorial validity and reliability with adolescents (Pons et al. 2000). The reliability  
321 coefficient was .85 for the current sample.

### 322 *Analysis Strategy*

323 The mediation hypotheses were tested for all three dependent variables: self-esteem, positive  
324 affect, and satisfaction with life. As traditional statistical techniques to test for mediation

325 suffer from problems including low statistical power, a lack of quantification of the  
326 intervening effect, and the inability to test multiple mediators simultaneously (Hayes 2009),  
327 we employed non-parametric bootstrapping analysis (Hayes 2013). This analysis allows for  
328 an estimation of direct and indirect effects in models with multiple mediators and performs  
329 better than other techniques in terms of statistical power and Type I error control (Hayes  
330 2009). To test each model we used the PROCESS macro for SPSS (Hayes 2013) with 20,000  
331 bootstrap resamples and 95% bias corrected confidence interval (CIs). There is evidence of  
332 mediation, or a specific indirect effect, when zero is not included within the lower and upper  
333 bound CIs. Previous studies have investigated mediational models using the same approach  
334 (e.g., Felton and Jowett 2013).

## 335 **Results**

### 336 *Preliminary Analysis*

337 In line with Tabachnick and Fidell's (2007) recommendations, the data was screened for  
338 missing responses, multivariate and univariate outliers, and a normal distribution. Within the  
339 original sample ( $N = 296$ ), of the 74 items each individual item was left blank an average of  
340 4.00 times across the whole sample ( $SD = 1.33$ ; range = 0–12). Data analysis revealed no  
341 pattern to these missing values, rather the data was missing at random. As the percentage of  
342 missing data was low (1.5%) and we wanted to minimise lost data, a mean substitution was  
343 performed. To assess for univariate outliers, standardized  $z$ -scores and 3.29 as the critical  
344 value were used. For multivariate outliers, mahalanobis distances and the critical value of  $\chi^2$   
345 ( $13$ ) = 34.53 ( $p < .001$ ) were used. No univariate but two multivariate outliers were found  
346 and deleted from the sample – leaving a final sample of 294 PE students. Regarding the  
347 distribution of the data, skewness values ranged from -0.71 to 0.01 and kurtosis values ranged  
348 from -1.08 to 0.47, indicating reasonable normality (Tabachnick and Fidell 2007).

### 349 *Descriptive Statistics*

350 Table 1 presents the means, scale ranges, standard deviations, reliability coefficients, and  
351 correlations for all variables [Table 1 near here]. The mean score for perceived teacher  
352 autonomy support was 4.80 on the 1–7 scale, indicating that participants felt their PE teacher  
353 was displaying moderate levels of autonomy supportive behaviors. Mean scores on the 1–5  
354 response scale of the LSSS revealed that participants felt they were developing ‘some’ (3 on  
355 the response scale) life skills through PE. The mean scores from highest to lowest were:  
356 teamwork (3.50), interpersonal communication (3.35), social skills (3.29), leadership (3.22),  
357 goal setting (3.09), time management (3.00), problem solving and decision making (2.95),  
358 and emotional skills (2.79). Mean scores for the psychological well-being indicators were:  
359 4.22 on the 1–6 scale for self-esteem, 3.52 on the 1–5 scale for positive affect, and 5.03 on the  
360 1–7 scale for satisfaction with life. Such scores meant that participants scored quite high for  
361 each of the psychological well-being indicators. Overall, the correlations between perceived  
362 autonomy support and all of the life skills ( $r$  range = .41–.53) and psychological well-being  
363 indicators ( $r$  range = .15–.46) were significant and positive. Each of the eight life skills and  
364 total life skills were positively associated with positive affect ( $r$  range = .49–.65) and  
365 satisfaction with life ( $r$  range = .13–.28). However, only teamwork, goal setting, leadership  
366 and total life skills were positively related to self-esteem ( $r$  range = .16–.24).

### 367 *Main Analyses*

368 Figure 1 displays unstandardized regression coefficients for each of the mediation  
369 models [Figure 1 near here]. Within the mediational models, we controlled for evident  
370 gender and age group differences (see supplementary materials for details of these  
371 differences). In all models, perceived teacher autonomy support was included as the  
372 independent variable. Teamwork, goal setting, time management, emotional skills,  
373 interpersonal communication, social skills, leadership, and problem solving and decision  
374 making were included as parallel mediators. Model A included self-esteem as the dependent

375 variable, Model B had positive affect as the dependent variable, and Model C included  
376 satisfaction with life as the dependent variable. Results of the indirect effects are presented  
377 in Table 2. This table tells us whether there is a total indirect effect and what effect, if any,  
378 each of the mediators are having. The total indirect effect also represents the indirect effect  
379 of total life skills as it is the sum of the indirect effects for each mediator. Lastly, Figure 2  
380 displays the mediation model when total life skills were included as a sole mediator.

381 The mediational models in Figure 1 showed that perceived autonomy support was  
382 positively associated with all eight mediators: teamwork ( $\beta = .21, p < .001$ ), goal setting ( $\beta =$   
383  $.25, p < .001$ ), time management ( $\beta = .34, p < .001$ ), emotional skills ( $\beta = .32, p < .001$ ),  
384 interpersonal communication ( $\beta = .32, p < .001$ ), social skills ( $\beta = .26, p = .001$ ), leadership  
385 ( $\beta = .31, p < .001$ ), and problem solving and decision making ( $\beta = .29, p < .001$ ). However,  
386 consistent relationships were not seen between each of the life skills and the psychological  
387 well-being indicators. Only teamwork ( $\beta = .28, p = .009$ ) was positively related to self-  
388 esteem; teamwork ( $\beta = .21, p = .007$ ) and leadership ( $\beta = .19, p = .014$ ) were positively  
389 associated with positive affect; and only time management ( $\beta = .29, p = .004$ ) was positively  
390 related to satisfaction with life.

391 The first model included self-esteem as the dependent variable (Figure 1, Model A).  
392 For this model, the total effect of perceived autonomy support on self-esteem was significant  
393 ( $\beta = .13, p < .001$ ). When the mediators were entered into the model, the direct effect of  
394 perceived autonomy support on self-esteem was reduced and non-significant ( $\beta = .07, p =$   
395  $.090$ ), suggesting full mediation. Of the proposed mediators (see Table 2) only teamwork  
396 displayed a significant indirect effect,  $\beta = .06, p = .013$ , 95% CI = [.02, .11] [Table 2 near  
397 here].

398 The second model had positive affect as the dependent variable (Figure 1, Model B).  
399 With this model, the total effect of perceived autonomy support on positive affect was



400 significant ( $\beta = .27, p < .001$ ). When the mediators were entered into the model, the direct  
401 effect of perceived autonomy support on positive affect was still significant ( $\beta = .08, p =$   
402  $.010$ ) although reduced, suggesting partial mediation. Of the proposed mediators (see Table  
403 2), teamwork,  $\beta = .04, p = .010, 95\% \text{ CI} = [.01, .09]$  and leadership,  $\beta = .06, p = .018, 95\% \text{ CI}$   
404  $= [.01, .12]$ , displayed significant indirect effects.

405 The third model included satisfaction with life as the dependent variable (Figure 1,  
406 Model C). For this model, the total effect of perceived autonomy support on satisfaction with  
407 life was significant ( $\beta = .21, p < .001$ ). When the mediators were entered into the model, the  
408 direct effect of perceived autonomy support on satisfaction with life was reduced and non-  
409 significant ( $\beta = .09, p = .089$ ), suggesting full mediation. Of the proposed mediators (see  
410 Table 2) only time management displayed a significant indirect effect,  $\beta = .10, p = .007, 95\%$   
411  $\text{CI} = [.04, .17]$ .

412 Finally, we analysed three models which had total life skills as the sole mediator  
413 (Figure 2, Models A–C) [Figure 2 near here]. These models showed that perceived  
414 autonomy support was positively associated with total life skills ( $\beta = .28, p < .001$ ).  
415 Additionally, total life skills were positively related to self-esteem ( $\beta = .19, p = .013$ ),  
416 positive affect ( $\beta = .64, p < .001$ ), and satisfaction with life ( $\beta = .38, p < .001$ ). For all  
417 models, when total life skills was entered as a mediator, the direct effect of perceived  
418 autonomy support on the psychological well-being indicators was reduced. Furthermore,  
419 the results from Table 2 indicate a total indirect effect (which represents total life skills) for  
420 each of the models: self-esteem,  $\beta = .06, 95\% \text{ CI} = [.01, .11]$ ; positive affect,  $\beta = .19, 95\%$   
421  $\text{CI} = [.14, .25]$ ; and satisfaction with life,  $\beta = .12, 95\% \text{ CI} = [.04, .21]$ . Combined, these  
422 results tell us that total life skills mediated the relationships between perceived autonomy  
423 support and participants' psychological well-being.

## 424 Discussion

425 The purpose of this study was to examine if students are developing life skills through PE  
426 and explore the antecedents and outcomes of life skills development. Like the research  
427 from youth sport (e.g., Johnston et al. 2013; Cronin and Allen Preprint), the present study  
428 found that students perceive they are developing the following life skills through PE:  
429 teamwork, goal setting, time management, emotional skills, interpersonal communication,  
430 social skills, leadership, and problem solving and decision making. As personal  
431 development is a key curricular aim of PE (Hardman 2011), it was encouraging that  
432 students felt they were developing life skills through PE to ‘some’ extent (3 on the 1–5  
433 response scale). Using a reliable and valid measure, this was the first study to show  
434 quantitatively that young people perceive they are developing these eight life skills through  
435 PE. To corroborate such findings, future research could gain multiple perspectives (i.e.,  
436 teachers or parents) on whether young people have developed these life skills or create  
437 behavioral ratings scales to assess the life skills (Goudas 2010).

438         Similar to research in youth sport (e.g., Cronin and Allen 2015; Flett et al. 2013),  
439 this study found that perceived autonomy support was positively related to participants’ life  
440 skills development. In practical terms, this suggests that teachers should display the  
441 following autonomy supportive behaviors within their classes: provide choice and options  
442 in the activities, convey confidence in students’ abilities to do well, listen to how students  
443 would like to do things, and encourage students to ask questions. Given that autonomy  
444 support forms only one aspect of self-determination theory (Ryan and Deci 2000), future  
445 PE studies focused on self-determination theory could investigate the mechanisms by  
446 which development occurs using the LSSS as an outcome measure. For example, the  
447 following causal sequence suggested by Van den Berghe et al. (2014) could be  
448 investigated: need support in PE – student need satisfaction – self-determined motivation –  
449 outcomes from PE (i.e., life skills development). Such a causal sequence fits well with

450 Hodge et al.'s (2013) framework for life skills interventions, which is based on self-  
451 determination theory.

452         Along with perceived teacher autonomy support, it is plausible that other factors  
453 account for students developing their life skills through PE. Specifically, it is possible that  
454 the teacher's approach to PE impacts upon whether the students develop certain life skills.  
455 For instance, a teacher that encourages students to coach one another on the techniques of a  
456 sport may promote students' leadership and communication skills. It is also probable that  
457 the development of some life skills is an indirect result of taking part in PE. For example,  
458 students may enhance their social skills through interacting with their peers before, during  
459 and after PE classes. Another interesting question is whether teachers are explicitly  
460 teaching life skills (e.g. directly teaching goal setting skills) or are they deliberately shaping  
461 activities and instruction to foster life skills (e.g., implementing the Sport Education Model  
462 to foster teamwork skills). Future research using the LSSS alongside observational or  
463 interview-based approaches could examine some of these suggestions which may account  
464 for students developing their life skills through PE. In particular, the impact of certain  
465 pedagogical models (e.g., the Sport Education Model and Cooperative Learning) on  
466 students' life skills development could be investigated. Taking advantage of the strengths  
467 of quantitative and qualitative research methods, future studies would provide a clearer  
468 picture of the mechanisms through which students develop their life skills within PE.

469         In their framework for youth development theory and research, Benson and Saito  
470 (2001) proposed that the life skills young people develop are related to other well-being  
471 outcomes. For individual life skills, the mediation models in this study suggested this was  
472 not the case for all life skills. Only the development of teamwork skills was positively  
473 associated with students' self-esteem; teamwork and leadership skills were positively  
474 related to students' positive affect; and only time management was positively associated

475 with students' satisfaction with life. In contrast to individual life skills, total life skills  
476 development was positively related to students' self-esteem, positive affect, and satisfaction  
477 with life. This finding supports Benson's (2006) proposed 'pile-up' effect and Bailey et  
478 al.'s (2013) untested proposition that the accumulation of human capital allows young  
479 people to develop positively. Based on these findings, researchers and practitioners should  
480 advise PE teachers to develop a range of life skills in their students. In practice, teachers  
481 could focus on different life skills at specific times during a particular PE class. For  
482 instance, the beginning of a class could be used to teach students to set goals for the  
483 session; whereas, the end of class could be used to allow students to communicate their  
484 thoughts on how the session went.

485         Within their framework, Benson and Saito's (2001) also suggested that life skills  
486 development would mediate the relationship between teacher autonomy support and  
487 participants' psychological well-being. Like other PE and sport studies (e.g., Smith, Duda,  
488 and Ntoumanis 2007; Standage and Gillison 2007), this study showed a direct relationship  
489 between perceived autonomy support and each of the psychological well-being indicators.  
490 Findings also showed that individual life skills had only a small mediation effect on these  
491 relationships. In contrast to individual life skills, total life skills did consistently mediate  
492 the relationships between perceived autonomy support and students' psychological well-  
493 being. Again, this clearly highlights the importance of teachers attempting to develop  
494 multiple life skills in their students.

495         Like any study, the present study had a number of limitations which need to be  
496 discussed. With self-report data there is always a concern with social desirability and the  
497 truthfulness of responses. Therefore, future studies could gain others' perspectives on  
498 students' life skills development through PE (e.g., parents or teachers). As all data was  
499 collected at one time-point, common method bias could also be a cause for concern.

500 According to Podsakoff et al. (2003), different response formats for the independent,  
501 mediator and dependent variables should have reduced possible common method bias.  
502 Future studies could reduce possible common method bias further by obtaining the  
503 independent and dependent variables from different sources, measuring independent and  
504 dependent variables in different contexts, or by introducing a time-lag between measuring the  
505 independent and dependent variables (Podsakoff et al. 2003). Another limitation was that  
506 only 90 female students took part in the study. Future research should target an even gender  
507 split and further investigate some of the gender differences highlighted in the supplementary  
508 materials. A final limitation was the correlational nature of this study, which means that  
509 causality could not be established between variables. Future longitudinal or experimental  
510 studies should investigate the causal relationships between the teaching climate, students' life  
511 skills development, and psychological well-being.

## 512 *Conclusion*

513 In summary, the present study provided a unique contribution to the literature by  
514 demonstrating that students develop the following life skills through PE: teamwork, goal  
515 setting, time management, emotional skills, interpersonal communication, social skills,  
516 leadership, and problem solving and decision making. Findings showed that perceived  
517 autonomy support was positively related to the development of all eight life skills and total  
518 life skills were positively related to the three psychological well-being indicators. These  
519 findings supported Benson and Saito's (2001) framework for youth development theory and  
520 research within the context of PE. In practice, the results of this study suggest that PE  
521 teachers should create an autonomy supportive climate to promote students' life skills  
522 development and psychological well-being.

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Table 1  
*Summary of Intercorrelations, Scale Ranges, Mean Scores, Standard Deviation, and Reliability Coefficients*

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Autonomy support	–												
2. Teamwork	.45***	–											
3. Goal Setting	.41***	.65***	–										
4. Time management	.49***	.57***	.68***	–									
5. Emotional skills	.44***	.45***	.56***	.67***	–								
6. Communication	.50***	.57***	.53***	.66***	.63***	–							
7. Social skills	.41***	.63***	.59***	.59***	.63***	.64***	–						
8. Leadership	.53***	.68***	.65***	.71***	.66***	.73***	.74***	–					
9. Problem solving	.45***	.61***	.65***	.69***	.69***	.62***	.66***	.75***	–				
10. Total life skills	.56***	.79***	.82***	.83***	.79***	.80***	.83***	.90***	.85***	–			
11. Self-esteem	.15*	.24***	.19**	.07	.06	.11	.11	.17**	.08	.16**	–		
12. Positive affect	.46***	.56***	.52***	.54***	.49***	.54***	.52***	.61***	.52***	.65***	.43***	–	
13. Life satisfaction	.22***	.27***	.20**	.26***	.13*	.20***	.23***	.28***	.19**	.27***	.32***	.36***	–
Scale range	1–7	1–5	1–5	1–5	1–5	1–5	1–5	1–5	1–5	1–5	1–6	1–5	1–7
Mean score	4.80	3.50	3.09	3.00	2.79	3.35	3.29	3.22	2.95	3.18	4.22	3.52	5.03
Standard deviation	1.54	.77	1.02	1.18	1.22	1.08	1.07	.97	1.07	.85	.97	.90	1.27
Cronbach's Alpha	.95	.87	.93	.92	.90	.87	.90	.93	.91	.97	.84	.93	.85

Note.  $N = 294$ .

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

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Table 2  
*Indirect Effects of Teacher Autonomy Support on Psychological Well-being (Self-esteem, Positive Affect and Satisfaction With Life) Through Each Mediator*

	Bootstrap effect	Normal effect	Normal theory tests			95% CI
			SE	z	p	
<b>Self-esteem</b>						
Total effect	.06					[.01, .11]
Teamwork	.06	.06	.02	2.48	.01	[.02, .11]
Goal setting	.04	.04	.02	1.67	.09	[-.005, .08]
Time management	-.02	-.02	.03	-0.73	.47	[-.07, .03]
Emotional skills	-.01	-.01	.02	-0.57	.57	[-.06, .03]
Communication	.00	.00	.03	0.08	.93	[-.05, .05]
Social skills	.00	.00	.02	-0.05	.96	[-.04, .04]
Leadership	.04	.04	.03	1.26	.21	[-.03, .12]
Problem solving	-.05	-.05	.03	-1.91	.06	[-.11, -.004]
Model	$F(3, 288) = 10.70^{***}, R^2 = .10$					
<b>Positive affect</b>						
Total effect	.19					[.14, .25]
Teamwork	.04	.04	.02	2.57	.01	[.01, .09]
Goal setting	.01	.01	.02	0.83	.41	[-.02, .05]
Time management	.03	.03	.02	1.65	.10	[-.002, .07]
Emotional skills	.01	.01	.02	0.67	.50	[-.02, .05]
Communication	.03	.03	.02	1.35	.18	[-.02, .07]
Social skills	.02	.02	.02	0.97	.33	[-.02, .05]
Leadership	.06	.06	.03	2.37	.02	[.01, .12]
Problem solving	-.01	-.01	.02	-0.69	.49	[-.05, .02]
Model	$F(3, 288) = 31.35^{***}, R^2 = .25$					
<b>Satisfaction with life</b>						
Total effect	.12					[.04, .21]
Teamwork	.04	.04	.03	1.41	.16	[-.01, .11]
Goal setting	-.02	-.02	.03	-0.83	.41	[-.09, .03]
Time management	.10	.09	.04	2.72	.01	[.04, .17]
Emotional skills	-.06	-.06	.03	-1.87	.06	[-.13, .02]
Communication	-.02	-.02	.03	-0.45	.65	[-.09, .05]
Social skills	.04	.04	.03	1.55	.12	[-.01, .10]
Leadership	.06	.06	.05	1.34	.18	[-.04, .16]
Problem solving	-.04	-.04	.03	-1.08	.28	[-.11, .03]
Model	$F(3, 288) = 9.00^{***}, R^2 = .09$					

*Note.*  $N = 292$ . Bootstrap generated confidence intervals. CI = confidence interval. Both gender and age group were entered as covariates in all three models. Two participants were omitted from the analyses as they did not provide their age.

\*\*\* $p < .001$

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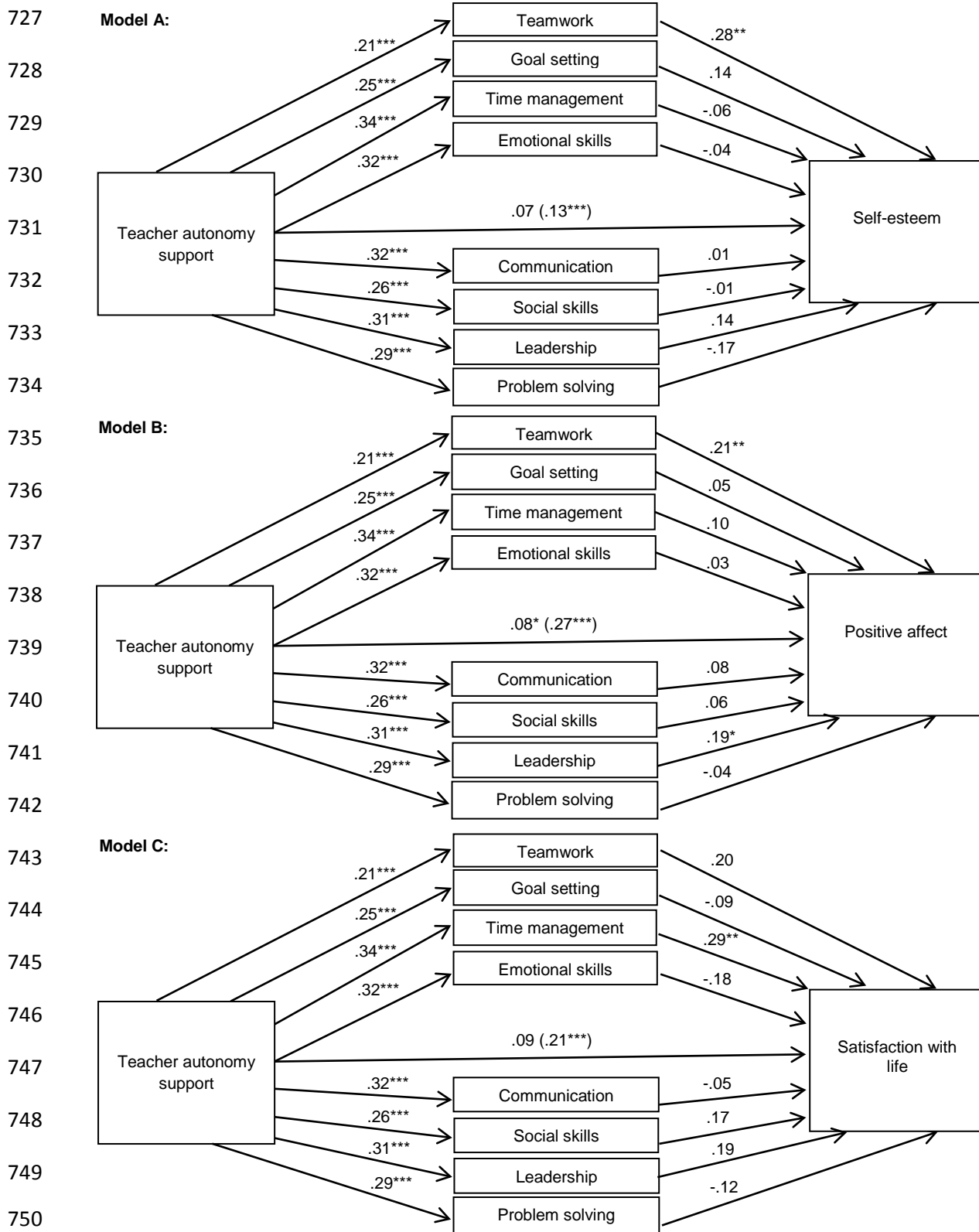
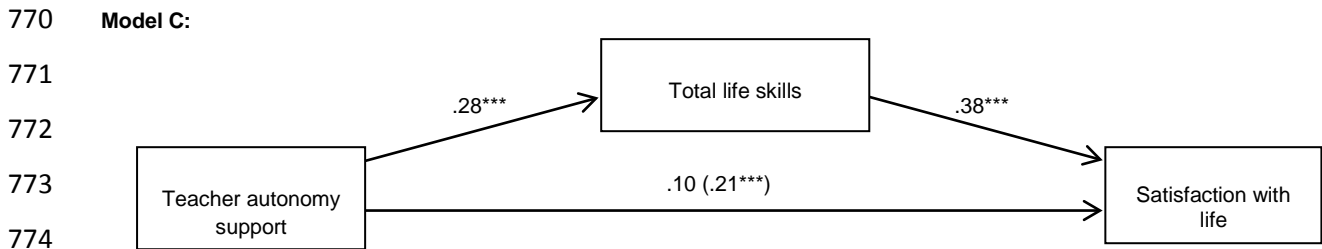
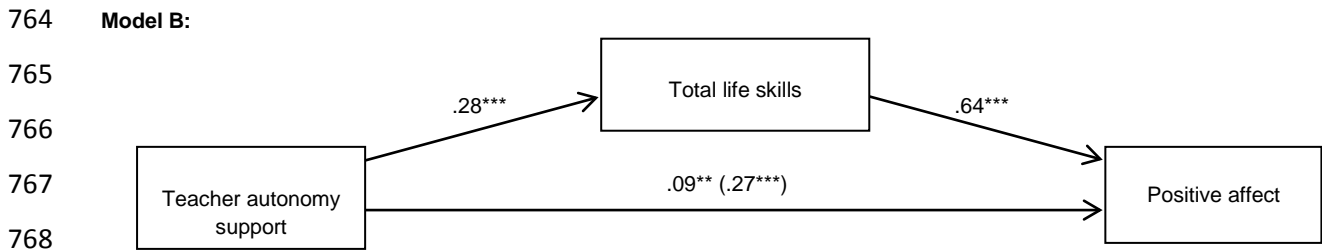
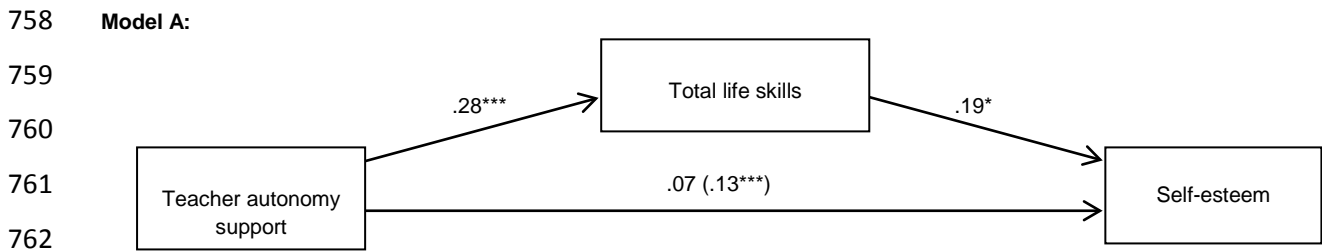


Figure 1. Regression models predicting self-esteem (Model A), positive affect (Model B), and satisfaction with life (Model C). Values signify unstandardized regression coefficients. The direct effect of teacher autonomy support on each indicator of psychological well-being are outside the parentheses. The total effects are inside the parentheses. Both gender and age group were included as covariates in all three models.

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .





776 *Figure 2.* Regression models predicting self-esteem (Model A), positive affect (Model B), and satisfaction with life (Model C).  
 777 Values signify unstandardized regression coefficients. The direct effect of teacher autonomy support on each indicator of  
 778 psychological well-being is outside parentheses. The total effects are inside parentheses. Both gender and age group were  
 779 included as covariates in all three models.

780 \*\* $p < .01$ , \*\*\* $p < .001$ .

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