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9 **The Perception of Psychology and the Frequency of Psychological Strategies**
10 **used by Strength and Conditioning Practitioners**

11 RADCLIFFE, J. N., COMFORT, P., & FAWCETT, T.

12 2013.

13 JSCR-08-2162: Revision 2

14

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16 This is a non-final version of an article published in final form in:

17 Radcliffe, J. N., comfort, P., & Fawcett, T. (2013). The perception of psychology and the
18 frequency of psychological strategies used by strength and conditioning practitioners.
19 *Journal of strength & conditioning research*, 27(4), 1136-1146.

20

21 Available at:

22 <http://journals.lww.com/nsca-jscr/Pages/default.aspx>

23

ABSTRACT

24 The study aimed to firstly examine the frequency of the psychological skills
25 and strategies of Strength and Conditioning practitioners and secondly distinguish
26 between demographic differences in relation to psychological skills and strategy use.
27 The Strength and Conditioning Sport Psychology Questionnaire was developed to
28 measure the frequency of use of 11 subscales. These consisted of goal setting, imagery,
29 self-talk, mental toughness, attention control, relaxation, stress management, adherence,
30 activation, self-confidence and ego management. Each subscale demonstrated
31 acceptable internal validity (mean inter-item correlations ranged 0.227 - 0.427). The
32 instrument allowed up to 5 open ended responses concerning skills considered most
33 important to strength and conditioning practice and up to 5 psychological attributes
34 considered detrimental within strength and conditioning. 102 participants met the
35 inclusion criteria (90 men and 12 women. Age 34.7 ± 9.7 yrs. Experience 7.4 ± 5.2 yrs.
36 Part time 36.5%, Full time 63.5%. The respondents were registered with the following
37 organizations: UKSCA: 41, NSCA: 48 and ASCA: 48). Goal setting was found to be
38 the most frequently used skill with mental imagery the least used with significant
39 differences identified in the frequency of skill use. The strategies deemed to be most
40 important were motivation and confidence with the most debilitating factors identified
41 as a lack of motivation and a lack of confidence. When comparing demographics,
42 overall skill use varied between practitioners with different experience with more
43 experienced practitioners having greater skill use, both overall and particular individual
44 skills. Participants accredited by the ASCA had a greater psychological skill use than
45 those accredited by other bodies.

46 **KEY WORDS:** Mental training, Goal-setting, Confidence, Motivation, Imagery,
47 Professional development

48

INTRODUCTION

49 Strength and Conditioning has developed from an amalgamation of various
50 long-standing disciplines with the Strength and Conditioning practitioner being
51 required to draw on knowledge from ranging disciplines such as Psychology,
52 Biomechanics, Nutrition, and Exercise Physiology. To date the National Strength and
53 Conditioning Association (NSCA) has conducted two studies into the job analysis of
54 Strength and Conditioning practitioners (7, 64) which has been used to determine both
55 the NSCA professional guidelines and the examination criteria to for the Certified
56 Strength and Conditioning Specialist (CSCS) examination. As published by the NSCA,
57 the Strength and Conditioning Professional Guidelines state that the ability to “*use*
58 *sport psychology techniques to enhance the training and/or performance of the athlete*”
59 is a scientific foundation required by certified Strength and Conditioning Specialists
60 (64). In addition, as a sport training practitioner in regular contact with the athlete the
61 Strength and Conditioning Specialist is in an ideal position to contribute to the
62 psychological aspects of training (5, 33, 53). Furthermore, the coach, rather than
63 psychology titled professionals, has been previously identified as the favored provider
64 of psychological support (53). As such it would be beneficial for Strength and
65 Conditioning practitioners to have knowledge of select psychological techniques and
66 applications within applied practice.

67 The multifaceted role of a Strength and Conditioner practitioner has been
68 examined in various contexts (21, 22, 24-27, 56, 57, 68, 77), ranging from the practices
69 within various North American sports (22, 24-27, 77), the sources of scientific data and
70 training upon which the Strength and Conditioner’s practice is based (24), to job
71 analysis’s and demographics of coaches working at differing levels of competition (21,
72 56, 57, 68). Despite the exploration of the responsibilities and practices of Strength and

73 Conditioning practitioners, the research has focused predominantly on physical training
74 strategies with a dearth of research examining the use of psychology within applied
75 Strength and Conditioning practice. This is emphasized by the widely used *Strength
76 and Conditioning Practices of Professional Strength and Conditioning Coaches* survey
77 instrument (22, 25-27, 56, 74) which focuses on various physical training practices with
78 only the miscellaneous section of “unique aspects” offering scope to examine
79 psychological skill use, consequently such studies have failed to yield data indicating
80 the use of psychological strategies within strength and conditioning practice.

81 Academic interest in psycho-physiological research has led to a wealth of
82 research exploring how psychological interventions affect variables pertinent to
83 Strength and Conditioning with psychological interventions such as mental imagery
84 (50, 62), attentional focusing (34, 54, 82) video modeling (15, 71, 72), increased self
85 confidence (32, 59, 83), goal setting (8, 38, 80), and arousal increasing strategies (58,
86 79, 81) examined. Holloway (45, 46) suggested that it would be beneficial for Strength
87 and Conditioning Specialists to apply key psychological self-regulatory and self-
88 expectancy theories and concepts such as imagery, goal setting, motivation, and self-
89 talk to their clients individualized programs, however there is limited research
90 suggesting the use of such skills. Literature has examined the behavior of Strength and
91 Conditioning professionals without objectively exploring the extent to which key
92 psychological strategies (45, 46) are implemented or perceptions towards the
93 importance of such strategies. Such studies have used a combination of self-report
94 inventories (12, 52) and observation (37, 55) with focus on coaching styles and
95 behaviors. Through observational techniques, Massey et al. (55) led the way in
96 determining the frequency of psychological skills used by Strength and Conditioning
97 coaches. The study highlighted the value of motivational techniques within Strength

98 and Conditioning with behaviors such as ‘hustle’ and ‘praise’ being observed however
99 served as a concern that particular psychological strategies such as positive modeling
100 were neglected in the observed sample.

101 The examination of the how psychological interventions are utilized by the
102 Strength and Conditioning practitioner and the perceived importance of psychological
103 components is a vital step in facilitating the development of Strength and Conditioning
104 as an expanding discipline. This would therefore offer guidance in regard to scope for
105 practitioner development. The present study hypothesized that due to the documented
106 benefits brought through the utilization of particular strategies, Strength and
107 Conditioning practitioners will indeed use psychological strategies as part of their
108 applied practice. It would be expected that strategies such as those to increase adherence
109 to exercise and motivation will be valued as important and expected to be utilized
110 frequently reflecting the existing work of Massey et al. (55). Conversely it is to be
111 expected that due to a perceived lack of awareness and time restraints particular
112 strategies will be perceived as unimportant and underutilized. However, owing to
113 lacking previous studies, it is unclear as to which skills will be neglected and the
114 mechanisms for which the selection of psychological skills is based. This study will
115 consider the perceptions of accredited practitioners from leading Strength and
116 Conditioning professional bodies with an aim to quantify the frequency to which
117 practitioners utilize psychological skills, the particular strategies perceived to be most
118 important to Strength and Conditioning and to identify possible factors such as
119 experience, and practitioner accreditation programs that account for variations in the
120 use of psychological strategies. It is through analyzing such previously neglected
121 variables that professional development can be targeted toward promoting the use of
122 such key psychological strategies.

123

124

METHOD

125 **Experimental Approach to the Problem**

126 To address the research question the present study had three objectives: (1) To
127 quantify the frequency of psychological skills and strategies used by accredited strength
128 and conditioning practitioners, (2) identify the most important psychological strategies
129 and the most debilitating psychological characteristics as perceived by practitioners,
130 and (3) to identify if any difference exists in terms of frequency of use between varying
131 participant demographics.

132 The study required the construction and validation of a suitable survey
133 instrument; the Strength and Conditioning Sport Psychology Questionnaire (SCSPQ).
134 A sample of accredited Strength and Conditioning practitioners were requested to
135 complete the instrument regarding the frequency of selected psychological strategies
136 and open ended questions allowing space to identify most important and the most
137 debilitate strategies and characteristics for their athletes. Through quantifying the
138 frequency of psychological skill usage measured using the SCSPQ comparisons could
139 be made between the perceived frequency of psychological skill usage depending on
140 both participant demographics and the psychological strategy in question. Non-
141 parametric statistical analysis identified significant differences between the frequencies
142 of psychological skill use. The alpha level from which to identify significant differences
143 between subscale scores was set at < 0.05 . Open ended questions invited participants
144 to list the five most beneficial qualities and the five most detrimental qualities with the
145 strength and conditioning environment. Subsequent qualitative analysis adopted the
146 thematic analysis approach (28).

147

148 **Subjects**

149 Prior to commencing the study the University of Salford Ethical Review Board
150 provided approval for the experimental procedures. Prior to participation all subject
151 received an invitation containing participant information including clear explanation of
152 the potential benefits and risks associated with the research, how the data will be
153 handled, the dissemination of findings, and voluntary nature of the study. An email
154 contact was provided for the lead investigator should any potential applicants request
155 additional information. Subsequent to receiving the participant information participant
156 informed consent was received when participants clicked they wished to take part in
157 the study (3). Participants were recruited through practitioner databases in which the
158 participants were registered as an accredited member as either Australian Strength and
159 Conditioning Association (ASCA) level one or above or United Kingdom Strength and
160 Conditioning Association (UKSCA) Accredited Strength and conditioning Coach
161 (ASSC). Mail shots were distributed via the NSCA through distribution channels that
162 requested response from only accredited Strength and Conditioning practitioners
163 accredited by either the UKSCA (ASSC), the NSCA (Certified Strength and
164 Conditioning Specialist: CSCS) or the ASCA (ASCA Level 1, or higher). The survey
165 instrument directions reinforced that only Strength and Conditioning practitioners were
166 eligible to take part. 104 participants responded. 2 participants did not meet the
167 eligibility criteria of being accredited as a strength and conditioning practitioner by a
168 recognized strength and conditioning association (UKSCA, NSCA, ASCA) 102
169 participants met the eligibility criteria comprising 90 men and 12 women with a mean
170 age of 34.7 ± 9.7 yrs. Participants had a mean experience of 7.4 ± 5.2 years working as
171 a Strength and Conditioning practitioner. 36.5% of respondents were part time whilst

172 63.5% working as full time practitioners. Participants were registered with the
173 following organizations: UKSCA Association: n=41, NSCA: n=48, and ASCA: n=48.
174 A number of participants were affiliated with more than one organization. Participants
175 had ranging educational backgrounds (Bachelors, Masters, and Doctoral qualifications
176 in addition to vocational qualifications in related disciplines) however there appears to
177 be no relationship between accredited practitioners affiliation and educational
178 background.

179

180 **Instrumentation**

181 The SCSPQ initially comprised 44 items measuring the frequency of goal
182 setting, imagery, self-talk, mental toughness, attention control, relaxation, stress
183 management, adherence, activation, self-confidence and ego management. Responses
184 were on a 5 point likert scale from *not at all* to *all the time*. The subscales were
185 composed after a review of literature indicating the salient psychological strategies to
186 Strength and Conditioning. Questionnaire content and wording was validated through
187 expert critique of both a Chartered Sport Psychologist (BPS C. Psychol.) and Strength
188 and Conditioning Specialist (CSCS*D, ASCC). Subsequent pilot testing utilized a
189 sample of students on the Strength and Conditioning MSc Degree at a UK university.
190 Subsequent minor changes were made to the wording of questions for example
191 “increasing arousal” was changed to “psyching-up”. Additional open ended question
192 required the respondents to identify up to 5 skills they felt most important to Strength
193 and Conditioning practice and up to 5 psychological attributes that are detrimental
194 within Strength and Conditioning. Participants were asked to provide select
195 demographic data including age, years experience, accrediting body, and the sports they

196 were predominantly involved in (individual, team or both equally) prior to completing
197 the survey.

198 Using SPSS 16 (SPSS Inc., Chicago IL), internal consistency of each subscale
199 was measured using Cronbach's Alpha. The reliability criterion was set at >0.6 due to
200 low number of items within each subscale (51). Subsequent item reduction was
201 conducted to increase internal reliability (19). 13 items were removed resulting in a 31
202 item scale resulting in acceptable internal consistencies ($\alpha > 0.6$) for Goal Setting
203 (0.677), Ego Management (0.679), Imagery (0.684), Relaxation, (0.658), Stress
204 Management (0.608), and Activation (0.675) subscales. Authors have documented the
205 difficulty in achieving acceptable Cronbach's alpha levels with small number of items
206 (42, 51), therefore Briggs and Cheek (11) recommend examining inter-item correlations
207 with mean inter-item correlations ideally between 0.2-0.4. All subscales were deemed
208 to have adequate internal consistency, correlations ranging from 0.227 (attentional
209 control) to 0.427 (imagery and ego management).

210

211 **Procedure**

212 Prior to approaching participants, ethical approval for the research procedure
213 was granted by the University of Salford Research Ethics Panel. The survey was
214 administered in electronic format using the Bristol Online Survey instrument (Bristol
215 University: UK). Convenience sampling used contacts collected from publicly
216 available databases (UKSCA n= 101 and ASCA n=425) and through distribution on
217 behalf by organization administration staff (BASES n=111). The instrument was
218 emailed with a covering letter introducing the research stating the demands, potential
219 benefits, potential risks, and the voluntary nature of the study as well as dissemination

220 procedures for the research findings. Participants received two follow-up reminders
221 via email and were thanked upon completion. NSCA distributed the survey in the
222 NSCA December e-bulletin to members on the mailing list (NSCA $n \approx 26,000$). The
223 survey was active for a seven month period (August- February).

224

225 **Statistical analysis**

226 Descriptive statistics including means, standard deviations and mean ranks for
227 each of the subscales and subsequent *A posteriori* analysis with appropriate non-
228 parametric tests was conducted using SPSS 16 (SPSS Inc., Chicago IL, USA). Non-
229 Parametric analysis was used as the data failed to satisfy criteria for parametric analysis
230 owing to the wording of the likert scale being subjective and not applicable to interval
231 level measurement, the convenience sampling methods used, and the data not having
232 normal distribution (44). The Holm-Bonferroni method was utilized to counter family-
233 wise type I error (47) as it more powerful yet less conservative than the traditional
234 Bonferroni procedure (1, 30, 75). The debate over the need for multiple comparison
235 corrections is documented with advocates for and against using corrected levels of
236 significance (30). Multiple comparison corrections serve to prevent the family-wise
237 type I error however dispute lies with the apparent extent of the family (14, 30) with
238 the consequences of excessive corrections threatening type II error (70). For the purpose
239 of the present study a family is termed as a number of comparisons directly relating to
240 a single null hypothesis (30) statistical power was calculated using G*Power software
241 (version 3.1.3: (29)).

242 The Friedman test was used to identify significant differences in the frequency
243 of psychological skill use with the critical value for significance set at < 0.05 .

244 Subsequent analysis of variance between the frequencies of skill use was conducted
245 using the Wilcoxon Signed Ranks with a Holm-Bonferroni correction to control for
246 family-wise type I error (47). The pairs were nominated for analysis on the basis of the
247 observed difference in the mean rank scores with the intention to identify the
248 differences most relevant to the present study on the presumption that larger z-values,
249 effect sizes, and smaller alpha values will lie within other comparisons. The stringency
250 of the criteria to be nominated for analysis was on the basis that excessive comparisons
251 will be detrimental to the adjusted alpha value and risk type II errors.

252 Subjects were then categorized based upon demographic criteria. This included
253 experience, working with predominantly teams or individual athletes, and accrediting
254 body. The Kruskal-Wallis test identified the presence of significant differences between
255 the groups when split by experience, accrediting body, and working with team or
256 individual athletes. Mann-Whitney tests highlighted location of the differences using
257 the Holm-Bonferroni correction.

258 Open ended questions asked respondents to list up to five psychological skills
259 critical to their athlete's successful performance and up to five psychological factors
260 which are detrimental to their athlete's performance. The responses were subjected to
261 thematic analysis using NVivo 8 (QSR International Pty Ltd. Version 8, 2008.:(69)).

262

263

RESULTS

264 Frequency of use of psychological skills measure using the SCSPQ

265 The results identify the rank order of the psychological strategies used by
266 Strength and Conditioning practitioners. To the authors knowledge this is the first paper

267 to rank the order of the frequency of psychological strategies use as perceived by
 268 practitioners.

269 Descriptive statistics were calculated for the 11 subscales and the total subscale
 270 scores (table 1). The Friedman test identified that there were significant differences
 271 between psychological skills in terms of frequency of use in the frequency of
 272 psychological skill use ($\chi^2=293.053$, $df=2$, $p<0.000$). This therefore supports the
 273 hypothesis that differences exist between the frequencies of use of particular strategies.

274

275 ¹ Rating Scale not at all = 1 to all the time = 5
 276 ² Total score by subscale and global psychological skill use measured by the SCSPQ.

<i>Subscale</i>	<i>Mean</i> * ¹	<i>Std dev</i>	<i>Mean rank</i>
Goal Setting	4.21	0.58	8.76
Adherence	3.99	0.72	7.60
Self Talk	3.89	0.72	7.55
Activation	3.76	0.76	6.75
Stress Management	3.63	0.66	6.20
Attentional Control	3.57	0.62	5.64
Relaxation	3.48	0.67	5.31
Mental Toughness	3.47	0.73	5.50
Self Confidence	3.45	0.83	5.27
Ego Management	3.25	0.73	4.28
Imagery	3.07	0.78	3.32
Total * ²	112.44	0.40	
Mean Total of items	3.41	0.40	

277 Subsequent pair-wise analysis was performed with pairs selected subjected to
 278 the Holm-Bonferroni correction. Six pairs were identified on the basis to identify the
 279 smallest significant differences whilst preserving an appropriate significance value.

280 Thus, after scrutinizing the data for apparent mean and mean ranked subscales
 281 differences, 6 pairs were identified for *a posteriori* analysis using 1-tailed Wilcoxon
 282 Signed Ranks test. Significant differences existed between goal setting and adherence

283 ($z = -2.678$, $p = 0.004$, $d = 0.38$, Power =0.98), self-talk and activation ($z = -1.728$, $p =$
 284 0.042 , $d = 0.17$, power =0.53), activation and attention control ($z = -2.892$, $p = 0.002$,
 285 $d = 0.29$, power=0.88), stress management and relaxation ($z = -2.750$, $p = 0.006$, $d =$
 286 0.23 , power 0.71), self-confidence and ego management ($z = -2.005$, $p = 0.023$, $d =$
 287 0.27 , power =0.83), and imagery and ego management ($z = -2.270$, $p = 0.012$, $d = 0.24$,
 288 power=0.75). It must be acknowledged that additional larger differences are assumed
 289 to exist between subscales.

290 **Comparison of strategy use between experience levels**

291 When comparing differing demographics, there were significant differences in
 292 the frequency of skill use depending on the respondents' experience thus fulfilling a
 293 subsequent aim of the study by identifying differences between demographics relating
 294 to skill use. Table 2 shows the comparison between the frequencies of psychological
 295 skills of practitioners with differing levels of experience.

296 When grouped by experience, 0-4 years ($n=33$, Age:29.21yrs \pm 8.1), 5-9years
 297 ($n=34$, age:32.8years \pm 6.1), and 10+ years, ($n=35$, Age:42.5 \pm 9.4) the Kruskal-Wallis
 298 between groups test yielded significant differences in the frequency of use of imagery
 299 ($\chi^2=15.293$, $df=2$, $p<0.001$), attentional control ($\chi^2=6.669$, $df=2$, $p=0.036$), stress
 300 management ($\chi^2=9.327$, $df=2$, $p=0.009$), self confidence ($\chi^2=8.746$, $df=2$, $p=0.013$),
 301 and total skill use ($\chi^2=12.927$, $df=2$, $p=0.002$).

302

Subscale	Experience in years		
	0-4yrs (n=33) Mean ^{*1} ± SD	5-9yrs (n=34) Mean ^{*1} ± SD	10+yrs (n=35) Mean ^{*1} ± SD
Goal Setting	4.04±0.62	4.22±0.61	4.36±4.47
Adherence	3.76±0.80	4.07±0.69	4.12±0.65
Self Talk	3.84±0.52	3.83±0.90	4.01±0.70
Activation	3.61±0.77	3.69±0.82	3.97±0.64
Stress Management	3.39±0.67	3.60±0.69	3.90±0.55
Attentional Control	3.40±0.63	3.53±0.60	3.77±0.58
Relaxation	3.35±0.68	3.44±0.74	3.65±0.58
Mental Toughness	3.33±0.74	3.58±0.74	3.51±0.54
Self Confidence	3.11±0.78	3.54±0.87	3.69±0.74
Ego Management	3.17±0.72	3.17±0.74	3.42±0.73
Imagery	2.75±0.67	2.92±0.75	3.49±0.55
Total ^{*2}	106.91±12.83	111.59±13.26	118.49±11.53
Mean Total of items	3.24±0.38	3.38±0.40	3.59±0.35

303 ¹ Rating Scale not at all = 1 to all the time = 5.

304 ² Total skill use minimum possible score = 33 – maximum possible score = 155.

305

306 Subsequent *a posteriori* analysis using Mann-Whitey with a Holm-Bonferroni
 307 corrected significance values identified that the imagery ($z = -3.700, p < 0.001, d = 1.21,$
 308 $power = 0.999$), attentional control ($z = -2.480, p = 0.007, d = 0.61, power = 0.78$), stress
 309 management ($z = -2.951, p = 0.002, d = 0.83, power = 0.96$), self confidence ($z = -2.953,$
 310 $p = 0.002, d = 0.76, power = 0.92$), and total skill used ($z = -3.499, p < 0.001, d = 0.96,$
 311 $power = 0.99$) was significantly greater in the 10+ years group compared to the 0-4
 312 years experience group.

313 Self confidence ($z = -2.088, p = 0.019, d = 0.52, power = 0.66$) was used
 314 significantly more by the 5-9 years experience group than the 0-4 years experience
 315 group.

316 Imagery ($z = -2.828, p=0.003, d= 0.67, \text{power} = 0.67$), stress management ($z =$
317 $-2.050, p=0.020, d = 0.48, \text{power} = 0.60$), and total skill use ($z = -2.216, p=0.019, d =$
318 $0.56, \text{power} = 0.71$) was used significantly more in the 10+ years group compared to
319 the 5-9 years group

320 **Comparison between respondents accrediting bodies**

321 In respect to identifying potential difference between accrediting bodies, a
322 subsequent objective of the study was achieved by identifying potential factors relating
323 to the use of psychology within strength and conditioning practice.

324 Respondents were grouped into categories according to the respective
325 accrediting bodies. These were ASCA ($n=36, \text{age}: 36.6 \text{ yrs} \pm 10.2, \text{experience}: 9.22 \text{ yrs}$
326 ± 7.4), NSCA ($n=24, \text{age}: 33.75 \text{ yrs} \pm 9.8, \text{experience}: 6.58 \text{ yrs} \pm 5.5$), both NSCA and
327 ASCA ($n=12, \text{age}: 35.8 \text{ yrs} \pm 8.3, \text{experience}: 11.3 \text{ yrs} \pm 6.3$), and both NSCA and
328 UKSCA ($n=20, \text{age}: 33.8 \text{ yrs} \pm 11.5, \text{experience}: 8.0 \text{ yrs} \pm 7.0$). Using the Kruskal-
329 Wallis test, the results yielded significant differences between the frequency of total
330 psychological skill use of respondents from different accrediting bodies ($\chi^2= 10.220, \text{df}$
331 $= 3, p=0.017$). The Kruskal-Wallis test show that significant differences existed
332 between the frequencies of select psychological skill usage of respondents from
333 different accrediting bodies. Differences existed in the frequency of attentional control
334 strategies ($\chi^2= 10.865, \text{df} = 3, p=0.12$), relaxation strategies ($\chi^2= 10.673, \text{df} = 3,$
335 $p=0.014$), stress management strategies ($\chi^2= 8.129, \text{df} = 3, p=0.43$), and ego
336 management ($\chi^2= 13.351, \text{df} = 3, p=0.004$).

337 1 tailed *a posteriori* Mann-Whitney test with the modified Holm-Bonferroni
338 correction (47) identified differences between the ASCA and the both NSCA and
339 UKSCA groups with ASCA having a greater total psychological skill ($z= -2.892,$

340 $p=0.002$, $d = 0.94$, power = 0.95), attentional control ($z= -2.904$, $p=0.002$, $d = 0.88$,
341 power =0.95), relaxation strategies ($z= -2.295$, $p<0.001$, $d = 1.00$, power = 0.97), stress
342 management strategies ($z= -2.571$, $p=0.005$, $d = 0.74$, power = 0.82) and ego
343 management strategies ($z= -3.153$, $p=0.001$, $d = 1.01$, power = 0.97) than the both
344 NSCA and UKSCA group.

345 Furthermore differences existed, although not achieving significance when
346 subjected to the modified Holm-Bonferroni correction (47), between the ASCA and the
347 NSCA groups. The ASCA having a greater total psychological skill use ($z= -2.348$,
348 $p=0.019$, $d = 0.61$, power = 0.71), with use of greater attentional control strategies ($z=$
349 -2.323 , $p=0.020$, $d = 0.59$, power =0.70) than the NSCA group.

350

351 **Factors important to success and factors debilitate to performance**

352 Table 3 shows the most commonly cited psychological aspects critical to an
353 athletes' success and judged by the sampled practitioners. Respondents highlighted
354 that the most important psychological attributes relevant to Strength and Conditioning
355 were motivation, confidence and commitment with 63.37%, 51.49% and 48.51%
356 respectfully of respondents identifying such characteristics as important for success
357 within Strength and Conditioning. Table 4 presents factors considered detrimental to
358 Strength and Conditioning training by Strength and Conditioning practitioners. This
359 showed that a lack of motivation, a lack of confidence, stress and anxiety were the

360 most often reported causes of a poor performance with 54.46%, 45.54% and 32.67%
 361 respectfully of the respondents stating such issues.

362 **Table 3** Factors listed by practitioners as important to the athlete's successful performance and the percentage of respondents (n=102) stating such factors as important. Measured using open ended questions within the SCSPQ.

<i>Factors critical to success</i>	<i>% consensus of respondents (n=102)</i>
Motivation	63.37%
Confidence	51.49%
Commitment	48.51%
Focus	38.61%
Mental toughness	32.67%
Positive attitude	23.76%
Goal setting	23.76%
Correct level of concentration	22.77%
Routines and organization	20.79%
Mental rehearsal	18.81%
Comparisons with others	16.83%
Relaxation	16.83%
Review of performance inc feedback	13.86%

363

DISCUSSION

Table 4 Factors listed by practitioners as detrimental to the athlete's performance and the percentage of respondents (n=102) stating such factors as important. Measured using open ended questions within the SCSPQ.

<i>Factors detrimental to performance</i>	<i>% consensus of respondents (n=102)</i>
Lack of motivation	54.46%
Lack of Confidence	45.54%
Stress and anxiety	32.67%
Ego	31.68%
Not focussed towards training objectives	26.73%
lack of commitment	19.80%
Burnout and depression	15.84%
Negative attitude towards training and competition	14.85%
Inappropriate goal setting	14.85%
Poor planning and organisation	13.86%

364 As was hypothesized it was apparent that Strength and Conditioning coaches
365 utilize and value psychological skills, however as expected an imbalance between the
366 use of particular strategies was observed. As predicted, adherence increasing strategies
367 and goal setting were widely used whereas complex strategies, namely mental imagery,
368 were used the least. It was highlighted that there is a difference in the frequency of
369 using psychological strategies within the prescribed practice of Strength and
370 Conditioning practitioners. Furthermore when comparing between groups it was
371 apparent that there are differences in psychological skill use depending on the level of
372 experience of the practitioner and also the body through which the practitioner gained
373 accredited status.

374 The most utilized strategy was the use of goal setting. This was in line with the
375 existing research showing short term goals are amongst the most commonly utilized
376 psychological skills in physiotherapy (4, 5, 43) and in athletic training (84). The
377 perceived increased use of goals setting is most likely owing to the nature of Strength
378 and Conditioning practice using established targets and physiological benchmarks from
379 which to determine the effectiveness of a training intervention. It is also probable that
380 the increased use of goal setting is dependent upon the Strength and Conditioning
381 specialists' perception of the previous success using the strategy. Indeed, Sullivan and
382 Hodge (76) have previously identified goal setting as a strategy coaches had most
383 success utilizing. Furthermore with the reported lack of time to use psychological
384 strategies (17) it is likely coaches will focus their use of psychological strategies on
385 those perceived as most beneficial to the neglect of other skill sets. The high frequency
386 of goal setting strategies is encouraging with numerous academics advocating such
387 strategies with the use of goal setting being a major determining factor between
388 successful and unsuccessful athletes (23, 66).

389 Conversely, the least used strategy was imagery, mirroring existing knowledge
390 that imagery was considered unimportant and difficult to prescribe by athletic trainers
391 (40, 84) and underutilized within physiotherapy (4, 5). The lack of prescribed imagery
392 interventions could be for numerous reasons. Primarily it is possible that there is
393 uncertainty of the applications towards Strength and Conditioning either the benefits of
394 imagery interventions or the methods of instructing imagery. The lacking promotion of
395 imagery is supported by the widely documented reason for neglecting psychological
396 being a lack of understanding (5, 20, 40, 43, 63, 85) with sports coaches and athletes
397 previously reporting that amongst other skills, imagery and visualization is an area in
398 which they would like more information (39). An important consideration is time
399 demands required for the athlete to become adept at using prescribed imagery strategies.
400 Consequently athletes may perceive imagery as an ineffective tool causing practitioners
401 to have a negative attitude towards the use of imagery as was observed in a sample
402 undergoing physiotherapy rehabilitation (35). The lacking use of imagery is
403 problematic, notably because of the benefits elicited through imagery training towards
404 increased strength (50, 89), EMG activity (87), technique development (65, 73), stress
405 regulation (86), and program adherence (61).

406 The lacking use of imagery, and indeed additional psychological strategies, may
407 be accounted for due to the nature of the discipline; previous studies show that coaches
408 working with athletes in both practice and competition, were reported to encourage the
409 use of imagery in a competition setting compared to practice (48). Thus, with the
410 Strength and Conditioning practitioner being concerned with training it is possible that
411 use of particular psychological strategies are undervalued and perceived less relevant
412 to training compared to competition, reflected in various studies when mental skills
413 have been shown to be used less in training compared to competition (36, 78). The

414 perceived lack of importance of psychological strategies in practice has been identified
415 previously and serves as a concern that skills are being used less in a practice setting.
416 Durand-Bush and Salmela (23) have identified that the use of psychological strategies
417 by expert performers are shaped through practice, during daily activities, and in
418 conjunction with training activities. This would suggest that the Strength and
419 Conditioning practitioner could play a critical role in the development of psychological
420 skills with transfer of such skills into competition to compliment physical development.
421 Therefore, education into the importance of psychological skills in training and indeed
422 transfer to completion should receive increased emphasis within practitioner
423 development.

424 In identifying critical psychological strategies, motivation and confidence were
425 amongst the most important while correspondingly a lack of confidence and a lack of
426 motivation were the most debilitate factors. Although the importance of motivation was
427 reflected in the frequent use of certain strategies such as goal setting and increasing
428 adherence there is an imbalance between the perceived importance and the frequency
429 of use of self-confidence shaping strategies. Possible reasons for such a disparity may
430 be either that practitioners feel that confidence is an innate characteristic unable to be
431 modified or that there is lacking knowledge in the techniques to increase self-
432 confidence. Likewise it is possible that the respondents are using confidence promoting
433 strategies that are not included within the survey instrument. The survey instrument
434 focused upon established sources of self-efficacy such as vicarious experiences and past
435 accomplishments, the latter being regarded as the most influential source of self-
436 efficacy (9, 10, 88) however the use of verbal persuasion received limited coverage
437 within the self confidence subscale. The effects of verbal encouragement have
438 previously been shown to benefit lifting performance significantly (60) and the use of

439 'hustle' and 'praise' have been observed previously within Strength and Conditioning
440 (55). Despite not observed in the present study, it is therefore probable that practitioners
441 utilize verbal persuasion as a source of increasing confidence however are not using
442 additional strategies to increase athlete self confidence.

443 As hypothesized, it was apparent that the use of psychological strategies is
444 related to experience. Various reasons could account for this. Firstly, it is possible that
445 as previously identified practitioners develop their skills 'on the job' as observed in
446 physiotherapy and sports coaching (49, 76) as such gain more experience and
447 confidence in implementing psychological strategies and consequently prescribe more
448 than their less experienced counterparts as reflected in the practices of athletic trainers
449 (40). As a result, despite having the prerequisite knowledge of psychological skills and
450 its importance practitioners may not have sufficient confidence, fostered through
451 experience, to implement such strategies. Secondly, Strength and Conditioning
452 practitioners are required to maintain their respective accreditation. For example the
453 UKSCA, the ASCA, and the NSCA have the *Continual Professional Development*
454 *(CPD) model*, the *updating procedure*, and the *Continuing Education Program*
455 respectively. An accredited practitioner must demonstrate advancement to maintain
456 their accreditation status, usually via documented hours of practice or though attending
457 relevant training (64). As a result practitioners are required to attend training and reflect
458 upon successful and unsuccessful aspects of their practice, thus potentially shaping their
459 applied practice. It should however be noted that the training sessions attended are at
460 the discretion of the practitioner, there is no requirement to attend CPD sessions with
461 an emphasis on psychology per se. Furthermore it has been documented that despite an
462 interest in psychology and an awareness of the benefits of implementing such strategies,
463 few numbers of physiotherapists, similarly having to maintain a CPD record, have

464 attended training concerning the use of psychological strategies (49). The effectiveness
465 of CPD training and procedures concerning the use of psychological strategies and
466 indeed the sources influencing psychological skills is an area worthy of further
467 investigation.

468 When drawing comparisons between practitioners accredited from various
469 accrediting bodies, the NSCA, UKSCA, and ASCA it is apparent that respondents
470 accredited by the ASCA had a greater global psychological skill use, using such skills
471 as imagery, self-talk, attentional control, relaxation, and stress management strategies
472 more than their counterparts accredited by other organizations. Unfortunately, many of
473 the respondents had dual accreditation; consequently the present study cannot
474 differentiate between those accredited by the NSCA and UKSCA. Further research is
475 required to ascertain if a difference exists between the psychological skills and strategy
476 use of those practitioners having been accredited with the UKSCA and those accredited
477 with the NSCA. There are proposed reasons for the increased use of psychology by
478 practitioners. Firstly it is possible that culture has a pivotal role in the use of psychology
479 with the majority of UKSCA accreditations practicing in the UK and similarly most
480 ASCA practitioners surveyed being located in Australia (44 of the 48 ASCA accredited
481 practitioners). For example Sullivan and Hodge (76) documented that coaches and
482 athletes from New Zealand considered psychology as very important devoting on
483 average 12% of their contact time to teaching psychological strategies to their athletes
484 with some coaches reported to spending up to 30 hours per week teaching psychological
485 strategies, despite 73% of coaches perceiving themselves to have insufficient
486 knowledge. Conversely, it is apparent that within certain areas of sport in the UK such
487 as Association Football in which with coaches portrayed a negative perception of
488 Psychology (67). The disparity between cultures has previously been identified with

489 athletes from New Zealand being more open with less stigmatization towards the use
490 of psychology than those observed in the USA and in the UK (2). Indeed, athletes from
491 New Zealand demonstrated a greater positive perception towards using psychology
492 than those athletes from the USA and UK, furthermore Anderson et al. (2) identified
493 that ‘subjective norms’ were predictive of athletes likelihood to be receptive of
494 psychological skill use suggesting cultural influences shaping the use of psychology.
495 The reduced receptivity toward psychology use may have two implications. Firstly it is
496 likely that the Strength and Conditioning practitioner may share a skeptical perception
497 towards psychology fostered within cultural influences and thus be reluctant to utilize
498 psychological strategies. Secondly it is possible that the athletes reduced receptivity
499 will reduce the effectiveness of any psychological strategies consequently resulting in
500 a reduced perception towards the effectiveness of psychology and subsequent reduced use
501 of particular strategies.

502 A second potential explanation would be the perceived lack of understanding
503 towards implementing psychological strategies. This is broadly cited as a major cause
504 inhibiting the use of psychology (5, 20, 40, 43, 63, 85). Thus, it is pertinent to examine
505 differences in educational procedures between various accrediting bodies. The ASCA
506 Strength and Conditioning coaching course is split into three levels with stage one
507 having a component regarding “modifying training programs to suit the psychological
508 development of the athlete” (6) with competence measured via direct observation. The
509 NSCA Certified Strength and Conditioning specialist assessment contains multiple
510 choice questions to assess competence in using “sport psychology techniques to
511 enhance the training and/or performance of the athlete”. Conversely, there is no
512 apparent assessment of psychological competencies in the UKSCA Strength and
513 Conditioner Practitioner assessment. It has been reported that when exposed to the use

514 of psychological strategies, in turn gaining more understanding, practitioners are more
515 likely to implement such psychological skills (33). This would indicate that Strength
516 and Conditioning practitioners accredited through the ASCA may have increased
517 exposure to psychological strategies though either initial training or through applied
518 practice and CPD consequently may be a more beneficial CPD model to adopt to
519 promote the use of psychological strategies.

520 It should be noted that the current study had limitations. Importantly, it is
521 noteworthy that completion of the survey was voluntary; therefore it could be assumed
522 that the findings are biased towards practitioners with an interest in sport psychology
523 and possibly having an increased perception of skill use. The study was based on the
524 perceptions of the respondents. Consequently, the subjective nature could have caused
525 discrepancies of the rating scale with respondents potentially having different
526 perceptions of time demands. The self-report survey could present a social desirability
527 bias. Further research should consider using a multidimensional approach with
528 triangulation including observational techniques to verify the responses. Additionally,
529 the survey instrument subscales did not offer scope for assessing specific method of
530 goal setting strategies, the various styles of imagery, or methods of increasing self-
531 confidence. Furthermore it was beyond the scope of the present study to identify the
532 quality of the psychological skills and strategies utilized. Whilst it is encouraging that
533 Strength and Conditioning practitioners are implementing psychological strategies
534 future studies must address the effectiveness of implementing such strategies.
535 Furthermore, additional research would be well directed to the reasons why particular
536 strategies are implemented or neglected. This would provide important consideration
537 regarding the training and CPD which Strength and Conditioners undergo and provide
538 direction for future strategies to promote psychology within Strength and Conditioning.

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PRACTICAL APPLICATIONS

541 The Strength and Conditioning practitioner is a valued member of the sport
542 support team and coupled with being in a critical role should be well equipped to
543 develop the psychological skills of the athlete, both to facilitate Strength and
544 Conditioning training, and to offer a valuable environment in which to rehearse assorted
545 psychological strategies in preparation for competition. Areas should be addressed
546 through CPD to offer a greater scope of strategies to the Strength and Conditioning
547 practitioner thus benefitting the athletes and the profession as a whole. Practitioners
548 would be well advised to attend sessions to gain confidence in utilizing psychological
549 strategies and likewise organizations should make such sessions readily available to
550 attend and endeavor to promote the use of psychological strategies. Respective CPD
551 programs should endeavor to promote the use of psychology within the discipline
552 though offering training methods which incorporate the active practice of psychology.
553 Strength and Conditioning professionals should critically reflect on the use of
554 psychological strategies within their practice, identifying positive aspects brought
555 through psychological interventions and areas in which improvements could be made.
556 Through critical reflection, ‘on the job’ learning can be enhanced. Reflection would
557 promote a greater awareness and development of currently used strategies, for example
558 the use of goal setting, and encourage a problem solving mindset needed to select
559 appropriate beneficial psychological strategies within the Strength and Conditioning
560 field. Practitioners should whenever possible be given the opportunity to attend active
561 training sessions in which the practitioner is exposed to practical scenarios and role
562 playing situations as this has many proven benefits not least the providing the

563 practitioner with confidence to implement strategies and is the approach recommended
564 for athletic trainers (16).

565 Strength and Conditioning practitioners should collaborate with additional
566 support staff and athletes to foster an atmosphere receptive of psychological
567 interventions liaising with additional support staff including coaches and psychologists
568 where applicable to facilitate the psychological development of athletes. In order to
569 promote the benefits of psychology Strength and Conditioning practitioners should
570 incorporate an education phase regarding the benefits of their prescribed psychological
571 strategies in line with recommendations regarding psychological skills training (13).
572 The education should be not only in respect to training improvements but how
573 psychology can be utilized in competition and the requirement to practice psychological
574 skills in the same way physical skills are acquired. Strength coaches should recognize
575 the potential influence they could have on the athletes they support and how they
576 incorporate psychological strategies used in competition.

577 Such examples would exist through manipulations of self-efficacy through the
578 use of goal setting. As previously identified, the manipulation of athlete perceived goal
579 difficulty can have a facilitative effect on efficacy (31, 83, 88). Consequently through
580 the use of manipulated goals it is possible that the athlete is able to progress from a
581 training plateau and subsequently allow the practitioner to continue to progressively
582 increase the athletes training loads. Further examples would concern the use of
583 attentional focusing techniques. For example simply instilling an external focus of
584 attention has been shown to yield increased force production (54, 90). Consequently,
585 through instructing an athlete to focus on the bar when lifting or to jump and reach a
586 target is likely to yield increase force production when compared to instructing using
587 internal focusing cues such as drive with your legs. These are simplistic instances of

588 using psychological strategies to provide training performance gains with direct
589 implications for physical performance within competition. Furthermore skills such as
590 mental imagery and self talk have been shown to facilitate power exercises (50, 81)
591 with both methods identified as adaptive strategies to increase confidence, motivation,
592 focus and technique (18, 41). Thus whilst particular skills can be utilized in training,
593 for example to improve motivation or to facilitate technique acquisition, such skills
594 have direct applications towards competition, with parallels existing concerning the
595 need to focus attention, increase confidence, or to regulate anxiety during competition.
596 Consequently, the benefits of being adept at utilizing psychological skills in
597 competition is a crucial component of success and as such should be afforded time
598 during practice to refine such skills.

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ACKNOWLEDGMENTS

607 There are no conflicts of interest associated with the present research. There are
608 no professional relationships with the authors and any potential organizations
609 benefiting from the present research.

610 The results of the present study do not constitute endorsement of any of the
611 accreditation or professional development programs processes discussed in the present
612 study by either the authors or the NSCA.

613 The Authors are grateful for the help in distributing the survey from the British
614 Association of Sport and Exercise Sciences and The National Association of Strength
615 and Conditioning.

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FIGURE LEGENDS

866 **Table 1** Descriptive mean frequency of skills used by strength and conditioning
867 specialists (n=102) with standard deviation. Split by subscale and global

868 psychological skill use measured by the SCSPQ. *¹Rating Scale not at all = 1 to all
869 the time = 5. *²Total skill use minimum possible score = 33 – maximum possible
870 score = 155.

871 **Table 2** Descriptive means \pm standard deviation of skill use by strength and conditioning
872 practitioners with different levels of experience. Split by subscale and global psychological
873 skill use measured by the SCSPQ. *¹Rating Scale not at all = 1 to all the time = 5.
874 *²Total skill use minimum possible score = 33 – maximum possible score = 155.

875

876 **Table 3** Factors listed by practitioners as important to the athlete's successful
877 performance and the percentage of respondents (n=102) stating such factors as
878 important. Measured using open ended questions within the SCSPQ.

879 **Table 4** Factors listed by practitioners as detrimental to the athlete's performance and
880 the percentage of respondents (n=102) stating such factors as important. Measured
881 using open ended questions within the SCSPQ.