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Predictors of Military Veterans' Engagement in Bespoke Recovery Pathways and Health and Well-being Outcomes

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26 **Abstract**

27 Purpose/Objective: The objective of this cross-sectional study was to assess how
28 psychosocial variables predict UK military veterans' level of engagement in bespoke
29 recovery pathways (Aim 1) and a sports-specific recovery pathway (Aim 2). A further
30 purpose of this study was to test whether predictor variables indirectly predict outcome
31 variables of physical health (Aim 3), mental health (Aim 4), and subjective vitality (Aim 5),
32 when mediated through level of engagement with all recovery pathways and the sport
33 recovery pathway.

34 Research Method/Design: A cross-sectional battery of questionnaires were completed by 514
35 military veterans who had been enrolled in Help for Heroes recovery pathways (e.g., sports
36 recovery pathway) from three months-10 years. Data were analyzed by multinomial logistic
37 and multiple linear regressions and mediation analyses using the PROCESS SPSS macro.

38 Results: Engagement in all recovery pathways (i.e., frequency and duration of attendance)
39 was predicted by basic psychological needs frustration and perceived social support
40 (Nagelkerke $R^2 = .16$). Sport-related social support ($p < .05$) and competence satisfaction ($p <$
41 $.001$) were directly positively associated with mental health, and competence satisfaction
42 with physical health ($p < .001$) and well-being ($p < .001$) on the sport recovery pathway.

43 Whilst perceived stress was directly negatively associated with mental health and well-being
44 ($p < .001$). Mediation analyses revealed no significant, indirect effects of psychosocial
45 variables on health and wellbeing through level of engagement.

46 Conclusions/Implications: In sum, engagement in recovery pathways does not mediate the
47 effects of psychosocial variables on veterans' health and well-being. Perceived social
48 support, satisfaction of veterans' needs, and perceived stress were better predictors of health
49 and well-being outcomes and should be an important focus of future research and recovery.

50 *Keywords:* motivation, need support, recovery pathway, social support, stress

51 **Impact and Implications Statement**

- 52 • Findings suggest that engagement in recovery pathways does not mediate the effects
53 of psychosocial variables on veterans' health and well-being.
- 54 • Perceived sport-related social support, stress, and competence satisfaction associated
55 with recovery pathways predicted military veteran health and well-being.
- 56 • Future research should examine these recovery pathways longitudinally to determine
57 whether these pathways are already effective for wounded, injured, and sick military
58 veterans, or whether there are factors that could enhance these pathways'
59 effectiveness further.
- 60 • Initial implications from this cross-sectional study suggest that practitioners should
61 develop programmes which reduce perceived stress, appeal to achievement motives,
62 and encourage social support and the satisfaction of basic psychological needs.

63

64 There are approximately 2.5 million UK Armed Forces veterans living in the UK, of
65 whom over 66,000 are estimated to require health-related support as a result of their previous
66 military occupation (Diehle & Greenberg, 2015; Ministry of Defence, 2017). Military
67 charities have typically supported wounded, injured, and sick (WIS) military veterans with
68 their health and well-being post-Service. Supporting WIS military veterans in improving their
69 health and well-being through their recovery journeys is a key driving factor of recovery
70 services. Previous research has suggested that encouraging military veterans to positively
71 engage with their own recovery journey is key to successful, long-term physical and mental
72 health benefits following military service (Crawford et al., 2015; Warren et al., 2015). The
73 military charity Help for Heroes (H4H) offers support through a range of activities and
74 pathways. At the time of this study, the support on offer took the form of five bespoke
75 recovery pathways which included, but were not limited to; career (e.g., access to courses),

76 psychological (e.g., counselling services), social (e.g., group-based peer support), financial
77 support (e.g., grants), and the opportunity to be physically active through ‘sports recovery’
78 (e.g., adapted sports; “Get Support H4H”, 2018). These services are typically ‘open to all
79 military veterans’ as they are designed to support the recovery of all WIS military veterans
80 regardless of the wound, injury or illness that they experience. As these pathways are ‘self-
81 referral’ in nature, there is no expectance around attendance and any level of engagement is
82 considered a benefit to participants (“Get Support H4H”, 2018).

83 Within these services, engagement with sport and physical activity (PA) has
84 repeatedly demonstrated numerous benefits. These include not only physiological benefits
85 (e.g., improved physical fitness), but also psychological (e.g., self-confidence), and social
86 (e.g., re-integration) benefits (Caddick & Smith, 2014; 2018; Shirazipour et al., 2018). The
87 H4H ‘sports recovery’ pathway engages hundreds of military veterans every year through
88 team sports, exercise, and training toward sport and exercise related qualifications (see “Get
89 Support H4H”, 2018, for further information). For this reason, it is now considered by H4H
90 as a key recovery pathway for WIS military veterans. As suggested by Shirazipour et al.
91 (2018), despite the proliferation of sport and physical activity programs for military veterans,
92 these programs have not been systematically examined to determine what strategies foster
93 most benefits. Considering the prominence of the ‘sports recovery’ pathway at H4H, and the
94 lack of research conducted on this bespoke pathway, it is important to assess military
95 veterans’ use of and engagement with the sport-specific pathway.

96 Occupational psychology research has suggested that “engagement” refers to a
97 positive, fulfilling, state of mind that is characterized by vigor, dedication, and absorption
98 (Bakker & Demerouti, 2008; Weir et al., 2019). The intensity and nature of an individual’s
99 engagement with health services (i.e., any service that supports improvement in or
100 engagement with healthy behaviours) has been shown to positively impact on their health,

126 Research conducted with a broader military veteran population has identified a further
127 potential barrier to engagement, perceived stress (Cohen et al., 2010). Perceived stress can be
128 defined as, “the thoughts and feelings that an individual has about the demands they are
129 currently experiencing or over a period of time” (Phillips, 2013). Extant literature in the field
130 of business (Bakker & Demerouti, 2008) has demonstrated how increased stress can be linked
131 to reduced engagement, due to factors including decreased motivation, lack of autonomy, and
132 reduced perceived social support. The Bakker and Demerouti (2008) engagement model is
133 applicable when examining engagement with recovery services. For example, the presence of
134 stress (i.e., a demand) is believed to motivate people to disengage with healthy behaviors and
135 engage in unhealthy, non-beneficial behaviors (e.g., not engaging with recovery) in order to
136 bring them short-term pleasure or relief (i.e., an outcome; Ng & Jeffery, 2003). Indeed,
137 military veterans who experience high levels of perceived stress have been found to decrease
138 their participation in positive behaviors such as exercise, social interactions, and stress
139 management (Ng & Jeffery, 2003). Therefore, the presence of stress in military veterans’
140 lives may negatively affect their level of engagement with recovery pathways as they seek
141 alternative, short-term benefits or relief. The military psychology literature at present has
142 neglected perceived stress in military veterans and predominantly focused on the stress-
143 related experiences of those experiencing mental health issues such as anxiety, depression,
144 and post-traumatic stress disorder (PTSD; Crawford et al., 2015; Sayer et al., 2009). To this
145 end, it is of interest to study the effect of perceived stress on military veterans and their
146 decision to engage with recovery pathways.

147 An additional factor that can be considered a determinant of engagement is an
148 individual’s participation motives (Zahariadis & Biddle, 2000). Simply, these participation
149 motives describe the reasons given by individuals for participating in activities, and cover
150 motives including fun, social aspects, and skill development (Zahariadis & Biddle, 2000).

151 Further to this, understanding these motives could indicate an individual's goal orientation
152 and whether they have intrinsically or extrinsically motivated goals (Vansteenkiste & Ryan,
153 2013). The application of these motives to WIS military veterans could be of interest to
154 researchers and practitioners alike, as understanding these motives could aid in the
155 development of a more personalized approach to encourage engagement with and support
156 maintenance of recovery.

157 Research examining physical activity adoption (Teixeira et al., 2012) has
158 demonstrated, in line with self-determination theory (SDT; Deci & Ryan, 1985), that an
159 individual's basic psychological needs being supported has been consistently associated with
160 increased engagement. Within SDT, adaptive forms of motivation are predicted to develop
161 through the satisfaction of an individual's three basic psychological needs of autonomy
162 (feeling of being the origin of one's behaviors), competence (feeling effective), and
163 relatedness (feeling understood and cared for by others). Frustration of these needs can
164 undermine motivation (Chen et al., 2015; Vansteenkiste & Ryan, 2013). It has been
165 demonstrated in a meta-analysis applying SDT to health contexts that provision of need
166 support (i.e. the inter-related nature of autonomy support, structure, and involvement) relates
167 positively to physical and psychological health, and negatively to ill-being (Vansteenkiste &
168 Ryan, 2013). Other research has demonstrated that if need frustration occurs, then this can
169 elicit defensiveness and ill-being (Chen et al., 2015). The SDT framework could provide a
170 useful means of exploring the factors predicting engagement in all recovery pathways, as
171 each pathway is contributing to the holistic development and recovery of the individual.
172 Consequently, it would be worth examining if veterans' basic psychological needs are
173 supported through the recovery pathways to indicate the likelihood of them developing
174 adaptive forms of lasting motivation to engage with their recovery journeys and the
175 associated positive health and well-being outcomes.

176 Previous research has suggested that in order to enhance motivation, increase
177 engagement, and buffer against stress, social support is required (Romero et al., 2015;
178 Wilcox, 2010). Social support is the perception and actuality that ‘one’ is cared for, has
179 assistance available to them, and that ‘one’ is part of a supportive social network (Romero et
180 al., 2015). Some studies suggest that social support could increase engagement because an
181 individual’s support network ‘enables’ them to seek treatment when it is needed (Coleman et
182 al., 2017). In contrast, other findings suggest that social support acts as a ‘buffer’ to mitigate
183 the severity of physical and mental health issues, thus reducing the need for treatment
184 (Wilcox, 2010). Although research demonstrates that military veterans benefit from social
185 support (Coleman et al., 2017), little research has been conducted which examines the role of
186 social support in predicting engagement of military veterans with bespoke recovery
187 pathways.

188 The purpose of this study was to test a mediation model of engagement, predicted by
189 psychosocial variables, on health and well-being outcomes in WIS military veterans. More
190 specifically, the first aim was to assess how psychosocial variables (i.e., barriers, perceived
191 stress, motives for participation, basic psychological needs, and perceived social support)
192 predict UK military veterans’ level of engagement in bespoke recovery pathways provided by
193 Help for Heroes (Aim 1; see Figure 1). The second aim was to determine whether
194 psychosocial variables predict whether military veterans engage with the ‘sports recovery’
195 pathway (Aim 2; see Figure 1). The final aims consisted of whether predictor variables
196 indirectly predict outcome variables of physical health (Aim 3), mental health (Aim 4), and
197 subjective vitality (Aim 5; see Figure 1), mediated through level of engagement with all
198 recovery pathways and the sport recovery pathway.

199 **Methods**

200 *Participants*

201 An a priori power analysis was conducted using G*Power3 (Faul et al., ,2007) to test
202 multiple regression using a medium effect size ($f^2 = .50$), and an alpha of .05. Results showed
203 that a total sample of 495 participants was required to achieve a power of .80.

204 Any UK military veteran who had expressed an interest in engaging with H4H
205 recovery pathways (i.e., a minimum requirement was for individuals to sign up to the H4H
206 mailing list) was eligible to take part. The sample was drawn from an online database used by
207 H4H (N = 3,250) and generated a 16% response rate (i.e., those who fully completed the
208 survey). The final sample comprised 514 participants (419 males, 95 females; $M_{\text{age}} = 41.5 \pm$
209 9.5 , age range 18-61), who had served in the British Army ($n = 337$), Royal Air Force ($n =$
210 79), Royal Navy ($n = 74$), or Royal Marines ($n = 24$), for a mean \pm SD of 12.2 ± 7.2 years.
211 Participants reported their type of disability as: physical impairment ($n = 117$), mental health
212 ($n = 69$), hearing impairment ($n = 1$), visual impairment ($n = 5$), cognitive impairment/brain
213 injury ($n = 5$), or other ($n = 14$). The majority of participants reported co-morbidities ($n =$
214 293) with participants reporting having had their injury/impairment for an average of $11.7 \pm$
215 9.0 years.

216 ***Procedures***

217 Following institutional and H4H ethical approval, participants were contacted via
218 email. The initial communication provided them with an information sheet which gave
219 further details of the study, informed participants of their ethical rights (e.g., confidentiality,
220 right to withdraw, anonymity), and asked them to provide informed consent if they were
221 willing to participate. A questionnaire pack was developed and piloted with ten UK veterans
222 from diverse backgrounds including differing injury types, lengths of Service, and recovery
223 experiences. No amendments were made following piloting. Each participant completed the
224 questionnaire online at a single time point, over a period of 12 months between July 2016 and
225 July 2017. The questionnaire pack took approximately 30-40 minutes to complete.

226 Participants were asked to respond to the questionnaires with their experiences of recovery in
227 mind (e.g., H4H recovery pathways). Those who identified as ‘non-engagers’ were asked to
228 reflect on the psychosocial variables in relation to their life and what was available to them at
229 the time.

230 *Measures*

231 *Predictors.*

232 **Exercise Benefits/Barriers Scale (EBBS).** The 14-item barriers subscale of the
233 EBBS (Sechrist et al., 1987) was used, rated on a four-point Likert scale ranging from 1
234 (*strongly disagree*) to 4 (*strongly agree*). Participants were asked to reflect on the statements
235 presented in relation to their current participation with recovery services. Items represent
236 three main potential barriers; Environment (e.g., “Facilities are inappropriate/inaccessible”),
237 Expenditure (e.g., “I am fatigued by participating”), and Experiences (e.g., “I lack the
238 confidence to participate”). Previous research has reported excellent internal consistency
239 (mean $\alpha = .90$) for the barrier subscale of the EBBS (Nelson & Gordon, 2003), with
240 acceptable alpha values present in the current study (mean $\alpha = .66$).

241 **Perceived Stress Scale (PSS).** The 14-item PSS (Cohen et al., 1983) was used to
242 measure the degree to which situations in a military veteran’s life are appraised as stressful.
243 For all items on the PSS, the stem “In the last month, how often have you...” was provided,
244 to which the participants responded to each item (e.g., “been upset because of something that
245 happened unexpectedly”) on a 5-point scale ranging from 0 (*never*) to 4 (*very often*). Previous
246 research has reported excellent internal consistency ($\alpha = .90$) and convergent validity for the
247 PSS (Padden et al., 2011) with good alpha values present in the current study ($\alpha = .80$).

248 **Participation Motivation Questionnaire (PMQ).** Participants completed the PMQ
249 (Gill et al., 1983), which comprises 30-items covering possible reasons individuals have to
250 participate in recovery. The items represent eight subscales: team orientation (e.g., “I like the

251 teamwork”), achievement/status (e.g., “I like the rewards”), fitness (e.g., “I want to stay in
252 shape”), friendship (e.g., “I like to meet new friends”), skill development (e.g., “I want to
253 improve my skills”), fun (e.g., “I like to have fun”), energy release (e.g., “I like to get out of
254 the house”), and miscellaneous (e.g., “I like to use the equipment or facilities”). Thinking
255 about their current reasons for participating in recovery (i.e., “I participate in the recovery
256 services because...”), participants responded to each item on a 5-point Likert scale ranging
257 from 1 (*not at all important*) to 5 (*extremely important*). Similar to previous studies
258 (Zahariadis & Biddle, 2000), the Cronbach’s alpha coefficients ranged from .81 to .94.

259 **Basic Psychological Need Satisfaction & Frustration Scale (BPNSFS).** The 24-
260 item BPNSNF scale (Chen et al., 2015) was designed to measure the three psychological
261 needs of autonomy, competence, and relatedness. Three of the subscales measure
262 participants’ experiences of satisfaction for autonomy (e.g., “a sense of choice and freedom in
263 the things I undertake”), competence (e.g., “confident that I can do things well”), and
264 relatedness (e.g., “close and connected with other people who are important to me”). The
265 remaining three subscales measure the experiences of frustration for autonomy (e.g.,
266 “pressured to do too many things”), competence (e.g., “insecure about my abilities”), and
267 relatedness (“the relationships I have are just superficial”). The stem, “When thinking about
268 my current involvement in recovery services, I feel...” was provided to which participants
269 responded on a 5-point Likert scale, ranging from 1 (*Not at all true of me*) to 5 (*Very true of*
270 *me*). Similar to previous evidence (Chen et al., 2015), the Cronbach’s alphas range between
271 .91 and .94 for satisfaction subscales and .83 and .91 for the frustration subscales in this
272 study.

273 **The Perceived Available Support in Sport Questionnaire (PASS-Q).** The PASS-Q
274 (Freeman et al., 2011) is a 16-item measure of the four dimensions of sport-related social
275 support. For all items on the PASS-Q participants were asked to reflect on their current

276 involvement with their recovery and the stem “If needed, to what extent would someone...”,
277 was provided to which participants responded on a 5-point Likert scale ranging from 0 (*not at*
278 *all*) to 4 (*extremely so*). The four dimensions measured are emotional (e.g., “Always be there
279 for you”), esteem (e.g., “Reinforce the positives”), informational (e.g., “Give you
280 constructive criticism”), and tangible (e.g., “Help you with tasks to leave you free to
281 concentrate”) support. Previous research has reported excellent reliability for the PASS-Q (α
282 = .89; Freeman et al., 2011) with good alpha values present in the current study ($\alpha = .93$).

283 ***Outcomes.***

284 **The U.K. Short Form 12 Health Survey Questionnaire (UK SF-12).** The SF-12
285 (Ware et al., 1995) is a multidimensional generic measure of health-related quality of life. It
286 has become widely used in clinical trials and routine outcome assessment because of its
287 brevity and psychometric performance (Jenkinson & Layre, 1997; Ware et al., 1995).
288 Participants were asked to reflect back on the previous four-weeks. Perceived physical health
289 was measured using eight items such as, “In general, would you say your health is...” to
290 which participants responded on a 5-point Likert scale ranging from 1 (*Poor*) to 5 (*Excellent*).
291 Perceived mental health was assessed by four items (e.g., “Have you felt calm and
292 peaceful?”) which participants responded to on a 6-point Likert scale, ranging from 1 (*All of*
293 *the time*) to 5 (*None of the time*). Items were recorded so that higher scores reflect better
294 health status.

295 **Subjective Vitality Scale (SVS).** Vitality is considered an aspect of eudemonic well-
296 being (Ryan & Deci, 2001), as being vital and energetic is part of what it means to be fully
297 functioning and psychologically well. The SVS asked participants to consider how seven
298 items (e.g., “I feel alive and vital”) applied to them at the time of completing the scale.
299 Participants responded on a 7-point Likert scale, ranging from 1 (*not at all*) to 7 (*very true*).
300 An excellent level of internal consistency ($\alpha = .92$; Ryan & Frederick, 1997) for the SVS has

301 previously been demonstrated, whilst this study demonstrated acceptable levels ($\alpha = .76$).

302 *Mediator.*

303 *Engagement with Help for Heroes (H4H) support.* As previously highlighted, the
304 H4H recovery pathways are bespoke to the military veteran population and as such, no
305 measure exists for engagement with these pathways. Therefore, participants reported their
306 engagement through answering a number of attendance related questions that could indicate
307 their level of engagement. Participants were asked to report whether they engaged with H4H,
308 and if so, when they had first engaged with H4H. Participants then recorded whether they had
309 attended any of the H4H recovery centers, their length of attendance, and how many times
310 they would visit in a month. Participants also recorded whether they engaged with H4H
311 recovery pathways, length of attendance on those pathways, and how often they engaged with
312 the pathways in a month. Responses to these questions in particular highlighted participants
313 who stated that they attended the ‘sports recovery’ pathway. Given the unique setting, H4H
314 practitioners were then involved in the operationalization of the term ‘engagement’, with the
315 following categories developed. Participants were then categorized into engagers and non-
316 engagers (i.e., those who were not involved in, or associated with, H4H recovery pathways).
317 Participants were then further split into non-, short-term (<6 months), long-term infrequent
318 (>6 months but attended, on average, less than once a week), or long-term frequent (>6
319 months and attended, on average, more than once a week) engagers for further analysis.
320 Similarly, participants were then categorized into engagers and non-engagers (with the
321 ‘sports recovery’ pathway), as well as being further split into the aforementioned levels of
322 engagement within the ‘sports recovery’ pathway. Long-term frequent and infrequent
323 engagers were differentiated between by their average attendance on pathways per week.
324 These two levels of engagement were split in such a way because long-term engagement,
325 although viewed as desirable, may also raise issues of reintegration or dependency, which

326 may be further understood using this differentiation.

327 *Data Analysis*

328 Data were analyzed using SPSS software (IBM Corp, 2015). To answer Aims 1 and 2,
329 two multinomial logistic regression analyses were run with level of engagement (i.e., non-,
330 short-term-, long-term infrequent, or long-term frequent engager) used as the dependent
331 variable, and predictor variables (i.e. barriers to engagement, perceived stress, basic
332 psychological needs, motives for participation, and perceived social support) added
333 simultaneously as independent variables. The reference group were those military veterans
334 who did not engage with H4H or the ‘sports recovery’ pathway dependent on the analyses.
335 To facilitate the interpretation of differences between predictors, each predictor variable had
336 been standardized to a mean of 0, and a standard deviation of 1.

337 Aims 3-5 were analyzed using multiple linear regression for each of three dependent
338 outcome variables; self-reported physical health, mental health, and subjective vitality. The
339 PROCESS SPSS macro was utilized to explore whether level of engagement mediated the
340 effect of significant predictor variables on outcomes (Hayes, 2018). Specifically, direct,
341 indirect, and total effects were measured to examine: (a) whether predictor variables were
342 linked to outcome variables, and (b) whether engagement levels mediated the relationship
343 between predictor variables and outcome variables. Bootstrapping was set at 1000 samples
344 with bias-corrected 95% confidence intervals estimated for all effects (Hayes, 2018). An
345 effect was considered significant when the confidence interval did not contain zero (Hayes,
346 2018).

347 **Results**

348 Descriptive group statistics are presented in Table 1. All measures demonstrated
349 acceptable internal consistency (see Table 2).

350 <Table 1>

351 **Main Analyses**

352 Aim 1: In line with the first aim, when all predictor variables were included, the
353 model significantly predicted engagement in H4H recovery pathways ($\chi^2(51) = 76.73$,
354 Nagelkerke $R^2 = .16$, $p < .01$). Significant unique contributions were made by competence
355 frustration ($\chi^2 = 12.75$, $p < .01$) and perceived social support ($\chi^2 = 11.43$, $p < .01$). Post-hoc
356 tests revealed that for each one-unit increase in competence frustration, the odds of being
357 categorized as a long-term infrequent engager, compared to a non-engager, was decreased by
358 .45. Furthermore, the odds of being categorized as a long-term frequent engager, compared to
359 a non-engager, was increased by .47 for each one-unit increase in perceived social support
360 (see Table 3 in supplementary materials for further detail).

361 Aim 2: In line with the second aim, when all predictor variables were included, the
362 model significantly predicted engagement in the H4H 'sport recovery' pathway ($\chi^2(51) =$
363 67.90 , Nagelkerke $R^2 = .14$, $p < .05$). Significant unique contributions were made by
364 competence ($\chi^2 = 11.38$, $p < .01$) and relatedness frustration ($\chi^2 = 10.18$, $p < .05$). Post-hoc
365 tests revealed that for each one-unit increase in competence and relatedness frustration, the
366 odds of being categorized as a long-term frequent engager, compared to a non-engager, was
367 decreased by .74 and .80, respectively (see Table 3 in supplementary materials).

368 Aim 3: Predictor variables (barriers to engagement, perceived stress, participation
369 motives, perceived social support, and basic psychological needs) explained 16% of the
370 variance of veterans' physical health ($F(17,496) = 5.56$, $p < .001$, $R^2 = .16$). Variables of
371 'achievement/status' participation motives ($b = 2.53$, $p < .001$) and competence satisfaction
372 ($b = 3.05$, $p < .001$) were both independently positively predictive of perceived physical
373 health. In comparison, relatedness satisfaction ($b = -2.64$, $p < .001$), 'skill development' ($b = -$
374 2.85 , $p < .001$), and 'friendship' participation motives ($b = -3.40$, $p < .01$) negatively
375 predicted perceived physical health. No other variables contributed significantly to the model.

376 There were no significant indirect effects of the predictor variables on physical health
377 through engagement levels (see Table 4a in supplementary materials), suggesting that the
378 relationships between psychosocial variables and physical health outcomes were not
379 mediated by engagement in all recovery pathways.

380 Aim 4: Predictor variables (barriers to engagement, perceived stress, participation
381 motives, perceived social support, and basic psychological needs) significantly predicted
382 veterans' mental health ($F(17,496) = 17.34, p < .001, R^2 = .37$), explaining 37% of the
383 variance. Perceived social support ($b = .99, p < .05$), 'fun' participation motives ($b = 2.90, p$
384 $< .001$), and competence satisfaction ($b = 2.99, p < .001$) all displayed significant positive
385 contributions to mental health. Perceived stress ($b = -.33, p < .001$), 'achievement/status' ($b =$
386 $-1.58, p < .01$), 'friendship' participation motives ($b = -2.88, p < .01$), competence frustration
387 ($b = -1.75, p < .01$) and relatedness frustration ($b = -1.51, p < .01$) all displayed significant
388 negative contributions to mental health. Mediation results indicated that there were no
389 significant indirect effects of the predictor variables, on mental health through engagement
390 levels (see Table 4b in supplementary materials), suggesting that the relationships between
391 the psychosocial variables and mental health outcomes were not mediated by engagement in
392 all recovery pathways.

393 Aim 5: Predictor variables (barriers to engagement, perceived stress, participation
394 motives, perceived social support, and basic psychological needs) explained 42% of the
395 variance in veterans' subjective vitality ($F(17,496) = 20.66, p < .001, R^2 = .42$). Variables of
396 'fun' ($b = 2.53, p < .001$) and 'energy release' ($b = 1.10, p < .05$) participation motives, as
397 well as competence satisfaction ($b = 2.37, p < .001$) all displayed significant positive
398 contributions to the model. Variables of perceived stress ($b = -.22, p < .001$), 'skill
399 development' participation motives ($b = -1.04, p < .05$) and competence ($b = -.99, p < .05$)
400 and relatedness ($b = -1.64, p < .001$) frustration all displayed significant negative

401 contributions to the model. No other predictor variables contributed significantly to the
402 model. There were no significant indirect effects of the predictor variables on subjective
403 vitality through level of engagement (see Table 4c in supplementary materials), suggesting
404 that the relationships between the psychosocial variables and subjective vitality were not
405 mediated by engagement in all recovery pathways.

406 **Discussion**

407 The present cross-sectional survey study aimed to test a mediation model of
408 engagement, predicted by psychosocial variables, on health and well-being outcomes in a
409 population of WIS military veterans engaged with bespoke national pathways of recovery
410 (H4H). Competence frustration (i.e., feelings of failure or inadequacy, and doubts over one's
411 own abilities) appeared to be associated with poor engagement with all recovery pathways,
412 and the sports recovery pathway in particular. Perceiving oneself to have social support
413 appeared to be positively associated with participation on all recovery pathways, whilst
414 frustration of the need for relatedness was associated with limited engagement with the sports
415 recovery pathway specifically. Contrary to our suppositions, the association of predictive
416 factors with outcome variables was not mediated by level of engagement in any case (i.e.,
417 across all recovery pathways).

418 In partial support of Aim 1, it was found that a combination of determinants (low
419 competence frustration and higher perceived sport-related social support) predicted the level
420 of engagement that military veterans had with H4H recovery pathways. Frustration of the
421 need for competence occurs when a person feels the challenge set in a given setting is either
422 beyond their capacity, or does not permit them to demonstrate their competence. It may be
423 that competence is particularly pertinent to military veterans if, for example, tasks within a
424 recovery pathway are comparable to what an individual used to be able to do (e.g., prior
425 levels of physical performance), then that individual will likely experience competence

426 frustration because they will be comparing their current limitations with their former ability
427 (Fortier et al., 2007; Vansteenkiste & Ryan, 2013). Potentially, this frustration may then lead
428 individuals to disengage with recovery pathways as they feel as though they are not
429 progressing. In contrast, these same individuals may be able to feel more competent if tasks
430 are better matched to their current selves, and they are able to see progress, which in turn,
431 will mean they are likely to remain engaged (Fortier et al., 2007; Vansteenkiste & Ryan,
432 2013). Ensuring that recovery service tasks are matched with individuals' current abilities
433 could aid veterans in feeling competent in their recovery and as though they are progressing.

434 The significance of competence frustration rather than satisfaction is also an
435 interesting finding within this study. Research has typically found that active need support is
436 a better predictor of behavior than the absence of need frustration (Vansteenkiste & Ryan,
437 2013). It has been argued that frustration of psychological needs, rather than fulfilment of
438 them, can lead to maladaptive behaviors (e.g., not engaging in positive health behaviors;
439 Bartholomew et al., 2011). This argument is made from the notion that lack of experienced
440 need satisfaction does not necessarily imply active need frustration (Bartholomew et al.,
441 2011). With military veterans engaging with recovery pathways, it may be argued that
442 environments that actively thwart an individual's competence (e.g., make individuals feel as
443 though they cannot successfully complete difficult tasks) would reduce engagement with
444 recovery. Therefore, the absence of need frustration (which if present would slow growth or
445 develop maladaptive behaviors) offers military veterans the opportunity to adapt to and
446 engage with recovery. A consideration for practitioners, therefore, could be to create an
447 environment that reduces need frustration in the initial stages, before later emphasizing need
448 satisfaction in order to promote growth in recovery (Vansteenkiste & Ryan, 2013).

449 As highlighted, perceived social support (i.e., emotional, esteem, informational, and
450 tangible) was also positively associated with engagement. This supports previous research

451 (Coleman et al., 2017; Romero et al., 2015), as it appears that support from their surrounding
452 network ‘enables’ veterans to engage in recovery pathways. Expanding upon these findings
453 however, perceived social support was a significant predictor of *long-term* engagement with
454 recovery pathways. It may be argued that long-term frequent engagers had the time to
455 develop further social support networks within H4H, alongside their existing support
456 networks, which may have meant they then remaining engaged in the long-term (Coleman et
457 al., 2017). Therefore, future researchers should look to further explore the social support
458 received by long-term frequent engagers, as this will further inform researchers and
459 practitioners on the type and timing of social support that WIS military veterans require to
460 engage over time with their recovery journeys.

461 Contrary to predictions, level of engagement did not mediate any associations
462 between psychosocial and outcome variables. These findings contradict previous findings,
463 which suggested that engagement with recovery programs could have positive effects on
464 physical health, mental health, and aspects of well-being (Caddick & Smith, 2018; Warren et
465 al., 2015). The findings of this research demonstrate that level of engagement in recovery
466 pathways does not mediate the effects of psychosocial variables on veterans’ health and well-
467 being. A potential explanation for this finding may be that veterans engage with their own
468 recovery journey away from the recovery services setting, and only re-engage when they feel
469 the need to. Furthermore, this finding on engagement may be partly explained by how this
470 concept was measured; in the present study, participants were split in accordance with how
471 long they had attended recovery pathways, alongside the frequency of their attendance per
472 week to generate a calculation of engagement. There have been calls within the literature to
473 move away from a length of engagement focus and rather focus on quality of engagement
474 (Caddick & Smith, 2014; 2018). Future research should therefore examine the concept of
475 engagement with a greater emphasis on the quality of the engagement experience.

476 Despite mediation not being found, positive (i.e., ‘achievement or status’ motives and
477 competence satisfaction) associations between psychosocial variables and perceived physical
478 health were found. Given the WIS military veteran population examined, when
479 improvements in physical health are framed as a motive, individuals are likely to focus on
480 physical aspects of recovery (Zahariadis & Biddle, 2000). This focus may ultimately lead to
481 positive impacts upon physical health (e.g., increased functioning). This would offer support
482 to ‘achievement/status’ motives being an independent, positive predictor of perceived
483 physical health as demonstrated in this study. It can be suggested that military veterans who
484 are wounded, injured, and sick are attempting to, through recovery, achieve their previous
485 health status (Caddick & Smith, 2014; Warren et al., 2015). Framing improvements in
486 physical health as a motive may be how these veterans initially motivate themselves to
487 engage with the recovery process. Once involved with the process, these veterans are likely to
488 see progression in their physical health due to the naturally increased levels of physical
489 activity (Caddick & Smith, 2014; 2018; Shirazipour et al., 2018). Of further interest was the
490 positive association of competence satisfaction to physical health. As suggested by previous
491 research (Fortier et al., 2007; Teixeira et al., 2012) individuals who felt competent, may have
492 been likely to feel enjoyment and interest, which could have led to them increasing their time
493 and effort in improving their physical health.

494 Shifting the focus from predictors of physical health to mental health, this study
495 demonstrates the importance of, and positive associations between, social support,
496 competence satisfaction, and mental health and well-being in the context of a recovery
497 pathway specifically designed for military veterans. A potential explanation for this finding
498 could be that perceived social support and feelings of competence experienced by military
499 veterans originate from course instructors and fellow participants on the pathway who share
500 similar military backgrounds (Coleman et al., 2017). Although not measured in this study, the

501 shared identity of the military veterans (i.e., previous military occupation) engaged with H4H
502 recovery pathways may be a protective factor, as military veterans see the recovery pathway
503 as somewhere they feel comfortable in talking about or dealing with mental health (Romero
504 et al., 2015); thus enhancing feelings of being supported and competent. It will be important
505 moving forward to ensure these pathways maintain opportunities for social support and
506 competence satisfaction to encourage military veterans to continue to work with and maintain
507 their mental health and wellbeing. Considering the topicality of military veteran health (HM
508 Government, 2018), a finding of concern was that perceived stress was negatively associated
509 with mental health and wellbeing. This finding is in line with previous research, which shows
510 that military veterans who perceive stress in relation to services are more likely to have
511 anxiety, depression, or PTSD (Crawford et al., 2015; Sayer et al., 2009). It is, therefore,
512 suggested that future research specifically explores the stress experiences of military veterans
513 during their recovery (see, e.g., Roberts et al., 2019) so that, ultimately, practitioners are
514 optimally equipped to ensure that recovery pathways are appropriately designed and tailored
515 to help reduce and better manage the stress that is experienced.

516 *Strengths and limitations*

517 A key strength of the current study was gaining access to a distinctive UK military
518 veteran population, of whom some were engaging with organized recovery pathways. The
519 main limitation of the study was the cross-sectional nature of the research as this only
520 allowed for a snapshot of military veterans' recovery processes. Consequently, future
521 research could supplement the results of this study with a longitudinal cohort follow-up
522 study, since this would help to examine the varying, and often complex relationships between
523 engagement and health outcomes. Further to this, the findings from specific questionnaires
524 need to be interpreted with caution. For example, the PASS-Q (Freeman et al., 2011) was
525 developed to measure sport-related social support, and despite adaptations for the studied

526 population, more recovery service specific questionnaires may have offered clearer insight
527 into experiences of military veterans using these services. In addition, examining objective
528 measures of health may further the methodology of this study in the future. Whilst an
529 individually tailored measure of engagement was created for this study, future research
530 should repeat testing the relationships examined with a validated engagement questionnaire.
531 Another potential limitation is the homogeneity of the sample and the limited response rate
532 (16%). With participants recruited from a H4H online database, the experiences of those who
533 have never contacted H4H nor signed up to a recovery pathway may have been missed, as
534 well as those individuals who did not respond to questionnaire. These individuals may
535 provide greater insight into the factors or reasons that prevent individuals from engaging or
536 even considering engagement, and offer a clearer idea of what could be done to ensure
537 recovery pathways are accessible to all military veterans.

538 The findings of this cross-sectional study offer potential avenues for researchers to
539 explore and practitioners to consider. Firstly, there were few distinct differences found
540 between the H4H recovery pathways in general and the H4H ‘sports recovery’ pathway
541 specifically. This suggests that these pathways require further, separate examination as each
542 pathway may make their own unique contribution to military veterans’ recovery journeys.
543 Secondly, the issue of engagement requires further consideration. Previous research suggests
544 engagement to be beneficial (Britt & Bliese, 2003), yet engagement did not mediate findings
545 in this study. The suggestion here is not to focus solely on engagement per se, but other
546 important factors. For example, engagement may not have been predictive as individuals
547 require different levels of support, and so reduced contact time (e.g., attending only once)
548 may be enough to spur change in some instances. All of these are factors, plus a focus on the
549 ‘quality’ of engagement, need to be considered by those involved with creating and tailoring
550 programs and support within military veteran recovery contexts. It is also important for

551 practitioners and family members to remember that military veterans will engage with their
552 recovery when they are ready to and that engagement should not be forced upon them.
553 Thirdly, practitioners should ensure that particular psychosocial variables (e.g., basic
554 psychological needs satisfaction) are nurtured within current military veteran recovery
555 pathways. Environments should be supportive of veterans' competence and avoid need
556 frustration, with research endorsing the use of a combination of multiple co-acting techniques
557 (e.g., providing informational feedback and ensuring there is a task climate; Gillison et al.,
558 2019). Finally, considering the negative associations found between mental health, well-
559 being, and perceived stress in this study, it will be pertinent for practitioners to consider
560 integrating stress management interventions into military veterans' recovery journeys (cf.
561 Rumbold et al., 2018).

562 **Conclusions**

563 The results of the study suggest that engagement in recovery pathways does not
564 mediate the effects of psychosocial variables on veterans' health and well-being. In the
565 present setting, perceived social support from significant others (as well as recovery services)
566 and satisfaction of veterans' need for competence were positively associated with health and
567 well-being outcomes, whilst perceived stress was negatively associated with health and well-
568 being outcomes. It can be argued therefore, that these factors should be an important focus of
569 any recovery service. Future research should look to examine these recovery pathways and
570 programs in greater detail and over a longer period of time. Further research in this area can
571 support practitioners in encouraging greater quality of engagement with recovery pathways,
572 as well as developing and implementing programs that are of greatest benefit to WIS military
573 veterans.

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Tables

Table 1
Demographic characteristics of all participants.

Demographics	Total Sample (N=514)	<i>Level of Engagement in H4H</i>				<i>Level of Engagement in H4HSR</i>			
		NE (n=56)	ST (n=17)	LT-I (n=293)	LT-F (n=148)	NE (n=304)	ST (n=71)	LT-I (n=102)	LT-F (n=37)
Age (years)	41.46 ± 9.53	40.34±9.27	37.47±11.80	42.56±9.67	40.16±8.80	41.73±9.55	43.86±10.23	40.49±8.99	37.30±7.96
Gender									
Male	419	43	11	245	120	257	57	78	27
Female	95	13	6	48	28	47	14	24	10
Military Branch									
Army	335	41	11	185	98	204	43	63	25
Royal Air Force	79	10	4	46	19	44	13	15	7
Navy	74	4	2	45	23	39	11	21	3
Royal Marines	24	1	0	15	8	15	4	3	2
Length of Service (years)	12.18 ± 7.19	10.61±5.76	11.03±8.00	12.83±7.53	11.63±6.80	12.33±7.18	13.57±8.00	11.15±6.77	11.14±6.49
Disability/Impairment									
Comorbidities	293	37	9	159	89	172	50	55	16
Physical only	117	14	3	66	34	63	13	26	15
Mental Health only	69	2	4	50	13	48	4	15	2
Other (inc. Illnesses)	14	0	0	1	0	1	0	0	0
Visual only	5	0	0	4	1	2	2	1	0
Cognitive only	5	0	0	3	2	3	0	2	0
Hearing only	1	1	0	8	5	6	2	2	4
None	10	3	1	2	4	9	0	1	0
Disability/Impairment (years)	11.35 ± 8.00	12.00±7.91	10.73±9.72	11.84±8.26	10.19±7.22	11.46±8.20	13.07±8.80	11.18±7.35	7.58±4.86

Note. H4H = Help for Heroes; H4HSR = Help for Heroes 'Sports Recovery' Pathway; NE = Non-engagers; ST = Short-term Engagers; LT-I = Long-term Infrequent Engagers; LT-F = Long-term Frequent Engagers.

Table 2
Means and standard deviations of all psychosocial variables for all participants.

Variables	Total Sample (N=514)	Cronbach Alphas (α)	Level of Engagement in H4H				Level of Engagement in H4HSR			
			NE (n=56)	ST (n=17)	LT-I (n=293)	LT-F (n=148)	NE (n=304)	ST (n=71)	LT-I (n=102)	LT-F (n=37)
Barriers	24.45±5.59	.66	24.79±5.67	24.18±4.77	24.91±5.79	23.46±5.15	24.21±5.97	25.65±5.36	24.60±4.89	23.76±4.25
Perceived Stress	26.82±7.83	.80	26.91±7.57	26.06±7.68	26.85±8.06	26.82±7.54	27.10±8.14	26.10±7.45	26.71±8.07	26.27±4.82
Part. Motivation										
Team Orientation	3.84±1.02	.94	4.04±0.80	4.00±0.91	3.77±1.06	3.87±1.04	3.86±0.98	3.93±1.13	3.70±1.04	3.82±1.11
Achievement/Status	3.12±0.99	.89	3.24±0.92	3.06±1.06	3.02±0.97	3.02±0.97	3.14±1.00	3.22±1.01	3.07±0.94	2.89±1.01
Fitness	4.06±0.90	.92	4.04±0.80	4.00±1.08	4.08±0.92	4.08±0.92	4.02±0.88	4.07±0.98	4.16±0.83	4.04±1.07
Friendship	3.74±0.86	.82	3.92±0.77	3.75±0.73	3.71±0.88	3.75±0.85	3.74±0.85	3.81±0.86	3.74±0.85	3.68±0.96
Skill Development	3.89±0.95	.86	4.00±0.82	3.89±0.82	3.89±0.96	3.84±0.99	3.89±0.96	3.97±0.98	3.87±0.90	3.74±1.01
Fun	3.81±0.89	.81	3.92±0.77	3.82±0.95	3.80±0.89	3.80±0.92	3.82±0.86	3.83±1.00	3.84±0.84	3.71±1.06
Energy Release	3.60±0.88	.82	3.74±0.83	3.33±1.00	3.58±0.88	3.62±0.88	3.60±0.86	3.59±0.88	3.58±0.83	3.68±1.16
Miscellaneous	3.00±0.91	.64	3.31±0.91	2.89±0.64	2.98±0.88	2.92±0.97	3.04±0.91	2.98±0.82	2.91±0.90	2.90±1.07
Basic Psych. Needs										
Autonomy Sat.	3.84±0.83	.91	3.80±0.91	4.09±0.56	3.85±0.84	3.79±0.83	3.82±0.84	3.90±0.88	3.84±0.74	3.82±0.98
Autonomy Frus.	2.07±0.88	.83	2.00±0.93	1.90±0.66	2.08±0.90	2.09±0.84	2.06±0.91	2.23±0.89	1.91±0.76	2.26±0.88
Competence Sat.	3.67±0.86	.94	3.70±1.02	4.10±0.61	3.83±0.84	3.71±0.87	3.78±0.87	3.82±0.94	3.87±0.74	3.60±1.00
Competence Frus.	1.81±0.91	.87	2.51±1.13	2.10±0.89	2.21±1.03	2.52±1.02	2.25±1.07	2.44±1.05	2.28±0.95	2.86±0.91
Relatedness Sat.	3.79±0.87	.94	3.54±0.93	3.66±0.59	3.73±0.87	3.61±0.86	3.70±0.87	3.68±0.86	3.64±0.81	3.53±0.94
Relatedness Frus.	2.33±1.04	.91	1.88±1.06	1.93±0.79	1.79±0.89	1.81±0.90	1.80±0.93	2.01±0.91	1.75±0.87	1.66±0.80
Social Support										
PASS	2.29±1.12	.93	2.06±1.14	1.98±0.98	2.28±1.11	2.41±1.16	2.20±1.15	2.27±1.05	2.51±1.06	2.43±1.21
Outcomes										
Physical Health	39.50±10.57	.89	39.09±10.59	42.30±10.04	39.98±10.90	38.37±9.89	39.89±10.79	39.26±10.08	38.57±10.53	39.30±9.90
Mental Health	36.83±10.25	.76	36.58±10.30	39.05±9.98	37.36±10.00	35.62±10.71	36.49±10.18	36.41±10.63	38.73±9.29	35.14±12.18
Subjective Vitality	26.79±7.87	.76	27.09±7.80	30.00±6.17	26.96±7.99	25.97±7.79	26.69±7.93	27.07±7.81	27.22±7.64	25.89±8.39

Note. H4H = Help for Heroes; H4HSR = Help for Heroes 'Sports Recovery' Pathway; NE = Non-engagers; ST = Short-term Engagers; LT-I = Long-term Infrequent Engagers; LT-F = Long-term Frequent Engagers; Part. Motivation = Participation Motivation; Sat. = Satisfaction; Frus. = Frustration; PASS = Perceived Available Social Support.

Figure

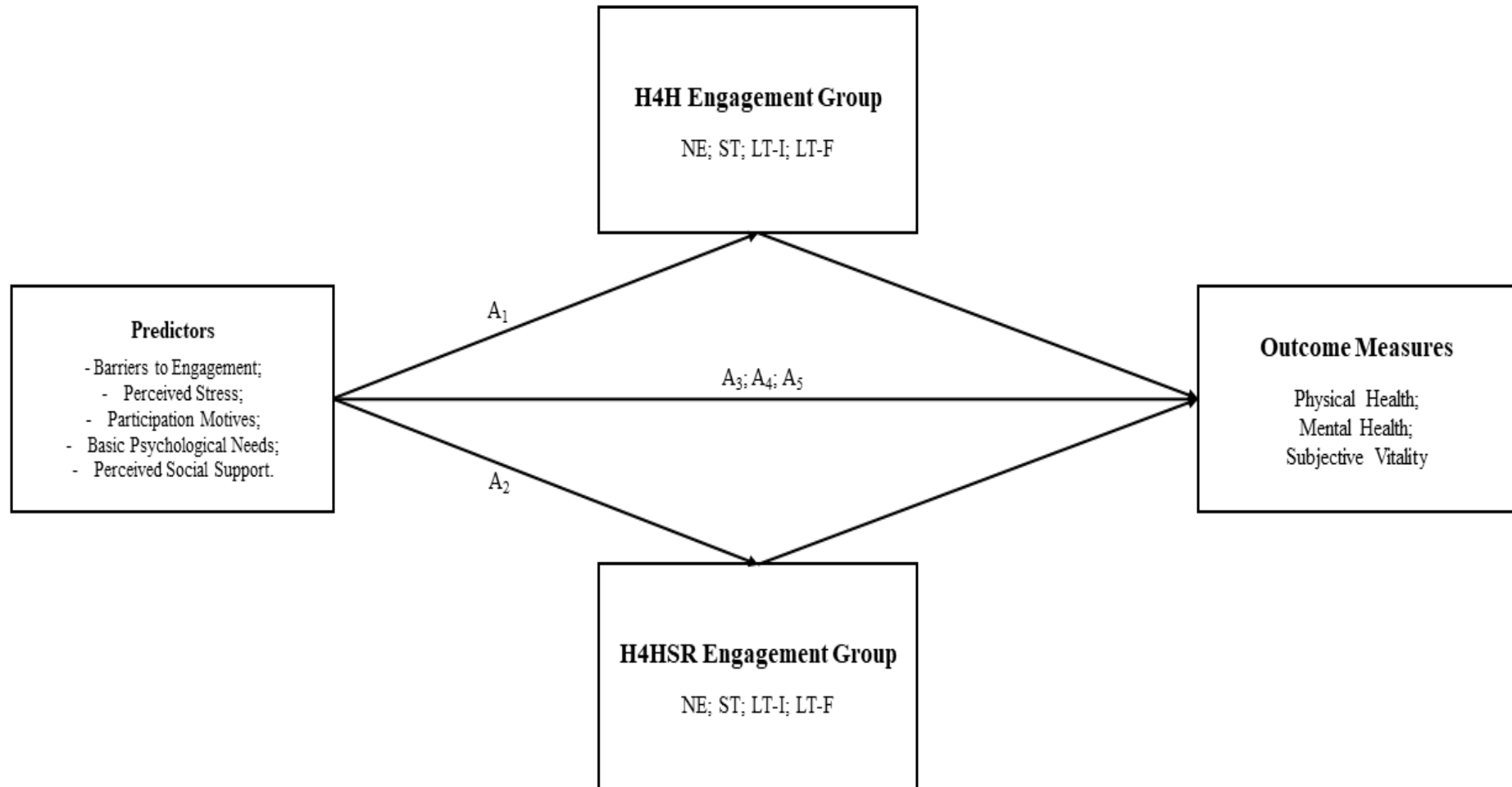


Figure 1. A framework for testing aims pertaining to engagement with Help for Heroes. *Note.* H4H = Help for Heroes; H4HSR = Help for Heroes Sports Recovery Pathway; NE = Non-engagers; ST = Short-term Engagers; LT-I = Long-term Infrequent Engagers; LT-F = Long-term Frequent Engagers.