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Paper:

Deighton, K., Hudson, J., Manley, A., Kaiseler, M., Patterson, L., Rutherford, Z. & Swainson, M. (2017). Effects of emotional intelligence and supportive text messages on academic outcomes in first-year undergraduates. *Journal of Further and Higher Education*, 1-14.

<http://dx.doi.org/10.1080/0309877X.2017.1377161>

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1 **Effects of emotional intelligence and supportive text messages on academic outcomes in**
2 **first year undergraduates**

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20

21 **Running head:** Supportive intervention and student outcomes

22

23 **Word count:** 5876 words.

24 **Abstract**

25 An increase in the number of students entering higher education has intensified the need for
26 targeted strategies to support a wider range of student requirements. Current research suggests
27 that emotional intelligence (EI) may be associated with academic success, progression and
28 retention in university students but the use of EI screening as a prospective measure of success
29 requires further investigation. This study evaluates the utility of prospective EI screening to
30 predict progression rates, mean grades, attendance and online engagement in a sample of first
31 year undergraduate students enrolled on the same degree programme (n=358). A supportive
32 text messaging intervention was employed during potentially stressful periods of the academic
33 year in a subsection of participants (n=60) that demonstrated low total EI scores relative to the
34 cohort. Results showed no effects of EI classification on progression rates, mean grades,
35 attendance and online engagement (all $P > 0.418$). Alternatively, the text messaging intervention
36 was associated with significant improvements compared with a matched control group for
37 progression rates ($P = 0.027$), mean grades ($P = 0.026$) and attendance ($P = 0.007$). The frequency
38 of access to the virtual learning environment also tended to be higher in the intervention group
39 compared with the control group ($P = 0.059$). In conclusion, this study did not identify any
40 benefits of EI screening as a prospective indicator of student success but provides encouraging
41 indications that a text messaging support intervention could help to improve progression rates,
42 mean grades, attendance and online engagement in first year undergraduate students. Further
43 research is warranted to develop these proof-of-concept findings.

44

45 **Key words:** engagement; attendance; grades; progression, support; academic achievement

46

47 **Introduction**

48 The past two decades have witnessed a significant increase in the number of students entering
49 higher education (HE) in the UK. This is demonstrated by the Higher Education Statistics
50 Agency (HESA) who recorded a rise in the number of students enrolling for their first degree
51 from 313,589 in 1996 to 542,575 in 2015 (HESA 1998, 2017). Such widening participation in
52 HE has been maintained in recent years despite the majority of institutions increasing
53 undergraduate tuition fees to £9000 per year and it appears that numbers will remain high for
54 the foreseeable future. In this regard, the continued recruitment of a large number of
55 undergraduate students has been encouraged by the relaxation of government controls over the
56 number of students recruited by institutions, with the complete removal of government controls
57 on recruitment in 2015 being associated with a further small rise of 3% for the number of first
58 degree enrolments (HESA 2017). The increased diversity of university students that
59 accompanies these increased student numbers is acknowledged to broaden the range of student
60 support needs to maximise engagement, progression and academic success (Crozier et al. 2008;
61 Harper & Quaye 2014).

62 The positive relationship between student engagement, retention and success during HE is
63 well-established and has stimulated a growing focus for institutions to develop evidence-
64 informed resources to enhance the engagement of university students (Thomas 2012; Trowler
65 2010). This focus has been particularly aimed at first year students due to the elevated risk of
66 low levels of engagement with the learning environment and increased attrition in this cohort
67 during the transition from school to university (Schneider 2010; Trotter & Roberts 2006). In
68 addition to institutions shaping the HE context to facilitate academic engagement, a growing
69 body of evidence has explored the influence of students' existing emotional and social
70 competencies in aiding them in the transition into, and through, university-level study (Keefer
71 et al. 2012; Richardson et al. 2012).

72 The definitions of academic achievement and academic success remain debated and these
73 concepts are often used interchangeably within the research literature. Acknowledged
74 definitions of student success are typical broad, as described by Kuh et al. (2006, p.5) as
75 “academic achievement, engagement in educationally purposeful activities, satisfaction,
76 acquisition of desired knowledge, skills and competencies, persistence, attainment of
77 educational outcomes, and post-college performance”. The focus of EI research on student
78 outcomes during their first year at university often precludes the assessment of post-college
79 performance but instead focus on the mean grade achieved by students during an academic
80 year and/or the progression rates of students to the subsequent year of study (Parker et al. 2004,
81 2005, 2006; Qualter et al. 2009). This also aligns with the findings of a recent literature review
82 which identified that academic achievement is the most frequently used assessment of
83 academic performance in previous research and that this was almost entirely measured as the
84 grades achieved by the students (York et al. 2015). In accordance with the definition provided
85 above, measures of progression and engagement were also frequently identified within the
86 literature (York et al. 2015). The use of these most commonly employed assessment methods
87 were prioritised in the present study to facilitate comparisons with previous research within the
88 topic and due to the easily quantifiable and accessible nature of these data.

89 Emotional intelligence (EI) has generated significant attention as an explanatory variable for
90 important life outcomes, including the extent to which students succeed and progress during
91 their studies at university (Parker et al. 2011). The exact definition of EI and the most
92 appropriate methods for assessing this construct remain highly debated, with some authors
93 considering EI to be an ability-based measure (e.g., Mayer et al. 2008), while others have
94 promoted EI as a trait-based measure (e.g., Petrides, Pita, & Kokkinaki 2007). In accordance
95 with these perspectives, ability-based measures of EI focus on emotion-related cognitive skills,
96 whereas trait-based measures of EI are assessed using self-report questionnaires, similar to

97 other personality variables. Although the broad and varied definitions of EI have attracted
98 criticism from some scholars (e.g., Locke 2005), both the ability and trait aspects of EI have
99 been linked with substantive outcome criteria. The focus of the current investigation will be on
100 trait EI due to the established relationship between trait EI and academic success in North
101 American universities (Parker et al. 2004, 2005). In this regard, high achieving first year
102 university students demonstrated greater self-reported EI scores on enrolment to university
103 compared with lower achieving students (Parker et al. 2004, 2005). These findings are based
104 on assessments using the EQ-i:S (Bar-On 2002) which comprises four broad EI dimensions of
105 intrapersonal, interpersonal, adaptability, and stress management. The subsequent validation
106 of these scales in undergraduate students (Parker et al. 2011) further supports this approach to
107 assessing EI, which may accordingly be defined as: “the interrelated emotional and social
108 competencies, skills and facilitators that determine how effectively we understand and
109 express ourselves, understand others and relate with them, and cope with daily demands”
110 (Bar-On 2006, p.3). The development of such self-report methods also allows for large cohorts
111 to be screened which may help to prospectively identify students with lower levels of EI upon
112 entry to university and enable targeted interventions to provide further support during their
113 studies.

114 In addition to maximising academic performance, screening students for EI at the beginning of
115 their university studies could also be beneficial for identifying students with an increased risk
116 of attrition to enable more targeted support interventions. In this regard, preliminary evidence
117 from individual UK and Canadian universities has demonstrated higher total self-reported EI
118 scores in students who progressed from the first to second year of university study compared
119 with students who withdrew from their respective degree programme (Parker et al. 2006;
120 Qualter et al. 2009). Although EI is likely to be only one aspect of a multitude of reasons for
121 differences between students’ progression and attrition rates, this represents an easily

122 quantified variable that can be targeted to improve student outcomes. When considering other
123 factors that influence progression and attrition rates, it is widely acknowledged that the
124 motivation and opportunity for students to succeed within education is considerably influenced
125 by the context of an individual's personal and social circumstance (Cartney & Rouse 2006;
126 Haggis 2004). Specifically, the extent to which students feel socially integrated and connected
127 within the university environment is positively associated with student progression (Christo &
128 Oyinlade 2015; Lockhart 2004; Wilcox et al. 2005). The socio-economic circumstances of
129 students have also been shown to be predictive of progression and academic achievement as
130 recently reported by Crawford (2014). This report evaluated English-domiciled students who
131 attended any UK university for the first time at age 18 or 19 between 2004-05 and 2009-10,
132 with each cohort including between 180,000 and 235,000 HE participants. The socio-economic
133 background of students was established by combining individual and neighbourhood level data,
134 with the findings demonstrating that students from the highest socio-economic quintile group
135 were approximately 3.4 percentage points less likely to withdraw from their studies, 5.3
136 percentage points more likely to complete their degree and 3.7 percentage points more likely
137 to graduate with a First or 2:1 degree classification than those from the lowest socio-economic
138 quintile group. Similar degree completion rates and attrition differences between socio-
139 economic groups have been reported in Australian universities which demonstrates the
140 international relevance of this issue (Edwards & McMillan 2015). Although EI is the focus of
141 the present study, further research should aim to develop interventions to support students in
142 relation to these other predictors of progression and academic achievement.

143 Targeted interventions to support students with lower EI scores on entry to university are
144 promising and have primarily focussed on peer-mentoring from older students at the university.
145 In a Canadian university, this approach has been shown to reduce attrition in students who
146 received peer-mentoring either during the summer break at the end of their first year of study

147 or throughout the full academic year (Philippi, Kristensen, and Taylor 2012). These beneficial
148 effects were substantial with an attrition rate approximately 10% lower than a control group of
149 students with similar EI scores that did not receive peer-mentoring. These findings have been
150 further substantiated at a UK university where peer mentoring and the completion of activities
151 to improve EI in students with low baseline scores increased retention rates by approximately
152 25% compared with a cohort that did not receive the intervention (Qualter et al. 2009).

153 The benefits of peer-mentoring for students with low EI scores is encouraging. However, it
154 must be acknowledged that this intervention has resource implications regarding staffing and
155 time commitments which may not be feasible for all institutions. Recent developments within
156 the field of physical activity has demonstrated the utility of targeted text messages to increase
157 participants' feelings of support and improve the continuation of increased physical activity
158 levels in response to an exercise intervention (Kinnafick, Thøgersen-Ntoumani, and Duda
159 2016). These findings demonstrate the potential application of a supportive, yet generic, text
160 messaging intervention to improve persistence with a new behaviour within an unfamiliar
161 environment. This has many similarities with the behavioural changes required for an effective
162 transition and learner success in an unfamiliar HE environment (Briggs et al. 2012) and
163 subsequently it seems feasible that similar interventions could also assist students during their
164 transition to university and through their first year of study. This would also represent a cost-
165 effective method to highlight the support that is available to students and encourage students
166 to seek assistance if required.

167 The purpose of the present study was to further investigate the relationship between the EI
168 scores of students on enrolment to university and measures of academic attainment,
169 engagement and retention during their first year of study. From this sample, we also aimed to
170 establish whether a text messaging intervention can improve student outcomes in those who
171 demonstrated low EI scores on enrolment. This research will add to the limited understanding

172 of the relationship between EI scores and academic outcomes in UK universities, as well as
173 evaluating the effectiveness of a novel low cost intervention to improve academic outcomes in
174 students with low EI scores. In contrast to previous research, this study utilised a cohort of
175 students that were enrolled on the same degree programme in the same year and who were
176 required to complete the same six 20 credit modules for their first year of study. This novel
177 population allowed further investigation into the role of EI on student outcomes without the
178 confounding influence of students having different enrolment dates, studying different modules
179 or studying for different degree programmes. We hypothesised that students with higher EI
180 scores on enrolment would achieve higher grades and have higher levels of engagement and
181 retention than students with lower EI scores. We also hypothesised that the provision of
182 supportive text messages would improve academic attainment, engagement and retention in
183 those students with low EI scores on enrolment.

184 **Materials and methods**

185 *Participants*

186 All first year BSc Sport & Exercise Science students at the same university in the UK were
187 invited to participate in the study in October 2015. From the cohort of 420 students, 358
188 students provided written informed consent for their data to be used within the study. All
189 participants would be expected to graduate from their three year degree programme in 2018.
190 To ensure that students did not feel coerced into giving consent, they were informed that student
191 IDs would be used to store data and to track student activity and engagement with support and
192 Virtual Learning Environment (VLE) services. Ethical approval for the study was granted by
193 the Faculty Local Research Ethics Committee.

194

195 ***Context***

196 This research was embedded within one of the six compulsory 20 credit first year modules on
197 the BSc Sport & Exercise Science course titled ‘Introduction to Research and Study Skills’
198 (IRSS). The module spanned both semesters and focused on developing academic and study
199 skills in semester one, while providing an introduction to research methods and data analysis
200 in semester two. The module structure included biweekly keynote lectures and weekly seminars
201 delivered to each group by their personal tutor. Each tutor group contained approximately 20
202 students and there were 20 tutor groups for the cohort (groups A-T). Staff teaching on the
203 module were briefed about the research study and its use as a stimulus for students’ personal
204 reflection and planning during the IRSS module.

205 ***Procedures***

206 *Emotional Intelligence Profiling*

207 During the first week of semester one, all participants completed an online version of the EQ-
208 i:S (Bar-On 2002) during their IRSS seminar session. Based on its factor structure and
209 associations with conceptually similar measures (ability-based EI and alexithymia), Parker et
210 al. (2011) have demonstrated the conceptual and theoretical integrity and the discriminant and
211 convergent validity of the EQ-i:S.. For total EI scores and individual subscales, test-retest
212 correlation coefficients, obtained from administrations six months apart, of 0.60 and above
213 supported its temporal reliability, and, Cronbach’s alpha values over 0.75 indicated the
214 measure’s internal reliability. This measure has been associated with academic success and
215 retention in universities in North America (Parker et al. 2004, 2005, 2006).

216 The EQ-i:S includes 51 items that represent six subscales, four of which were used to determine
217 a total EI score in accordance with previous research (Keefer et al. 2012). These four subscales
218 (comprising 35 items) were used in the current study and are as follows: Interpersonal skills

219 (10 items assessing social awareness and ability to establish and be part of social relationships);
220 Intrapersonal skills (10 items assessing self-awareness and the ability to recognise and
221 effectively manage one's self-expression); Stress management (8 items assessing the ability to
222 manage and regulate emotions); and Adaptability (7 items measuring the ability to adapt to
223 change and solve personal and interpersonal problems).

224 Example items from each subscale are: 'I like helping people' (Interpersonal); 'I'm unable to
225 express my ideas to others' (Intrapersonal; reverse scored item); 'It is a problem controlling
226 my anger' (Stress Management; reverse scored item); 'My approach in overcoming difficulties
227 is to move step by step' (Adaptability). Respondents indicate their responses using a 5-point
228 Likert scale anchored by 1 (*Very seldom true of me*) and 5 (*Very often true of me*).

229 Students confidentially received their individual EQ-i:S results during the fourth IRSS seminar
230 in semester one. This session also provided an explanation of the concept of emotional and
231 social skills, the different elements that the scores on the EQ-i:S represented, and evidence
232 supporting the link between emotional intelligence and outcomes in academia. Students were
233 encouraged to consider the relevance of these skills to help them manage the transition to
234 university and to reflect on their personal profiles to establish areas of strength and areas for
235 improvement. It is important to note that the entire cohort for the degree programme completed
236 the EQ-i:S and attended the feedback session as part of the IRSS module provision but data
237 was only used in the present study for those who provided consent.

238 *Group Allocation*

239 The participants were separated into thirds based on their total EQ-i:S scores (i.e. highest,
240 middle and lowest thirds). Students in the lowest third for EQ-i:S scores were selected for the
241 intervention based on evidence that lower scores increase the risk for attrition and lower
242 academic performance (Parker et al. 2004, 2006), therefore suggesting that these students may

243 benefit most from the intervention. To robustly investigate the effects of the intervention,
244 students in the lowest third were quasi-randomised into either a control or intervention group
245 based on their tutor group. In this regard, those in the lowest third in tutor groups A-J received
246 the intervention, while those in the lowest third in tutor groups K-T acted as control participants
247 without any intervention. The assignment of these students to a non-intervention control group
248 enabled accurate assessment of the text messaging intervention but also provided the
249 opportunity to investigate the relationship between EI scores and student outcomes without
250 there being any contamination of the data from the intervention. In this regard, the 168 students
251 from tutor groups K-T provided a large sample of students to accurately assess differences in
252 student success outcomes across the different EI tertiles without any intervention. The control
253 and intervention groups were matched for EQ-i:S scores (mean (SD); Intervention: 103 (4);
254 Non-intervention: 103 (5)) and 60 participants were included in each group.

255 *Intervention*

256 Participants in the intervention group received three text messages from the Faculty Student
257 Liaison Officer (SLO) at pre-identified time points throughout the year. These time points
258 represented potentially stressful periods for the students and were as follows: November 2015
259 (prior to the semester one assessment period); February 2016 (the beginning of semester two
260 and at the time of results feedback from semester one); and April 2016 (prior to the assessment
261 period for semester two). The text message reminded students of the pastoral, academic and
262 personal support that was available within the faculty and the university with a hyperlink to
263 details about these services. The message also invited students to ‘drop-in’ or make an
264 appointment to see an SLO using the hyperlink provided. Messages were tailored to match the
265 time of year at which they were sent, for instance, referring to preparing for examinations,
266 considering assessment results and preparing for the upcoming semester. Although these

267 services were available to all students within the faculty, the intervention highlighted the
268 availability of the services and made an explicit offer for the students to use this support.

269 *Monitoring of Outcomes*

270 Attendance registers were collected during all seminar sessions for the IRSS module and
271 collated at the end of the academic year. The number of times that the participants accessed the
272 IRSS module content on the VLE was also monitored and collated throughout the year as a
273 marker of student engagement. The mean grade achieved by the participants for their first year
274 modules and the successful completion of first year studies for progression to the second year
275 of the degree programme were obtained from the annual examination board statistics.
276 Progression to the second year of the degree required a mean grade of 40% or higher for the
277 first year modules, with a minimum grade of 40% in five modules and a minimum grade of
278 30% in the remaining one module.

279 *Data Analysis*

280 Data were analysed using IBM SPSS statistics version 22 for Windows and all data are
281 presented as mean (SD). Participants were divided into tertiles based on their ranked total EI
282 score to produce highest, middle and lowest thirds. The threshold values for each third were
283 calculated based on the scores from the entire cohort of the degree programme. Where the
284 threshold value for each third contained multiple participants all participants were retained
285 within the relevant third.

286 One-way ANOVA with post-hoc independent samples t-tests was used to assess differences
287 between tertiles for EI subscales, attendance, VLE access and the mean grade achieved during
288 the year. Differences between the intervention and non-intervention groups for attendance,
289 VLE access and the mean grade achieved during the year were assessed using independent
290 samples t-tests. Progression and withdrawal data were entered in binary form and compared

291 between tertiles and between the intervention and non-intervention groups using the Chi-
292 squared test. Statistical significance for this study was accepted as $P < 0.05$.

293

294 **Results**

295 *Baseline data*

296 Total EI scores for the A-J and K-T tutor groups were comparable at baseline (Highest third:
297 122 (6) vs. 125 (6); Middle third: 112 (2) vs. 113 (2); Lowest third: 103 (4) vs. 103 (5) for the
298 A-J and K-T tutor groups, respectively). The number of students in the A-J and K-T tutor
299 groups was also similar at baseline (Highest third: 53 vs. 50; Middle third: 77 vs. 58; Lowest
300 third: 60 vs. 60 for the A-J and K-T tutor groups, respectively). The scores for each subscale
301 of the EQ-i:S were significantly different between tertiles in accordance with the total EI scores
302 (all $P < 0.0005$; Table 1).

303 *Progression rates*

304 Chi-squared test revealed a trend towards a difference in progression rates to the second year
305 of the degree programme between tertiles when assessed as an entire cohort. This indicated
306 higher progression rates in the lowest third than the highest and middle thirds ($P = 0.077$;
307 Highest third: 67%; Middle third: 67%; Lowest third: 78%; Figure 1a). This trend was
308 consistent within tutor groups A-J ($P = 0.092$; Highest third: 72%; Middle third: 73%; Lowest
309 third: 87%; Figure 1c) but not tutor groups K-T ($P = 0.419$; Highest third: 62%; Middle third:
310 59%; Lowest third: 70%; Figure 1d). This difference appears to be the result of higher
311 progression rates in the intervention group (i.e., the lowest third of tutor groups A-J) compared
312 with the non-intervention group (i.e., the lowest third of tutor groups K-T) ($P = 0.027$;
313 Intervention: 87%; Non-intervention: 70%; Figure 1b).

314 The number of students that withdrew from the degree programme before the end of the
315 academic year was not different between tertiles ($P = 0.490$; Highest third: 7 students; Middle
316 third: 13 students; Lowest third: 7 students). There was also no difference between tertiles in
317 the number of withdrawals for tutor groups A-J ($P = 0.610$) or K-T ($P = 0.381$), or between
318 intervention and non-intervention groups ($P = 0.697$).

319 *Mean grade*

320 One-way ANOVA revealed no significant difference in mean grade between tertiles when
321 assessed as an entire cohort ($P = 0.129$; Figure 2a). Alternatively, mean grade was significantly
322 different between tertiles for tutor groups A-J ($P = 0.032$), with post-hoc analysis demonstrating
323 significantly higher grades in the lowest third compared with the highest third ($P = 0.010$) and
324 a trend for higher grades in the lowest third compared with the middle third ($P = 0.087$) (Figure
325 2c). There was no difference between tertiles for tutor groups K-T ($P = 0.678$; Figure 2d). These
326 contrasting findings appear to be the result of higher mean grades in the intervention group
327 compared with the non-intervention group ($P = 0.026$; Figure 2b).

328 *Attendance*

329 One-way ANOVA revealed no significant difference in attendance between tertiles when
330 assessed as an entire cohort ($P = 0.375$; Figure 3a), tutor groups A-J ($P = 0.490$; Figure 3c) or
331 tutor groups K-T ($P = 0.885$; Figure 3d). Attendance was significantly higher in the intervention
332 group than the non-intervention group ($P = 0.007$; Figure 3b).

333 *VLE access*

334 One-way ANOVA revealed no significant difference in the frequency of VLE access between
335 tertiles when assessed as an entire cohort ($P = 0.652$; Figure 4a), tutor groups A-J ($P = 0.935$;
336 Figure 4c) or tutor groups K-T ($P = 0.500$; Figure 4d). There was a trend towards a higher

337 frequency of VLE access in the intervention group compared with the non-intervention group
338 ($P = 0.059$; Figure 4b).

339

340 **Discussion**

341 Higher education institutions typically rely on personal tutoring programmes to provide both
342 academic and pastoral support to students. However, there is a need to adopt additional
343 strategies to support students during their transition to a university learning environment and
344 to retain students in accordance with the UK performance indicators of HE (HESA 2016;
345 Pollard et al. 2013). Although recent research has used EI screening as a tool to identify
346 students that may require additional support during the transition to university (Philippi,
347 Kristensen, and Taylor 2012; Qualter et al. 2009), the present study did not observe any
348 association between EI scores and academic performance or progression rates in a cohort of
349 first year undergraduate students. However, this study did demonstrate improved outcomes for
350 a subsection of the participants that received a targeted text messaging support intervention.

351 In addition to investigating the effects of a supportive text messaging intervention, the present
352 study design enabled further exploration of the relationship between EI and progression rates,
353 achieved mean grade, attendance and VLE access in first year undergraduate students. This
354 was achieved through the use of a control group for students within the lowest third of total EI
355 scores who were in tutor groups K-T. Subsequently, the lack of any intervention for the 168
356 students in tutor groups K-T across all EI tertiles provided the opportunity to investigate these
357 relationships without any contamination from experimental interventions. Our findings
358 demonstrated that progression rates, achieved mean grade, attendance and VLE access did not
359 significantly differ across the three tertiles of EI. These results do not appear to support the
360 notion suggested by others that higher emotional intelligence is associated with greater

361 likelihood to progress (Parker et al. 2006; Qualter et al. 2009), higher academic attainment
362 (Parker et al. 2004, 2005; Pope, Roper, and Qualter 2012) and greater engagement with
363 learning (Arguedas, Daradoumis, and Xhafa 2016). One potential explanation for such
364 conflicting results is the method of data analysis performed within the studies. In this regard,
365 positive associations between EI and academic outcomes have typically been observed via
366 retrospective analysis of EI scores after the participants have been separated into categories of
367 academic achievement or progression at the end of the monitoring period (Parker et al. 2004,
368 2005, 2006; Pope, Roper, and Qualter 2012; Qualter et al. 2009). In contrast, the purpose of
369 the present study was to evaluate the effectiveness of EI screening as a *prospective* measure to
370 identify students that might benefit from additional support during their first year at university.
371 The categorisation of participants into tertiles based on total EI scores follows a similar
372 approach to Qualter et al. (2009) who also failed to observe a relationship between EI and
373 progression rates when participants were prospectively categorised.

374 A particularly novel aspect of the present study was the targeted provision of a text messaging
375 intervention to raise students' awareness of university support services at key time points
376 during the academic year. Although the present study may be regarded as a pilot intervention,
377 the initial results are encouraging. In this regard, compared with a matched control group, the
378 students receiving the intervention demonstrated significantly higher progression rates, higher
379 mean grades, higher attendance, and a trend towards greater VLE access. These seemingly
380 beneficial effects occurred despite the absence of any responses from the intervention group to
381 seek appointments with the Student Liaison Officer after receiving the text messages. The
382 reasons for students not responding to the offered support are unknown but their reluctance to
383 engage with support services corresponds with previous literature. In this regard, university
384 students have shown significant heterogeneity in their support seeking behaviours, with
385 students commonly not seeking help for academic (Ryan et al. 1998), counselling (Morgan et

386 al. 2003) career guidance (Graef et al. 2010), and mental health support (Eisenberg et al. 2007)
387 even when the help is available and required. Findings specifically from UK universities
388 highlight that many students do not seek support even when experiencing a problem (Christie
389 et al. 2004), which is particularly concerning based on data from more than 450 campus-based
390 and open university students that all students within this sample reported some difficulty when
391 entering HE (Gutteridge 2001). In the present study we attempted to reduce the barriers to
392 support seeking by directly reminding students of the support available within the university.
393 Further investigation of the reasons underlying the lack of help seeking behaviours was beyond
394 the scope of this study but represents an important avenue for future research to establish how
395 to develop future support mechanisms that are most appropriate for the student population.

396 Although the text messaging intervention did not promote help seeking behaviours from the
397 students, it seems feasible that the receipt of the text messages alone may have benefitted the
398 students. This effect is supported by previous evidence that a text messaging intervention
399 increased participant perceptions of support and persistence with new behaviours in a physical
400 activity setting (Kinnafick, Thøgersen-Ntoumani, and Duda 2016). Furthermore, in a sports
401 performance context the mere perception of support has been shown to evoke an increased
402 sense of confidence and reassurance coupled with a reduction in stress and anxiety (Freeman
403 and Rees 2010). These findings suggest that an increased perception of support may have been
404 gained from the text messaging intervention to help students cope and persist with the demands
405 of an unfamiliar HE environment. The observed improvements in progression rates may be
406 particularly relevant for HE institutions in the UK considering the increased focus on student
407 retention as a key marker of success for universities and the need for high retention rates to
408 fulfil financial aims via the income generated from tuition fees (Bennett, Kottasz, and
409 Nocciolino 2007; Owen 2002; Simpson 2005). Retention is also important to maximise the
410 prospects of enrolled students based on evidence that compared with non-graduates, university

411 graduates lead healthier lifestyles (Baum, Ma, and Payea 2013) and experience better outcomes
412 in both lifetime earnings and employability (Day and Newburger 2002; Universities UK 2014).
413 However, further research is required to substantiate the findings of the present study and to
414 assess student perceptions of support in response to this form of intervention.

415 The findings from the present study provide a number of implications and future directions for
416 both research and practice that require consideration. First, considering the novelty of the text
417 messaging intervention within this context, it is crucial that further research is performed to
418 investigate similar time- and cost-effective interventions to improve student outcomes in a
419 larger sample of students and across a range of institutions. It must also be acknowledged that
420 EI is considered to be a dynamic construct with the potential to fluctuate over the course of a
421 student's experiences within HE (Parker et al. 2004). Subsequently, the findings of the present
422 study may be limited by the assessment of EI at a single baseline time point and future research
423 may benefit from the longitudinal assessment of EI and its association with relevant outcomes
424 throughout university degree programmes. Second, future research should also consider the
425 most appropriate outcomes to assess as a measure of student engagement. Although the present
426 study used the most appropriate proxy measurements for student engagement (attendance and
427 VLE access), a more targeted and comprehensive investigation is required in future research
428 to examine the qualitative aspects of this concept (Kuh 2009). Third, EI was assessed in the
429 present study using a validated and reliable EI questionnaire (Parker et al. 2011) in order to
430 screen a large cohort of students with limited resources. This method successfully differentiated
431 the EI of students and provided further insights into the relationship between EI and student
432 success outcomes, as well as enabling our investigation into the effects of a text messaging
433 intervention for those students with the lowest EI scores on entry to university. The quantitative
434 findings gained from the present study provide important insights into the potential utility of
435 prospective EI screening as a predictor of student success. These findings have also

436 demonstrated the potential benefits of supportive text messaging to improve student outcomes.
437 It would be beneficial for future research to develop these findings through the addition of
438 qualitative data to better understand optimal support interventions and for the development of
439 other novel or adapted approaches to support the diverse needs of university students.

440 An additional fundamental consideration in relation to the present study is that the definition
441 of academic success and achievement remains a debated topic and we did not assess all aspects
442 of this concept. In this regard, a recent review has suggested that additional aspects beyond
443 those assessed in the present study should be considered when measuring academic
444 achievement (York et al. 2015). This includes distinctly assessing the attainment of learning
445 objectives and the acquisition of desired skills and competencies of students during their degree
446 programme as a marker of learning rather than focussing solely on performance ability. Student
447 satisfaction has also been considered as an outcome for student success based on the
448 acknowledged relationship between student wellbeing and academic performance (Beghetto
449 2004; York et al. 2015), and ultimately the post-college performance of students should be
450 integrated within measures of academic success (York et al. 2015). Subsequently, although the
451 present study measured the most commonly used markers of academic success, it must be
452 acknowledged that this provided relatively narrow criteria for academic success and it would
453 be beneficial for future research to evaluate the effectiveness of support interventions on
454 student success when measured more holistically.

455 Despite these limitations, we can state with confidence that the participants did not respond
456 adversely to the intervention performed in the present study and the observed positive effects
457 associated with such a low-cost initiative suggests that staff within HE environments may be
458 in a position to harness novel time- and cost-effective support mechanisms to benefit student
459 outcomes. It must also be considered that this approach could be used in conjunction with,
460 rather than as a replacement for, peer-mentoring schemes if these are already established within

461 institutions. Such use of multiple student support initiatives may be beneficial considering that
462 peer-support networks have been advocated as a useful intervention for students in HE but that
463 an optimal approach has not yet been established (Crisp and Cruz 2009).

464 In conclusion, this study did not identify any benefits of EI screening as a prospective indicator
465 of student success but provides encouraging indications that a text messaging support
466 intervention could help to improve attendance, mean grades and progression rates in first year
467 undergraduate students. Considering the novel nature of the intervention within this context,
468 these conclusions should be viewed as tentative, with further research warranted before they
469 are used as the basis for interventions being developed and implemented with student cohorts
470 on a wider scale. The authors of the present study recommend that colleagues at other
471 institutions consider opportunities for conducting additional studies that employ more
472 prolonged and intensive investigations to further investigate these proof-of-concept findings.

473

474 **Acknowledgements**

475 We would to thanks all of the staff who facilitated the completion of emotional intelligence
476 profiling during their IRSS seminar sessions. We would also like to thank the Student Liaison
477 Officers for their assistance with the project and Martin Pemberton for his assistance with the
478 administration of outcome monitoring.

479 **Conflict of interest**

480 The authors declare that there are no conflicts of interest.

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626 **Table 1.** Scores for each subscale of the EQ-i:S in each tertile.

| | Highest third | Middle third | Lowest third | P |
|----------------------|---------------|--------------|--------------|---------|
| Interpersonal skills | 41 (3) | 40 (3) | 38 (4) | <0.0005 |
| Intrapersonal skills | 27 (5) | 23 (4) | 19 (4) | <0.0005 |
| Stress management | 28 (5) | 24 (4) | 22 (3) | <0.0005 |
| Adaptability | 27 (4) | 26 (3) | 24 (4) | <0.0005 |

627

628 Values are mean (SD). P-values were determined using one-way ANOVA.

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633 **Figure 1.** Progression rates from the first to second year of study for the entire cohort (a), the
634 intervention and non-intervention groups (b), tutor groups A-J (c) and tutor groups K-T (d).
635 Black bars represent the number of progressing students and the white bars represent the
636 number of non-progressing students. *Significantly different between intervention and non-
637 intervention groups.

638 **Figure 2.** Mean grade achieved during the first year of study for the entire cohort (a), the
639 intervention and non-intervention groups (b), tutor groups A-J (c) and tutor groups K-T (d).
640 *Significantly different between intervention and non-intervention groups. #Significantly
641 higher in the lowest third than the highest third. Values are mean (SD).

642 **Figure 3.** Seminar attendance within the IRSS module for the entire cohort (a), the intervention
643 and non-intervention groups (b), tutor groups A-J (c) and tutor groups K-T (d). *Significantly
644 different between intervention and non-intervention groups. Values are mean (SD).

645 **Figure 4.** VLE access within the IRSS module for the entire cohort (a), the intervention and
646 non-intervention groups (b), tutor groups A-J (c) and tutor groups K-T (d). Values are mean
647 (SD).

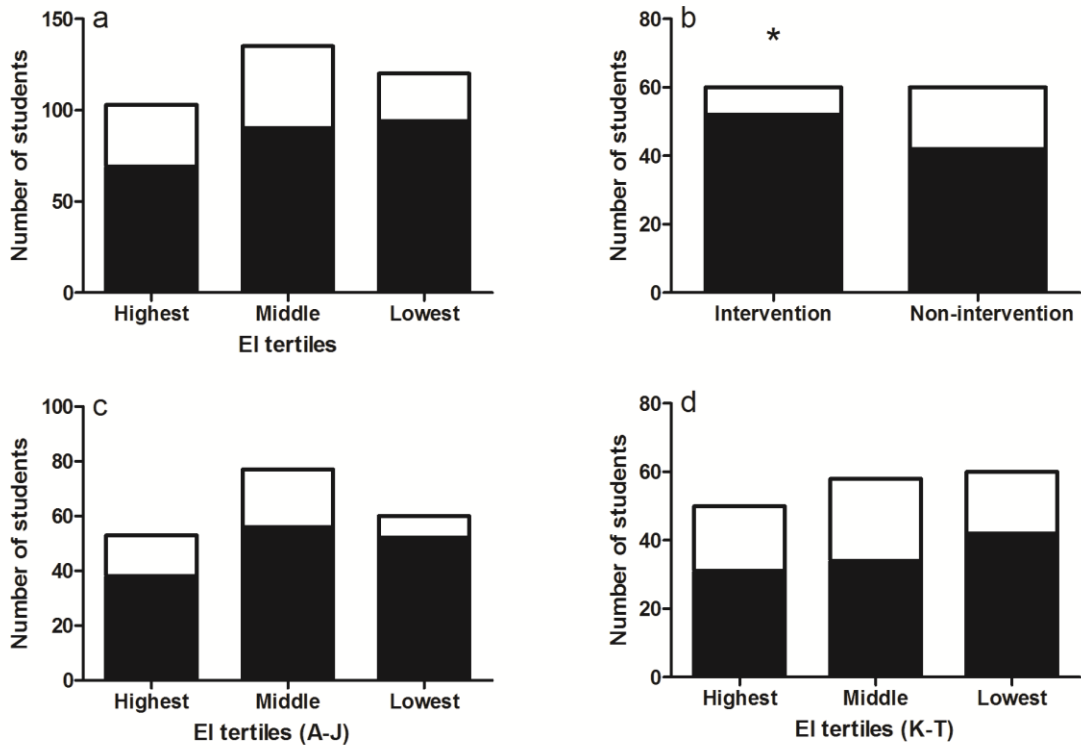
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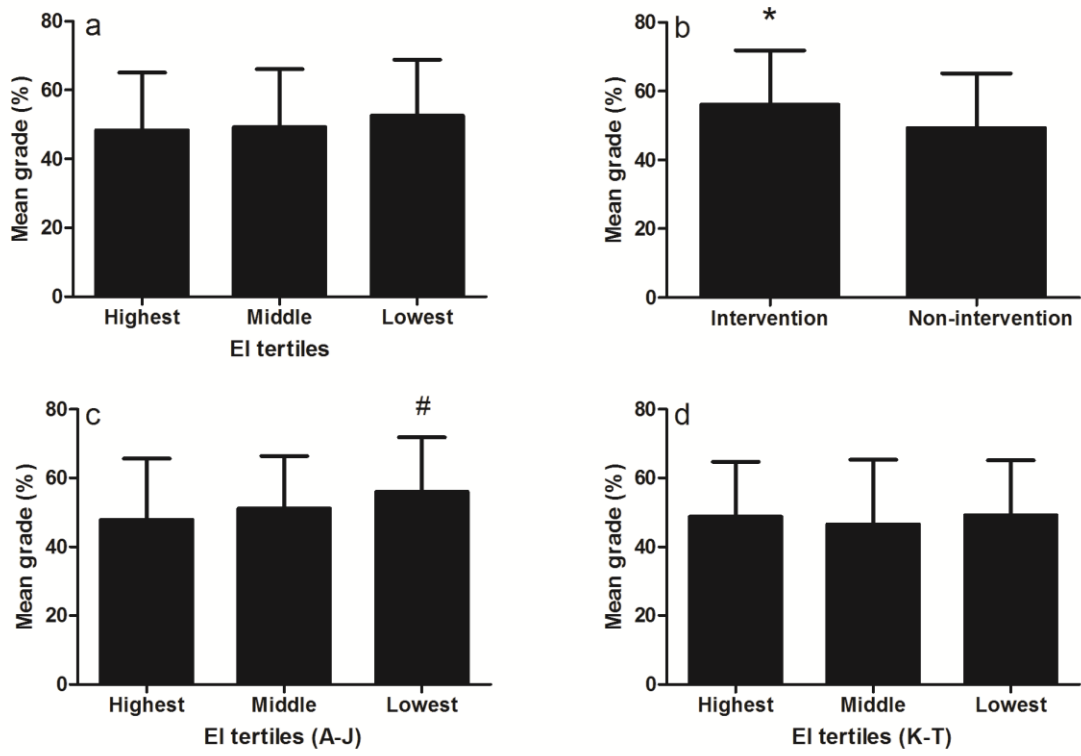
652 **Figure 1**



653

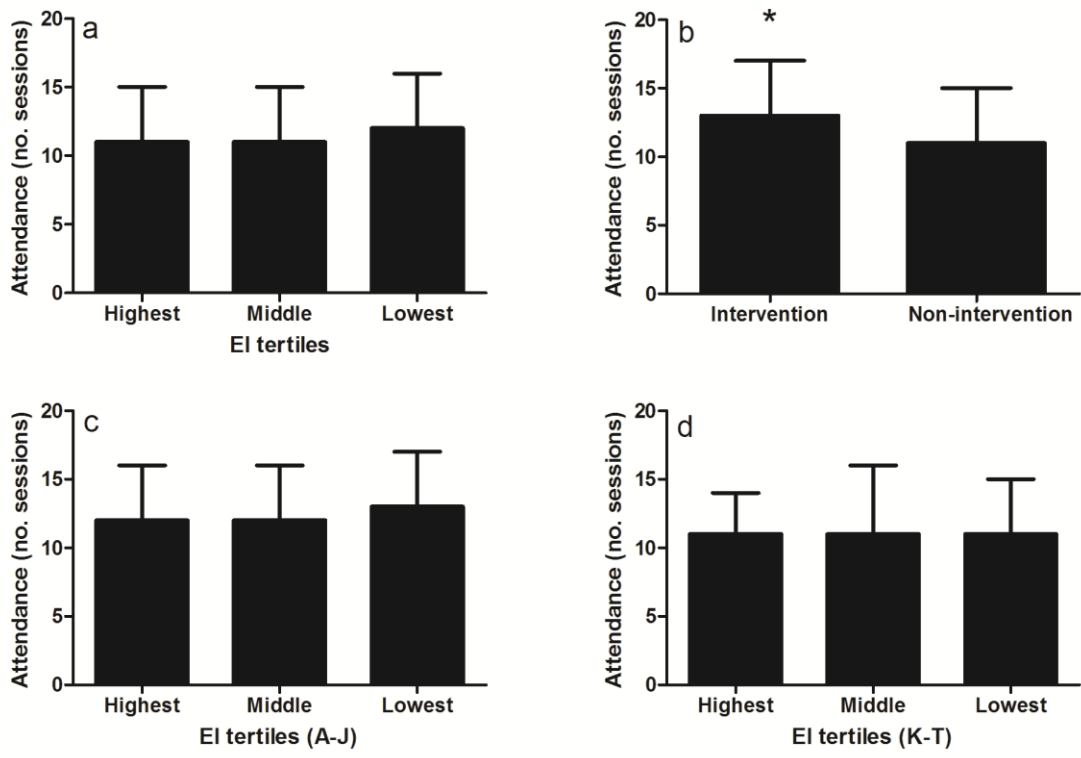
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655 **Figure 2**



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