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4      Will 'we' continue to exercise? The associations between group identification, identity
5              leadership, and relational identification on group exercise class adherence
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7

**Abstract**

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9        The present study sought to provide support for the roles of both the social identity

10     approach (group identification and identity leadership) and relational identification in

11     adherence to group exercise classes.  One hundred and twenty U.K. based group exercise

12     class attendees completed an online survey in a cross-sectional design.  Group identification,

13     perceptions of identity leadership behaviour, and relational identification were not

14     significantly associated with length of class attendance.  However, both identity leadership

15     behaviour of the class instructor and ingroup affect (measured as an element of multi-

16     dimensional group identification), were significantly associated with expected likelihood of

17     continued class participation.  For every 1 unit increase in the identity leadership and in-

18     group affect measures respectively, participants were 1.9 and 2.0 times more likely to be 'at

19     or near 100%' likely to continue vs not.  Social identity variables were not associated with

20     how long exercisers had been attending class, but identity leadership and ingroup affect are

21     positive influencers of expected future adherence.  Further research into the social identity

22     approach and identity leadership behaviour regards exercise class attendance tenure vs

23     volume is warranted and is likely to benefit from the use of multi-dimensional group

24     identification measures.

25

26     KEYWORDS: Group Dynamics, Health, Behaviour Change, Physical Activity

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28

29    **Will 'We' Continue to Exercise? The Associations between Group Identification,**

30    **Identity Leadership, and Relational Identification on Group Exercise Class Adherence**

31        Physical activity is associated with a wide range of health benefits, including

32    reduced risk of cardiovascular disease, type 2 diabetes, cancers, and depression [1].  While it

33    is recommended that adults engage in 150 minutes of moderate intensity exercise each

34    week, 41% of those aged 40-60 are undertaking nowhere this level, failing to walk briskly

35    for even 10 minutes a month [2].  Adherence to new exercise programs is also poor, and

36    around half of those who begin exercising drop out within the first six months [3].  The

37    physical and psychological benefits of regular exercise make encouraging participation and

38    understanding factors linked to adherence of great importance.  There is a need to ensure

39    that adults not only start exercising, but also continue to participate.  Group exercise classes

40    have been highlighted as a potential gateway to participation, with almost one third of

41    people attending having been previously inactive [4].  With this in mind, group exercise

42    classes offer a valuable avenue for research to advance our understanding of how continued

43    attendance in these settings might be encouraged.

44    **The Social Identity Approach**

45        It has been suggested that the social identity approach provides crucial and unique

46    social processes to understand and influence physical activity participation [5-7].  While the

47    social identity approach has been applied across a variety of contexts including within

48    organisations [8], and sport [5,9], research with regard to its relevance to exercise remains

49    limited (exceptions [6,7]).  The social identity approach comprises two theories; social

50    identity theory [10] and self-categorisation theory [11].  Social identity theory posits that

51    individuals have personal identities and also social identities related to the groups (e.g., an

52    exercise class) to which they see themselves as part.  A social identity may be considered as a

53    person's sense of self that is based on their group membership(s).  Self-categorisation theory

54    describes the *process* by which individuals' move from a personal to a social identity ('me' to

55    'we') termed 'depersonalisation'.  Once 'depersonalised' it is suggested that an individual

56    will reference the values and norms of the group (as opposed to their own) to inform their

57    behaviour.  In this way, it is possible to hypothesise that by identifying as part of a group that

58    values regular exercise (e.g., an exercise class) an individual's behaviour may be affected in

59    the form of increased adherence.  Accordingly, group (social) identification, or an

60    individual's sense of belonging or commitment to a group, may relate to length of class

61    participation and/or intention to continue to participate.  This is not of course to suggest that

62    personal identity is unimportant in this regard.  Indeed, running role identity may be more

63    important than running group identity in terms of adherence in the face of group disbandment

64    [12], and the development of group and personal identities in relation to exercise may be

65    intertwined [13].  Examination of this however, falls beyond the scope of the present study.

66          The idea that group identification may engender exercise participation and adherence

67    is not new in itself, with research evidence, including meta-analysis, supporting this [14-16].

68    In general, participants reporting to identify more strongly with a group for which exercise

69    is a norm also report increased intention to exercise [16] and groups have been shown as

70    beneficial in terms of exercise adherence [14].  More recently, studies have adopted the

71    social identity approach as a theoretical standpoint.  Stevens et al. [7,17] demonstrated a

72    relationship between levels of group identification and exercise attendance rates (in group

73    exercise classes and parkrun).  Whilst undoubtedly promising research in terms of the

74    applicability of the social identity approach to group exercise contexts, these studies adopted

75    attendance measures of frequency/volume (e.g., Stevens et al. [7] measured percentage of

76    total sessions attended in a single week).  To our knowledge, no studies to date have

77    specifically examined the social identity approach regards exercise classes and adherence in

78    terms of *tenure,* i.e. how long a person has attended a given class.  Maintenance presents a

79    key area of difficulty in encouraging health behaviour change, such as exercise participation

80    [18].  By examining tenure, we have an opportunity to better understand factors relating to

81    continued adherence and encourage long-term participation. This may not be fully

82    comprehended through focus on frequency/volume of attendance in a single week.

83           A further opportunity is presented with regards the conceptualisation of group

84    identification.  Beauchamp [19] highlighted the influential role of identification within

85    exercise groups as a way to promote adherence and advocated a need for greater

86    understanding.  Whilst recent studies examining group identification in exercise classes have

87    used a global measure of identification [7,20], research evidence across disciplines has

88    suggested that group identification may in fact be multi-dimensional [21,22].  Cameron's [23]

89    three-factor model of social identity developed in social psychology has been empirically

90    supported in sport settings (e.g., [21]).  The model proposes two cognitive elements of

91    identity (ingroup ties and cognitive centrality) and an affective element (ingroup affect).

92    Although an alternate form of physical activity to exercise, in a sport context support has

93    been shown for the three factors relating to different outcomes, such as initiative, and

94    pro/anti-social behaviour [21,24].  It is therefore plausible to posit that each factor may relate

95    differently to behaviours within an exercise context, for example, the behaviour of 'adhering

96    to an exercise class', meaning investigation may add novel and important insight.

97    **The Social Identity Approach to Leadership**

98           Group exercise class instructors may also have a key role to play in regard to

99    attendance [25] often planning and advertising classes as well as providing instruction.  The

100   application of the social identity approach to physical activity has garnered interest in how

101   *leaders* (e.g. class instructors) in these settings may influence physical activity behaviour

102   [7,9,20,26].  Exercise leaders (i.e. instructors) may be an important influence on behaviour

103   of individuals who attend exercise classes (groups), and it has been suggested that the social

104  identity approach to leadership (SIL) could add substantial value to research in exercise

105  settings [6,7].  For instance, SIL places the group processes inherent within exercise class

106  settings at its analytical heart. According to SIL [27,28] effective leaders are: (1) in-group

107  prototypes ('prototypicality' - exemplifying the group and what makes it different); (2) in-

108  group champions ('advancement' - promoting the good of the group); (3) entrepreneurs of

109  identity ('entrepreneurship' - defining the shared beliefs and values); and (4) embedders of

110  identity ('impresarioship' - providing opportunities for the desired collective behaviour).

111  Through these four behaviours leaders are able to mobilise followers by recruiting and

112  maintaining the allegiance and support of other group members.  In the context of exercise,

113  a class instructor may therefore be able to mobilise followers to attend classes.  It is possible

114  to hypothesise that individuals attending exercise classes who perceive their instructor to

115  demonstrate identity leadership behaviours may be more likely to have greater class

116  adherence.

117       Until recently, there was limited direct research as to the relevance of SIL in exercise

118  settings.  A small number of studies have now begun to examine the relationship between

119  both identity leadership behaviours and group identification in exercise participants [7,9,20].

120  Stevens et al. [7] found a small significant association between identity leadership

121  behaviours and attendance in exercise class attendees.  However as previously noted, the

122  study measured attendance via proportional frequency as opposed to by tenure/adherence,

123  making predictions about applicability for long-term participation potentially difficult.  In a

124  follow-up study, Stevens et al. [9] used a 2-wave design to show that perception of identity

125  leadership behaviours at study outset predicted group identification 8-weeks later and, that

126  this group identification was associated with attendance.  These findings provided support

127  for the suggestion that identity leadership behaviours influence attendance via group

128  identification temporally.  Yet, this study examined members of amateur sports teams - not

129    exercise classes.  Support for SIL specifically within a group exercise context has recently

130    been offered by Steffens et al. [20], who demonstrated that identity leadership behaviours

131    were associated with more frequent class attendance (in the previous 4 weeks) via stronger

132    group identification.  Thus, whilst evidence is growing that identity leadership behaviours

133    may engender exercise class attendance, and that this may occur via group identification,

134    empirical evidence regarding group exercise classes specifically is limited and offers scope

135    for further investigation, particularly in terms of adherence as measured by tenure, and

136    future intentions to continue to adhere.

137    **Relational Identification**

138          A distinct yet related concept to group identification is that of relational

139    identification [29,30].  Sluss and Ashforth [29] suggest that even within a group, we form

140    one-to-one role-relationships with others, and that the impact of these relationships has been

141    overlooked in leadership research.  Sluss and Ashforth outlined relational identification as

142    the extent to which we define ourselves in terms of a given role-relationship.  In the context

143    of an exercise class and the present study, an individual may identify themselves in the

144    context of the relationship between themselves, as the class attendee, and the class instructor

145    (i.e. leader).  It is suggested that as two people get to know each other they become

146    'personalised' over time, thus affecting their interactions (behaviours) within the role-

147    relationship.  Sluss and Ashforth propose that relational identification may lead to

148    identification with groups that are shared by the individuals in the role-relationship via

149    generalisation.  Thus, relational identification may lead to group identification.

150          Sluss et al. [31] offered support for the association between relational and group

151    identification, and found that this was especially the case when the leader was viewed as

152    'prototypical'.  In contrast, Steffens et al. [30] found that identification with a group may

153    lead to relational identification with a leader, and that the group provides the framework for

154    the relationship.  It is plausible therefore that interaction in both directions may take place.

155    Whilst neither of the aforementioned studies pertained to an exercise situation, relational

156    identification to leaders has been shown to be associated with follower mobilisation of effort

157    in an elite sport context [32] and thus it is possible, but not yet known, that this may also

158    apply to exercise.

159    Since prototypicality is proposed as an element of identity leadership behaviour, its

160    potential involvement makes way for the possibility that group identification, identity

161    leadership, and relational identification may *all* be associated with, or predict, exercise class

162    adherence.  As 'personalisation' takes place over time and influences behaviour, and with

163    potential multi-directional interactions at hand, a group exercise class attendee may both

164    identify more strongly with a class or leader they have attended/known for longer and/or

165    attend for longer when they identify more strongly with the leader or class.  If both: (1)

166    relational identification with an exercise class instructor may affect behaviour/effort, and

167    lead to group identification with the exercise class; and (2) group identification with the

168    class may affect behaviour/adherence (through norms/values), and lead to relational

169    identification with the class instructor; we propose that it is a step forward, and logical, to

170    examine all three factors (group identification, identity leadership behaviours and relational

171    identification) together in a single study.  Presently, this has not been examined.

172    **The Present Research**

173    With group exercise classes a potentially important way of encouraging exercise

174    participation, and the social identity approach an increasing area of interest with regards to

175    physical activity adherence and leadership, the present study examined the associations

176    between group identification, identity leadership, relational identification, and exercise class

177    adherence. We also aimed to examine the potential relevance of multi-dimensional factors

178    of group identification.  The study partially replicated that of Stevens et al. [7] but expanded

179    upon it in four main ways.  First, through measurement of class adherence by tenure and

180    expected future participation as opposed to attendance by volume.  Second, through the

181    inclusion of relational identification as a potential predictor.  Third, by inclusion of a multi-

182    dimensional measure of group identification in addition to a global measure, and fourth,

183    through focussing solely on group *exercise* class attendees.

184         Based on previous research, it was expected that participants' group identification

185    with the exercise class (H1a), perceived identity leadership behaviours of the class instructor

186    (H1b), and relational identification with the class instructor (H1c) would be associated with

187    the length of time participants had attended the exercise class.  We also predicted that each

188    of the independent variables (respectively H2a, 2b, and 2c) would predict participant

189    expected likelihood of future attendance.  These formed our primary hypotheses.  A

190    secondary hypothesis was that the multi-dimensional elements of group identification may

191    show differing relationships with length of class attendance (H3).

192         It was anticipated that the findings may both support and offer new insights

193    regarding the potential role of identification in exercise adherence.  From a practical

194    perspective, our research, and others', may ultimately contribute to recommended design

195    and marketing of exercise classes, as well as the training provided to class instructors to

196    promote long-term adherence of attendees.

197                                            **Method**

198    **Participants and Design**

199         Participants were 120 U.K. based adult exercise class attendees (male: $n = 13$, female:

200    $n = 107$) aged between 18 and 71 years ($M = 40.11$, $SD = 11.27$).  Participants were part of a

201    range of exercise class types (see Table 1), and attended classes between "once every 2

202    weeks" and "more than 3 times per week", with the majority ($n = 61$) attending once per

203    week (see Table 2).  Participants who attended classes with more than one regular instructor

204    were excluded from the study.  A cross-sectional survey was conducted online and was open

205    for participant completion from March to October 2019.  Use of a cross-sectional survey

206    design aligned with that used by Stevens et al. [7] allowing for partial replication and

207    expansion of their findings.  Participants took an average of 10 minutes and 34 seconds to

208    complete the survey, which aligned with the researchers' expected timeframe.

209    Table 1.

210    *Participants by Exercise Class type*

211

| Class type | No. Participants |
|---|---|
| Aerial Aerobics | 1 |
| Barre | 1 |
| Body Attack | 1 |
| Body Balance | 5 |
| Body Combat | 3 |
| Body Conditioning | 1 |
| Body Pump | 4 |
| Bootcamp | 1 |
| Boxercise/Box Fit | 5 |
| Circuits | 9 |
| Crew | 1 |
| CrossFit | 1 |
| Dance/Dance Fitness | 2 |
| Drum Fit | 1 |
| General Workout | 1 |
| HIIT | 23 |
| Insanity | 2 |
| Jazzercise | 1 |
| Kettlebells | 2 |
| Kickboxing | 1 |
| Legs, Bums and Tums | 1 |
| Over 50s Ballet | 1 |
| Pilates | 19 |
| Running | 1 |
| Spinning | 15 |
| Triple Challenge | 1 |

| | |
|---|---|
| Yoga | 10 |
| Zumba | 6 |

Table 2.

*Participants by Frequency of class attendance*

| Attendance Frequency | No. Participants |
|---|---|
| More than 3 times per week | 5 |
| 3 times per week | 15 |
| Twice per week | 35 |
| Once per week | 61 |
| Once every two weeks | 4 |

Power tables in Clark-Carter [33], indicated that for an $R^2$ value of 0.148 (based on Stevens et al.'s [7] study examining identity leadership, group identification, and exercise class attendance), with 3 predictors (representing; group identification, identity leadership behaviour, and relational identification) a sample size of 60 is required to achieve power of .80.

**Procedures**

The study was granted ethical approval by an Institutional Ethics committee. A small pilot study ($n = 4$) was conducted in March 2019. The process of collecting the participant data was without issue and procedures remained as planned. Voluntary and snowball sampling were used for participant recruitment. A link to an online survey was posted on social media (Facebook, Twitter, LinkedIn) and the primary researcher's own website. Participants could also share the link to reach other potentially suitable and interested participants.

Individuals were invited to visit the link which took them to the participant information sheet. They were then given the option to continue to the survey and by doing so, provided informed consent for participation. This method of consent aligned with that by

233   Stevens et al. [7] (where consent was assumed through survey completion) and British

234   Psychological Society [34] guidelines for low risk studies.  Participants completed

235   demographics questions (age, gender, location, frequency of class attendance) and

236   inclusion/exclusion criteria questions.  Participants were asked the type of class which they

237   would be answering the questions in relation to (if they attended multiple classes, they were

238   requested to answer in relation to one only) and to confirm that the class had one regular class

239   instructor.  Participants subsequently completed the questionnaires; length of attendance to

240   date, expected likelihood of future attendance, group identification, social identity leadership

241   behaviour and relational identification.  The final page of the survey acted as a participant

242   debrief.

243   **Measures**

244      **Group identification.**  To assess participants' identification with their exercise group,

245   and replicate Stevens et al. [7], a four-item measure of social identification recommended by

246   Postmes et al. [35] was used.  Participants rated four statements on a 7-point Likert scale

247   from 1 (*fully disagree*) to 7 (*fully agree*).  The statements were 'I feel committed to my

248   exercise group', 'I am glad to be a member of my exercise group', 'Being a member of my

249   exercise group is an important part of how I see myself' and 'I identify with my exercise

250   group'.  Higher scores indicated higher levels of identification with the group.  This measure

251   has demonstrated good internal consistency in previous studies [7,20] and likewise did so in

252   the present study (Cronbach's $\alpha = .87$).

253      **Multi-dimensional group identification.**  A multi-dimensional measure of

254   identification enabled investigation of H3.  The social identity for sport questionnaire (SIQS;

255   [21]) has been developed in-line with theory and tested to enable measurement of social

256   identification by three factors; ingroup ties, cognitive centrality, and ingroup affect.  The

257   scale's 9-items were adapted to fit the context of the study with the word 'team' being

258    replaced with 'exercise class' (e.g. 'I feel strong ties to other members of this exercise class',

259    'In general, I'm glad to be a member of this exercise class').  Participants rated the items to

260    indicate how they felt about being part of the exercise class from 1 (*strongly disagree*) to 7

261    (*strongly agree*).  Higher scores indicated higher levels of the element of social identification

262    being measured.  Although in an exercise class as opposed to sport team context, the use of

263    the SIQS was considered as having the potential to add insight, and be the first application of

264    this scale in an exercise context.  In view of this, a three-factor (i.e., three subscales of the

265    SIQS) confirmatory factor analyses (via R software 4.0.2) using chi-square ($\chi2$), the robust

266    CFI, the robust Tucker-Lewis index, the robust root mean square error of approximation with

267    a 90% confidence interval (RMSEA), and the standardized root mean square residual

268    (SRMR; [36]) confirmed acceptable fit ($\chi2 = 57.885$, $p < .001$, Robust CFI = .960, Robust

269    TLI = .940, Robust RMSEA = .108, SRMR = .054). All factor loadings were above .76.  The

270    SIQS has been shown as being reliable with good construct validity [21].  The present study

271    illustrated good internal consistency for each of the three sub-scales; ingroup ties, cognitive

272    centrality, and ingroup affect; with Cronbach's $\alpha$ = .92, .87, and .91 respectively.

273        **Identity leadership.**  The Identity Leadership Inventory (ILI: [37]) assessed

274    participants' perceived SIL behaviour of their class instructor.  Comprising 15-items, this

275    scale was developed to measure identity leadership, as per the theory, both globally and by

276    the four-facets proposed by Haslam et al. [27]: prototypicality, advancement,

277    entrepreneurship and impresarioship.  Participants were asked to rate the extent to which their

278    exercise class instructor engaged in the behaviours/activities described by each of the fifteen

279    statements (e.g. 'the class instructor is a model member of the class', 'the class instructor

280    creates a sense of cohesion within the class') on a 7-point Likert scale from 1 (*not at all*) to 7

281    (*completely*).  Higher scores indicated a higher level of engagement in identity leadership.

282    The ILI has demonstrated good construct validity both during development [37] and across

283    20 countries [28].  Identity leadership research in exercise settings has used the ILI [7] and

284    shown good internal consistency.  Cronbach's α in the present study showed excellent

285    internal consistency (α = .94) for both the global measure and the four facets (α = .89, .90,

286    .91, .82 respectively).

287        **Relational identification.**  To measure participants relational identification with their

288    exercise class instructor, we adapted a 10-item measure from previous studies [38,39].  Ten

289    statements (e.g. 'When I talk about my class instructor, I usually say 'we' rather than 'him or

290    her'' and 'The values of my class instructor are consistent to my own') were rated on a 7-

291    point Likert scale from 1 (*strongly disagree*) to 7 (*strongly agree*).  Higher scores indicated

292    greater levels of relational identification.

293        Whilst the measure selected was intended for a workplace context, limited research on

294    relational identification in exercise settings rendered scale selection challenging.  Slater et al.

295    [32] used a three-item measure of relational identification in an elite sports context.

296    However, this measure was intended primarily as a manipulation check and has not been used

297    elsewhere in the literature.  The more widely used 10-item measure was therefore selected

298    and adapted to reference the 'class instructor' in place of 'supervisor'.  The measure has

299    shown good internal consistency in previous research [38,39] and also did so in the present

300    study (Cronbach's α = .91).  Given that this was the first use of this measure of relational

301    identification in an exercise setting, unidimensional confirmatory factor analyses were run,

302    which evidenced non-acceptable model fit ($\chi2$ =146.842, *p* < .001, Robust CFI = .846,

303    Robust TLI = .802, Robust RMSEA = .163, SRMR = .078). Despite unsatisfactory fit, all

304    factors loadings were above .40 [40].  Nevertheless, relational identification results should be

305    interpreted with caution.

306        **Length of exercise class attendance to date.**  Participants indicated how long they

307    had been attending the exercise class in relation to which they were answering the survey.  It

308    was felt that 'weeks' attendance would be too granular for longer term attendees to recall and

309    report accurately, and that 'years' would not capture shorter term attendees.  Thus, in an

310    attempt to balance obtaining data that was as accurate and granular as possible whilst

311    ensuring clarity for participant completion, *months* were selected as the attendance units.

312    Participants selected from a drop-down list ranging from 1 – 60 months, with additional

313    options of 'less than 1 month' and 'more than 5 years' (thus a total of 62 options were

314    available).  Selection of either of the two latter options elicited a free-format follow up box in

315    which participants indicated the length of time they had attended.  Data provided in this latter

316    circumstance was subsequently converted to months (e.g., 2 weeks = 0.5 months) prior to

317    analysis to ensure consistency of units.

318            **Expected likelihood of future attendance.**  Measurement of anticipated future

319    participation in a cross-sectional study poses some issues since intention may not accurately

320    predict behaviour [41].  Additionally, there has been debate in the literature regarding the use

321    of 'intention' versus 'expectation' [42-45].  Meta-analysis by Sheppard et al. [44] indicated

322    that expectation was more highly correlated to behaviour than intention.  In research directly

323    relating to physical activity (taking a walk) Warshaw and Davis [45] showed expectation to

324    be a significantly better predictor of behaviour than intention and more recently expectation

325    has been shown as more highly correlated to other health behaviours (alcohol consumption &

326    sustained weight loss) [42].  As such, *expected likelihood of future attendance* was

327    considered the most appropriate measure.

328            Courneya and McCauley [43] defined expectation as the "likelihood of the behaviour

329    being performed whether or not an intention exists" (p.53).  Adapted from research

330    conducted by Spink [46] our participants were asked *'How likely are you to continue*

331    *attending the exercise class for the foreseeable future?'*.  Fixed-choice responses available

332   were: (1) Not likely at all (at or near 0% chance); (2) Not likely (25% chance or less); (3) So-

333   So (50% chance); (4) Likely (75% chance or better); or (5) Very Likely (at or near 100%).

334   **Data Analysis**

335        To assess H1a, 1b, and 1c, a forced entry multiple regression was used to establish

336   whether group identification, identity leadership and/or relational identification were

337   associated with *length of class attendance*.  To establish whether the three predictor variables

338   were associated with *expected likelihood of future attendance* (H2a, 2b, and 2c), an ordinal

339   regression was planned.  Inspection of the data revealed the majority of participants (97%, n

340   = 116) had selected only two of the potential five answer categories ('at or near 100%' likely

341   and '75% or better').  Faced with this unexpected scenario and with an ordinal regression no

342   longer viable, a decision was taken to instead examine participants who were 'at or near

343   100%' likely to continue (n = 90) vs those who were not (n = 30 - comprising: 75% chance or

344   better, n = 26; 50% chance, n = 3; 0% chance, n = 1) using a binary logistic regression.

345   Although not ideal, given the focus on adherence, a distinction between participants who

346   reported being 100% likely to continue and those who did not, was felt to have potential

347   practical relevance.  Forced entry was selected due to the limited amount of previous research

348   on exercise, none containing all three of the potential predictors to be investigated, and since

349   we were interested in which of the three predictors, group identification, identity leadership

350   or relational identification, was most strongly associated with class tenure.  To address H3,

351   correlational analysis was used to assess whether the three SIQS elements showed differing

352   relationships with *length of class attendance*.

353                                              **Results**

354   **Preliminary Analysis**

355        Scatter plots for group identification, identity leadership and relational identification

356   (predictor variables) against length of class attendance (continuous outcome variable) were

357 run to ensure the relationships were not curvilinear. Z scores identified outliers as those with

358 values over 3.29 [47]. Three values for length of class attendance and one value for identity

359 leadership met the criteria and, the researcher being satisfied that this data was from the

360 population being studied, were winsorized. P-P plots to check for normality revealed

361 potential skew, particularly for identity leadership and length of class attendance. This was

362 potentially not a concern due to the sample size being over 30 [47]. ZResid vs ZPred and

363 partial plots revealed potential funnelling and a possible violation of homoscedacity with the

364 identity leadership variable. The assumption of independent errors was checked using the

365 Durbin-Watson statistic which was close to 2 (2.06). Collinearity between predictors was not

366 considered an issue since the correlation coefficient between the predictors were all below .8,

367 with the highest being between identity leadership and relational identification ($r = .68$).

368 Additionally, the VIF values for the predictors were all well below 10 (highest = 2.114) and

369 tolerance values above .2. The average VIF was 1.98 which was close to 1. Inspection of the

370 residuals revealed no cases had a Mahalanobis distance of > 15 (largest = 13.419), none had

371 Cooks distance > 1 (max = .151) and DFBETA statistics were all < 1. It was concluded that

372 extreme cases were unlikely to provide undue influence. The assumption of linearity

373 between the predictor variables and their logits (required for binary logistic regression) was

374 met since no interactions were significant ($p > .05$). The means and standard deviations of

375 the continuous variables are shown in Table 3.

376 Table 3.

377 *Means and standard deviations of continuous variables*

378

| | M | SD |
|---|---|---|
| Length of Class Attendance (months) | 24.14 | 24.76 |
| Group Identification | 5.05 | 1.48 |

| | | |
|---|---|---|
| Identity Leadership | 5.70 | 1.09 |
| Relational Identification | 4.66 | 1.31 |

## Main Analysis

**Multiple regression.** Multiple linear regression analysis to test whether group identification, identity leadership, or relational identification significantly predicted participants' length of class attendance showed a non-significant regression equation ($F(3,116) = .795, p = .499$) with a small effect size ($r = .142$) (See Table 4). The three predictors explained 2.0% of the variation in length of class attendance ($R^2 = .020$). This suggests that other factors are involved since 98.0% is unexplained by the model. None of the three predictors significantly predicted length of class attendance; group identification ($\beta = .004, p = .974$), identity leadership ($\beta = .163, p = .222$), relational identification ($\beta = -.037, p = .780$). In sum, H1a, 1b, and 1c were not supported.

Table 4.

*Linear model of predictors of length of class attendance with 95% confidence intervals reported in parenthesis.*

| | B | SE B | β | P |
|---|---|---|---|---|
| Constant | 5.951<br>(-18.223, 30.125) | 12.205 | | .627 |
| Group Identification | .066<br>(-3.971, 4.103) | 2.038 | .004 | .974 |
| Identity Leadership | 3.709<br>(-2.276, 9.693) | 3.022 | .163 | .222 |
| Relational Identification | -.707<br>(-5.717, 4.302) | 2.529 | -.037 | .780 |

*Note. $R^2 = .020, p = .499$*

**Binary logistic regression.** Binary logistic regression tested whether group identification, identity leadership or relational identification could significantly predict

398     whether participants were at or near 100% likely to continue attending their exercise class for

399     the foreseeable future vs less than at or near 100% likely to continue (H2).  Results showed a

400     significant regression equation (*chi-square* = 12.918, *df* = 3, *p* = .005) indicating that the

401     model provided a significantly better prediction than those made purely on which category

402     occurred most frequently.  The model explained 15.1% of the variation in outcome (*pseudo*

403     $R^2$ = .151) and the Hosmer and Lemeshow test indicated a good fit (*chi-square* = 6.531, *df* =

404     8, *p* = .588).  Group identification showed a non-significant positive effect (*b*  = *.301, Wald* =

405     2.443, *df* = 1, *p* = .118), identity leadership showed a significant positive effect (*b* = *.632,*

406     *Wald* = 4.926, *df* = 1, *p* = .026), and relational identification showed a non-significant

407     negative effect (*b* = -*.324, Wald* = 1.685, *df* = 1, *p* = .194) on likelihood of continued

408     participation being at or near 100% (see Table 5).   H2b was therefore supported but H2a and

409     2c were not. Table 5 summarises the results.

410     Table 5.

411     *Model of predictors of likelihood of future participation with 95% confidence intervals*
412     *reported in parenthesis.*
413

|                          | *B*     | SE B  | *P*   | Odds Ratio              |
| ------------------------ | ------- | ----- | ----- | ----------------------- |
| Constant                 | -2.397  | 1.133 | .034  | 0.091                   |
| Group Identification     | .301    | .193  | .118  | 1.352 (.926, 1.973)     |
| Identity Leadership      | .632    | .285  | .026  | 1.882 (1.077, 3.288)    |
| Relational Identification| -.324   | .249  | .194  | .724 (.444, 1.179)      |

414     *Note. Pseudo $R^2$ = .151, p = .005*
415

416          The analysis indicated that for every increase of 1 unit in identity leadership score it is

417     1.9 times more likely that someone will be 'at or near 100%' likely to continue attending

418     their exercise class for the foreseeable future versus not.  The confidence interval for the odds

419   ratio did not span 1, indicating the direction of the observed relationship is likely to be true in

420   the population sampled.  The confidence intervals for the odds ratios of group identification

421   and relational identification did span 1, providing ambiguous directional results.

422         **Correlation.**  Pearson's correlation coefficients were used to examine whether there

423   were differences in the associations between the three elements of multi-dimensional group

424   identification measured by the SIQS and the length of class attendance to date (H3).  Results

425   showed a small effect approaching significance for ingroup ties ($r = .165$, $p = .072$), a

426   negligible non-significant negative effect for cognitive centrality ($r = -.051$, $p = .579$) and a

427   negligible non-significant effect for ingroup affect ($r = .010$, $p = .910$).  This provided partial

428   support for H3 as there appeared to be marginal differences, both in effect size and direction,

429   across the elements.

430   Table 6.

431   *Correlation matrix of study variables*

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| 1. Group identification | - | .66** | .70** | .73** | .60** | .61** | .08 | .30* |
| 2. Ingroup ties | | - | .51** | .57** | .63** | .48** | .17 | .19* |
| 3. Cognitive centrality | | | - | .63** | .47** | .47** | -.05 | .19* |
| 4. Ingroup affect | | | | - | .56** | .54** | .01 | .35** |
| 5. Identity leadership | | | | | - | .68** | .14 | .32** |
| 6. Relational identification | | | | | | - | .08 | .16 |
| 7. Exercise to date (months) | | | | | | | - | .26* |
| 8. Future likelihood | | | | | | | | - |

432   *Note. * p < .05; ** p < 0.001.*
433   *Future likelihood coded as 0 = Not likely at all (at or near 0%); 1 = So-so (50% chance); 2*
434   *= Likely (75% chance or better); and 3 = Very likely (at or near 100%).*

435   **Exploratory Analysis**

436 **Binary logistic regression.** Given that elements of multi-dimensional group

437 identification as measured by SIQS showed potential to have differing relationships with

438 length of class attendance to date, and that identity leadership appeared to be associated

439 expected likelihood of future attendance, a binary logistic regression was conducted to

440 establish if the three elements of SIQS might significantly predict likelihood of future

441 attendance. The assumption of linearity of the logits of the predictors was met, as was the

442 assumption of multicollinearity (Tolerance values all > .1, VIF < 10, r < .8). P-P plots

443 appeared to indicate normality, with possible skew for ingroup affect. The regression showed

444 a significant equation (*chi-square* = 12.397, *df* = 3, *p* < .01) indicating that the model

445 provided a significantly better prediction than those made purely on which category occurred

446 most frequently. The model explained 14.5% of the variation in outcome (*pseudo $R^2$* = .145)

447 and the Hosmer and Lemeshow test indicated a good fit (*chi-square* = 9.167, *df* = 8, *p* =

448 .328). Ingroup affect showed a significant and positive effect (*b* = *.672, Wald* = 7.500, *df* =

449 1, *p* = .006), ingroup ties showed a non-significant negative effect (*b* = *-.079, Wald* = .174, *df*

450 = 1, *p* = .677), and cognitive centrality showed a non-significant negative effect (*b* = *-.059,*

451 *Wald* = .1081, *df* = 1, *p* = .742) on likelihood of continued participation being at or near

452 100% (see Table 7).

453 Table 7.

454 *Model of predictors of likelihood of future participation with 95% confidence intervals*
455 *reported in parenthesis.*
456

| | *B* | SE B | *P* | Odds Ratio |
|---|---|---|---|---|
| Constant | -2.011 | .995 | .043 | 0.134 |
| Ingroup Ties | -.079 | .188 | .677 | 0.924 (.639, 1.337) |
| Cognitive Centrality | -.059 | .179 | .742 | .943 (.664, 1.339) |

| | | | | |
|---|---|---|---|---|
| Ingroup Affect | .672 | .245 | .006 | 1.957 (1.210, 3.165) |

The analysis indicated that for every increase of 1 unit in ingroup affect score it is 2.0 times more likely that someone will be 'at or near 100%' likely to continue attending their exercise class for the foreseeable future versus not. The confidence interval for the odds ratio did not span 1, indicating the direction of the observed relationship is likely to be true in the population sampled. The confidence intervals for the odds ratios of ingroup ties and cognitive centrality did span 1, providing ambiguous directional results.

## Discussion

The goal of our study was to provide further support for the applicability of the social identity approach to physical activity, specifically in the context of group exercise class adherence and leadership. Additionally, we expanded on previous research [7,20] through examination of the potential relevance of relational identification and multi-dimensional factors of group identification. We sought to discover whether group identification, identity leadership and/or relational identification may predict exercise class adherence, as measured by length of class attendance to date and/or expected likelihood of future participation. We found that neither group identification, identity leadership behaviour nor relational identification were associated with length of class attendance to date. H1a, 1b and 1c were not supported. We did find support for H2b, as identity leadership behaviour was positively associated whether exercisers reported being 'at or near 100%' likely to continue attending their class vs not. Since neither group nor relational identification were associated with continuation likelihood, H2a and 2c were not supported.

The results appear to be at odds with previous work [7,9,20] which has suggested that identity leadership behaviour may influence group physical activity attendance via group

481 identification.  The fact that neither of these variables were shown to be associated with the

482 length of exercise class attendance to date in the present study may shed a slightly different

483 light.  Whilst mediational analysis was not conducted in the present study, this alone would

484 not likely account for the lack of findings.  One explanation of our findings could relate to

485 how we examined attendance.  Previous studies have examined attendance by

486 volume/frequency as opposed to *tenure*.  Our findings open the possibility that *length* of

487 exercise class attendance and *volume* of attendance when a person is minded to attend may be

488 distinct exercise adherence related constructs, each with differing relationships to group

489 identification, identity leadership, and/or relational identification. Equally, it could be that

490 these predictors are more impactful or relevant in a sport context compared to exercise or that

491 exercise class leaders are less aware of behaviour that may engender group identification, due

492 to the lack of training and research in the area.  Future longitudinal studies involving the

493 development and application of interventions (e.g., the 3Rs: Reflect, Represent, Realise; [27])

494 aimed at increasing both identity leadership behaviour and group identification, whilst also

495 measuring group identification and attendance both via frequency *and* length as well as

496 examining drop-out rates may help to provide a clearer understanding.

497     Identity leadership behaviour was however shown to be a significant predictor of

498 participants' expectations being 'at or near 100%' likely to continue attending their class.

499 For every unit increase in identity leadership score participants were 1.9 times more likely to

500 be 'at or near 100%' likely to continue vs not.  This finding partly aligns with the previous

501 research evidence that has shown identity leadership behaviour to be associated with more

502 frequent attendance in both exercise classes [20] and amateur sports teams [9].  However, it

503 does not align with other results in the current study that identity leadership did not predict

504 length of class attendance. 'Expectation' of future behaviour has been shown correlate more

505 closely to actual behaviour in a variety of health behaviours [42,45] and as such the finding

506     that identity leadership was associated with greater expected likelihood of future

507     participation, specifically in exercise class attendees, was as predicted, and accordingly, has

508     practical relevance (although it is important to remember this particular study does not permit

509     causational establishment).  Since group exercise classes offer a gateway to exercise [4] the

510     possibility that identity leadership behaviour might enhance expected or actual continuation

511     of participation could have important practical implications for increasing physical activity

512     adherence.  Further research in this regard appears warranted as it may offer an important

513     angle for inclusion of identity leadership behaviours in exercise instructor training.

514         The finding that relational identification with the exercise instructor did not appear to

515     be related to adherence in the present study was not as expected.  Relational identification

516     was not found to be associated with either length of class attendance to date or future

517     expected participation.  Although this could indicate that relational identification with the

518     class instructor is not a relevant factor in the adherence of exercise class attendees, it could

519     equally be that the measure used was not suitable for an exercise context.  Measure selection

520     was limited and that used had only been done so previously in workplace settings [38,39].

521     The development and validation of a relational identification measure specifically for

522     exercise class settings may help to enhance understanding and future work in this area.

523     Given the strong theoretical links to group identification and identity leadership, the null

524     finding in this study alone would seem insufficient to rule out a potential role for relational

525     identification regards exercise adherence.

526         Whilst no significant results were shown in relation to the global measure of group

527     identification, the study additionally aimed to explore the possibility that multi-dimensional

528     elements, as measured by the SIQS [21] may relate differentially to exercise class adherence.

529     It appeared that this may be the case.  Initial correlational analysis showed that the three

530     elements had differing relationships with length of class attendance and whilst none were

531    significant, small effects were observed for ingroup ties.  Of particular interest was follow-up

532    analysis indicating that ingroup affect (which specifically measures how good people feel

533    about being a member of a group) was significantly associated with whether participants

534    were 'at or near 100%' likely to continue vs not.  For every unit increase in ingroup affect

535    score participants were 2.0 times more likely to be 'at or near 100%' likely to continue to

536    exercise in the class.  This finding, whilst exploratory in nature, expands on previous research

537    indicating the importance of group identification on exercise class attendance by highlighting

538    that it may be the specific element of identity relating to how good a person feels about being

539    a member of a group that could enhance expected adherence.  This aligns with research in the

540    field of sport suggesting that the different elements measured by SIQS may relate to different

541    outcomes [21,24].  Clearly the small scale and cross-sectional nature of this study does not

542    enable any firm conclusions, but does suggest that further research on exercise adherence

543    utilising SIQS might enhance present understanding.

544    **Further Limitations and Considerations**

545         Whilst the present study has yielded some interesting and perhaps unexpected results,

546    there are limitations to note.  First, the sample examined may not have been representative of

547    the group exercise class attendee population and may not be generalisable due to voluntary

548    and snowball sampling.  Indeed, it is possible that only those more enthusiastic about their

549    class responded.  This was borne out by the majority of participants (97%) selecting ratings

550    of either 'at or near 100%' or '75% or more' likely to continue.  An alternative sampling

551    approach whereby classes are approached as a whole and attended in person by the

552    researcher, such that all attendees from a class are given an opportunity to participate, may

553    help address this were the study to be repeated.  This is partially akin to the approach adopted

554    by Stevens et al. [7] and could explain the difference in findings.  A systematic approach with

555    sufficient sample sizes could allow researchers to examine differences across exercise class

556    types.

557          Further regarding generalisability, the participants comprised primarily females (89%)

558    affording the possibility that the findings may not be as applicable for male class attendees.

559    The greater number of female respondents was perhaps unsurprising, since research has

560    suggested that female:male class attendance is in the region of 5:1 [48].  From a practical

561    standpoint, since more males than females are presently meeting physical activity guidelines

562    [49] opportunities to promote exercise activity by females may be of particular importance.

563          Third, our study was cross-sectional and relied on self-report data.  We asked

564    participants how long they had attended the exercise class, but how objectively accurate this

565    was is unknown. The use of a longitudinal design may partially eliminate this issue since

566    attendance could be recorded and measured over a known period.  Coupling this with

567    attendance register records, may also add rigor.  The cross-sectional nature of this research

568    means that whilst it may be speculated that group identification by way of ingroup affect may

569    positively affect group exercise class adherence (expectation to continue), no causal link can

570    be established.  Instead, our research should be seen as an important stepping stone in terms

571    of examining the multi-dimensional conceptualisation of group identification in exercise

572    settings.

573          Fourth, in an attempt to partially replicate and expand on Stevens et al. [7], we elected

574    to use length of exercise class attendance to date as a dependent variable, in place of exercise

575    class attendance frequency.  The aim of this was to allow comparison between results from

576    volume versus length of attendance data in a comparable cross-sectional study.  In view of

577    this we chose not to additionally use length of class attendance as a control variable in the

578    first step of the expected future attendance regression.  Controlling for attendance length in a

579    future study of expected class attendance continuation may provide additional insight.

580    Finally, although SIL behaviour showed a significant result in terms of predicting

581 likelihood of continued participation, mis-matched group sizes meant that 75% would have

582 been predicted correctly through chance alone.  Binary logistic regression was undertaken in

583 place of the planned ordinal regression since most participants selected only two of the five

584 available likelihood categories, with greater number choosing 'at or near 100%'.  Thus,

585 whilst the regression model with predictors offered a significant improvement, the prediction

586 percentage increased by just 2% to 77%.  For ingroup affect, this was even smaller, from

587 75.0% to 75.8%.  Further research, ideally with more equal group numbers, would need to be

588 conducted to check for replication.

589 **Conclusions**

590    The present study has provided partial support for a proposed role of SIL behaviour in

591 the continued participation of exercise class attendees.  Additionally, we present evidence

592 that supports the proposition that the multi-dimensional elements of group identification may

593 be associated differently with exercise class adherence.  Ingroup affect appears most pertinent

594 in this regard. Our study has also raised questions over whether the social identity approach is

595 as applicable for exercise class adherence in terms of *tenure* as has previously been suggested

596 in relation to attendance *frequency/volume* and indicates further investigation is warranted.

597 The lack of support for a role of relational identification regards exercise class adherence in

598 the present research should not preclude its investigation in future.  Increasing activity levels

599 amongst adults is of paramount importance, and we have provided initial evidence that the

600 perceived leadership of 'our' exercise instructors, and ingroup affect may be determinants of

601 whether 'we' will continue to attend our exercise classes.

602

603 The Authors declare that there is no conflict of interest.

604

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