Journal of Health Psychology

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J Health Psychol 2007; 12; 937
DOI: 10.1177/1359105307082458

The online version of this article can be found at:
http://hpq.sagepub.com/cgi/content/abstract/12/6/937

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Personality, Emotional Intelligence and Exercise

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Journal of Health Psychology

Los Angeles, London, New Delhi
and Singapore
www.sagepublications.com
Vol 12(6) 937–948
DOI: 10.1177/1359105307082458

Abstract

The associations of personality and self-report emotional intelligence (EI) with attitudes to exercise and self-reported exercise behaviour were investigated in a sample of 497 Canadian undergraduates. A positive attitude to exercise was negatively associated with Neuroticism and uncorrelated with other personality traits and EI. Exercise behaviour was positively associated with Extraversion and EI and negatively associated with Neuroticism. Structural equation modelling indicated that EI mediated the relationship between personality and exercise behaviour. The interpretation of this result in terms of EI having some properties of a coping style is discussed.

Keywords

- *attitudes*
- *emotional intelligence*
- *exercise*
- *personality*

ACKNOWLEDGEMENTS. Support for this project from the British Academy is gratefully acknowledged.

COMPETING INTERESTS: None declared.

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Introduction

THIS STUDY investigated the associations of personality, self-report emotional intelligence (EI) and exercise attitudes with self-reported exercise behaviour in a sample of Canadian undergraduate students. Understanding the factors that are associated with the tendency to take exercise and with the amount of exercise an individual chooses to take is of interest in its own right, and also potentially provides information which can inform the targeting of exercise-promoting messages to particular subgroups of the population. Encouragement of exercise is an important aspect of public health, given increasing levels of overweight and obesity found in many countries and the associated population health risks (Bélanger-Ducharme & Tremblay, 2005; Yach, Stuckler, & Brownell, 2006).

Within this context, examining the influence of EI as well as personality is of particular interest. EI has only begun to be studied relatively recently (Neubauer & Freudenthaler, 2005), and information on how it relates to health behaviours is therefore of particular interest. Some theoretical reasons for anticipating EI/exercise links are discussed below.

Personality and exercise behaviour

Personality traits are known to be related to the performance of health-related behaviours. Discussions of personality/health behaviour associations are generally placed within the framework of the five-factor model of personality (e.g. Bermúdez, 1999; Booth-Kewley & Vickers, 1994). There is a consensus among personality researchers that individual dispositional differences can be accounted for by five broad personality dimensions: Neuroticism (N), Extraversion (E), Openness (O), Agreeableness (A) and Conscientiousness (C) (Matthews, Deary, & Whiteman, 2003). Table 1 illustrates the facets of the five-factor model traits, using Saucier's (1994) Mini-Markers as used in the present study. A more extensive list of five-factor model trait-descriptive adjectives, from which the Mini-Markers are derived, is given by Goldberg (1992).

Among the more robust findings of associations between personality and health behaviours are positive associations of N and E, and negative associations of C with smoking and alcohol consumption (e.g. Vollrath & Torgersen, 2002), while a recent meta-analysis (Bogg & Roberts, 2004) has established that C consistently shows negative associations with risky health behaviours and positive associations with health-protective behaviours.

In the particular case of engaging in exercise, there are consistent findings in the literature of positive associations of E and C and negative associations of N with taking exercise (Bogg & Roberts, 2004; Courneya & Hellsten, 1998; Howard, Cunningham, & Rechnitzer, 1986; Potgieter & Venter, 1995; Szabo, 1992; Yeung & Hemsley, 1997). In one study E was found to associate with exercise motives in the domains of health, social, stress reduction and enjoyment, while the same study showed N associating with a range of perceived barriers to exercise such as lack of energy (Courneya & Hellsten, 1998). In the case of C, the observed association with exercise appears to be an aspect of a broader tendency for this personality trait to be positively associated with beneficial health behaviours (Bogg & Roberts, 2004).

Possible associations between emotional intelligence and exercise behaviour

The EI domain covers individual differences in capabilities to recognize, understand, manage and

Table 1. Components of the five-factor model of personality as assessed by Saucier's (1994) Mini-Markers

Personality dimensions	
Neuroticism (N)	Envious, Fretful, Jealous, Moody, Relaxed,* Temperamental, Touchy, Unenvious*
Extraversion (E)	Bashful,* Bold, Energetic, Extraverted, Quiet,* Shy,* Talkative, Withdrawn*
Openness (O)	Creative, Complex, Deep, Imaginative, Intellectual, Philosophical, Uncreative,* Unintellectual*
Agreeableness (A)	Cold,* Co-operative, Harsh,* Kind, Rude,* Sympathetic, Unsympathetic,* Warm
Conscientiousness (C)	Careless,* Disorganized,* Efficient, Inefficient,* Organized, Practical, Sloppy,* Systematic

Note: Items labelled * are reverse-keyed

use emotions in both intra- and inter-personal contexts. The issue of EI/health associations is complicated by the parallel development of two different measurement approaches to EI, with performance measures requiring emotion-related problem items to be completed, while self-report (or trait) measures assess EI as a dispositional tendency using questionnaires (Austin & Saklofske, 2005; Neubauer & Freudenthaler, 2005). Because of practical difficulties associated with the relatively large time commitment required from participants completing performance EI measures, most studies on EI/health associations have used self-report measures, although a few studies (e.g. Trinidad & Johnson, 2002) have used performance EI.

Associations between EI and health/well-being indicators are reasonably consistent across studies using performance and self-report measures (Schutte, Malouff, Thorsteinsson, Bhullar, & Rooke, 2007). EI has been found to be positively correlated with measures of psychological well-being such as life satisfaction and happiness, while associations with measures such as depression, stress and loneliness have been found to be negative (Austin, Saklofske, & Egan, 2005; Dawda & Hart, 2000; Day, Therrien, & Carroll, 2005; Palmer, Donaldson, & Stough, 2002; Saklofske, Austin, & Minski, 2003; Schutte et al., 1998; Slaski & Cartwright, 2002; Tsaousis & Nikolaou, 2005). Positive associations of EI with higher levels of self-rated physical health have also been reported (Tsaousis & Nikolaou, 2005). Such findings are readily interpretable, given that interpersonal components of EI, such as social skills, should lead to a better quality of relationships with others, while intrapersonal components such as mood regulation should be associated with maintenance of positive moods and better stress management. Evidence for associations between EI and behaviours related to physical health is less extensive, although there are again theoretical arguments for such associations to exist. High EI individuals may be more willing to interact with health professionals and act on their advice and also be more resistant to peer pressure in relation to risky health behaviours (Ciarrochi & Deane, 2001; Trinidad & Johnson, 2002). Associations of EI with reduced tendency to smoking and alcohol consumption (Austin et al., 2005; Trinidad & Johnson, 2002; Tsaousis & Nikolaou, 2005) may also be related to better self-capability for mood regulation in high-EI individuals.

In the context of health behaviours, the study of the associations between EI and exercise behaviour is of particular interest, given that there are theoretical arguments, outlined later, supporting the expectation of a positive relationship between EI and tendency to take exercise. The topic of EI/exercise associations has not been widely studied, but findings of positive associations of EI with both frequency of planned exercise and with taking regular exercise have been reported (Saklofske, Austin, Galloway, & Davidson, 2007; Tsaousis & Nikolaou, 2005).

Since exercise is known to be associated with enhancement of positive mood and reduction of negative mood (Byrne & Byrne, 1993; Penedo & Dahn, 2005; Saklofske, Blomme, & Kelly, 1992; Scully, Kremer, Meade, Graham, & Dudgeon, 1998; Thayer, 1996), the intrapersonal mood regulation skills of high EI scorers should allow them to be aware of and use this mechanism, while the positivity and optimism associated with high EI may assist in dealing with practical barriers to taking exercise. The social opportunities afforded by some forms of exercise might also act as a motivator for high EI individuals.

This proposal of intrapersonal EI, mood regulation and exercise links is a specific implementation of the suggestion that EI acts as a broad coping mechanism which facilitates 'successful and efficient self-regulation toward desired ends' (Salovey, Bedell, Detweiler, & Mayer, 2000, p. 511), and relates to the view expressed by Folkman and Moskowitz (2000) that coping research should cover positive as well as negative emotions and outcomes. Although it has been argued that the idea of EI as a coping mechanism currently lacks sufficient evidence to fully support its validity (Matthews, Zeidner, & Roberts, 2002), there is some preliminary evidence that EI associates as expected with coping, and an EI/coping composite has been found to mediate the association between personality and health behaviours (Saklofske et al., 2007).

Another approach to exercise behaviour—the health belief model

There are a number of social cognitive models (e.g. health belief model, theory of planned behaviour, health locus of control), which can be used as a theoretical framework for understanding differences in the extent to which individuals perform both positive and negative health-related behaviours (Conner & Norman, 1995). There is currently no consensus about the best approach to use in the prediction of health behaviours, although it is known that these

models have a considerable degree of conceptual overlap (Norman & Conner, 1995).

The health belief model (HBM) is a widely used model that has been shown to have explanatory power in the prediction of a diverse range of health behaviours (Harrison, Mullen, & Green, 1992; Sheeran & Abraham, 1995). The components of the model have also been shown to be amenable to intervention (Sheeran & Abraham, 1995).

The HBM comprises four components. Perceived susceptibility relates to the extent that an individual feels that they are at risk of the adverse health consequences of performing a risky health behaviour or not performing a protective one. Perceived severity assesses the individual's feelings about the seriousness of the consequences of performing/not performing the behaviour. Perceived benefits relate to the individual's view of the effectiveness of action they can take in relation to health, while perceived barriers relates to the individual's view of factors that impede them from health-promoting behaviour. A meta-analytic study (Harrison et al., 1992) has shown that all four components act as significant predictors of health behaviours, although effect sizes are small.

There has been little research on associations between personality and HBM components but perceived susceptibility and severity measures have been found to be positively associated with anxiety (Kawash, Woolcott, & Sabry, 1980), while a second study (Harris, Linn, & Pollack, 1984) replicated the susceptibility/anxiety association and also reported a positive association between perceived barriers and anxiety, and positive associations of all HBM components with obsessive-compulsiveness. The study of Courneya and Hellsten (1998) discussed above is also relevant, as it examined personality associations of factors related to some HBM components in relation to exercise. It was found that Extraversion and Conscientiousness were positively associated with health motives and Neuroticism was positively associated with appearance and weight-related motives. Neuroticism was positively related and Conscientiousness negatively related to perceived barriers such as lack of energy. In view of the personality/health associations discussed earlier, the associations between personality and HBM components is a promising area for further study, in that examination of such associations has the potential to increase the understanding of individual differences in health behaviour tendencies.

The present study

The main objective of the present study was to assess the associations of personality and self-report emotional intelligence with exercise behaviour and with components of the HBM. As indicated in the earlier literature review, the associations between personality and HBM components have not been widely studied; these associations are of intrinsic interest and may also be relevant in an applied context (for example it could be useful to be aware of the typical personality profile of individuals who have a particular tendency to perceive barriers to positive health behaviours).

In addition, in line with the discussion of EI as a coping-related variable, another objective was to examine whether EI plays a mediating role in the relationship between personality and exercise attitudes or exercise behaviour. In the light of the earlier literature review the following hypotheses were formulated:

Hypothesis 1: Exercise behaviour will be positively associated with Extraversion, Conscientiousness and EI, and negatively associated with Neuroticism. The hypothesized personality associations are consistent with previous studies of personality associations of exercise cited earlier. The prediction for EI is based on the general discussion above of the expected associations of the inter- and intrapersonal aspects of EI with exercise and with the previous finding of a positive association between EI and planned or actual exercise behaviour (Saklofske et al., 2007; Tsaousis & Nikolaou, 2005).

Hypothesis 2: The susceptibility, severity and barrier components of the HBM will be positively associated with Neuroticism.

Hypothesis 3: The barrier component will be negatively associated with Conscientiousness.

Hypotheses 2 and 3 are based on an interpretation of the small number of existing studies on personality/HBM associations. Hypothesis 3 is based on previous findings for anxiety/HBM associations (Courneya & Hellsten, 1998; Harris et al., 1984; Kawash et al., 1980), together with the characterization of anxiety as a component of N as indicated in Table 1. Hypothesis 3 is based on the negative barrier/C association reported by Courneya and Hellsten (1998).

Based on the literature reviewed earlier on dispositional associations of health behaviours, small effect sizes (correlations of around 0.2) would be

anticipated. The study was designed to give sufficient statistical power to detect associations of this magnitude.

Method

Participants

The participants were 497 students attending a large western Canadian university (355 females, 139 males and three individuals who did not state their gender). The mean age was 24 years, standard deviation 6.3 years, range 18–53 years. Of this group 128 were registered for physical education programmes within the University's College of Kinesiology.

Materials

Short form Bar-On EQ-i (EQ-i:S, Bar-On, 2002) This 51-item scale provides a measure of self-report emotional intelligence and the five composite scales of Intrapersonal EI (associated with awareness of one's own feelings and positivity), Interpersonal EI (interpersonal/social skills), Adaptability (ability to cope flexibly with everyday problems), Stress Management and General Mood (happiness and optimism). Scores can also be obtained for Positive Impression, a social desirability measure. The short form of the scale was selected in preference to the longer EQ-i (Bar-On, 1997) in order to keep the total length of the study questionnaire reasonably short and avoid participant fatigue. Correlations between the subscales of the short and long forms of the EQ-i are high (Bar-On, 2002). Full- and sub-scale internal consistency reliabilities are high (Austin et al., 2005; Bar-On, 2002). The EQ-i:S has been cross-validated against a number of other EI and EI-related scales (Austin et al., 2005; Austin, Saklofske, Huang, & McKenney, 2004; Bar-On, 2002). Only total EI score and the sub-scales identified in the introduction as theoretically linked to tendency to exercise (Interpersonal, Intrapersonal and General Mood) were used in the data analyses.

Personality Mini-Markers (Saucier, 1994) This 40-item scale of trait-descriptive adjectives provides scores (eight items per dimension) on the personality dimensions of Extraversion (E), Agreeableness (A), Conscientiousness (C), Emotional Stability and Intellect/Openness/Imagination (O). The fourth factor was reverse-scored in this study to give a Neuroticism (N) measure. Previous studies using this measure have shown that all five scales have good internal consistency reliabilities (e.g. Austin et al., 2005; Diefendorff & Richard, 2003; Dwight, Cummings, & Glenar, 1998; Saucier, 1994). The scale has also been validated in a number of studies which have examined associations between Mini-Marker personality trait scores and other measures including academic success, job satisfaction and life satisfaction, with a pattern of association consistent with those of other Five-Factor Model personality measures being reported (Austin et al., 2005; Diefendorff & Richard, 2003; Dwight et al., 1998). In addition, the Mini-Marker scale is considerably shorter than Goldberg's (1992) Big Five Markers, from which it is derived, making it more suitable for studies such as the present one where participants are required to fill in a number of measures. The Mini-Marker scale also contains fewer difficult items than the Big Five Markers (Dwight et al., 1998; Saucier, 1994).

Exercise attitude scale A literature search for an exercise attitude scale based on the HBM failed to locate an appropriate scale, so an exercise attitude scale was constructed. This consisted of 42 items, of which 40 were targeted at the components of the HBM. Susceptibility items were mainly focused on heart disease and obesity (e.g. *Lack of exercise would put me at risk of heart disease*); items relating to health in general (e.g. *It is important to exercise to maintain my general health*) were also included. The severity items focused entirely on heart disease and obesity as putative outcomes of lack of exercise (e.g. *Having heart disease would seriously affect my quality of life*). Benefits items covered a range of positive exercise-related outcomes (e.g. *Doing physical exercise makes me feel more positive and optimistic*) while the barriers items covered a range of impediments to exercise such as weather, lack of time, cost of equipment, feeling tired (e.g. *Bad weather often stops me from taking exercise*). The remaining two items related to self-assessed activity level (*I am a very active person*; *I am much more active than most people my age*). The items were presented in a randomized order, with responses on a five-point scale from strongly disagree to strongly agree.

Because this was a new scale and it could reasonably be anticipated that some of the items would function less well than others, the scale was subsequently tested by factor analysis, and the internal consistency reliabilities of the HBM subcomponents were also examined.

Table 2. Descriptive statistics

	Females		*Males*	
	Mean	*SD*	*Mean*	*SD*
EI	176.59	16.66	170.55	18.57
Intrapersonal	37.43	6.14	36.70	6.15
Interpersonal	43.22	4.03	40.35	4.64
General Mood	39.49	4.82	38.61	5.63
N	21.09	4.87	20.12	4.57
E	28.56	5.71	27.37	5.48
O	31.00	4.25	30.69	4.41
A	35.17	3.34	32.09	4.69
C	32.35	4.51	29.83	5.32

N = Neuroticism, E = Extraversion, O = Openness, A = Agreeableness, C = Conscientiousness

Exercise behaviour The first questionnaire segment on exercise behaviour asked participants about regular exercise, defined as 15–20 minutes or more of planned exercise taken at least three times per week. Participants indicated on a yes/no scale whether they had taken/would take regular exercise in the past six months, currently, in the next 30 days and in the next six months. This segment was followed by one asking the number of times per week and hours per week the participant typically exercised for the categories strenuous, moderate and mild exercise over the past year. Examples for each category were provided, and (to cover seasonal variations in activity level) responses were requested for spring/summer and autumn/winter. The use of multiple measures of exercise behaviour allowed the later construction of an aggregate measure of tendency to exercise, as recommended in the study of dispositional correlates of behaviour (e.g. Ajzen, 2005).

Procedure

A request was made to course instructors by the researchers for permission to present the study to students and to request their participation. The study was described to the students as an investigation of the relationship between personal factors and health behaviours and exercise. Those students who agreed to complete the questionnaires during the remainder of the scheduled class were asked to also sign a consent form approved by the university's ethics committee and were also advised that they could terminate their involvement at any time. Questions about particular items could be addressed to the researchers. Questionnaires were completed anonymously and the only identifying data requested were age, sex and programme of study. Protocols were examined to determine that all necessary information and responses had been provided by the participants.

Results

Internal consistency reliabilities for personality and EI measures

All internal consistency reliabilities were assessed by calculating Cronbach's alpha. The EQ-i:S subscales had internal consistency reliabilities above .7 (range .77–.81) and full-scale emotional intelligence had internal consistency reliability .90. Internal consistency reliabilities for the personality scales ranged from .75 to .84.

Descriptive statistics and gender differences

Table 2 shows means and standard deviations for the EI and personality scales. Using *t*-tests with critical significance level corrected for multiple comparisons, females were found to score significantly higher than males on the following scales: total EI, interpersonal EI, A and C (t [492] = 3.51, 6.81, 8.17, 5.31; all $p < .001$, Cohen's $d = .32, .61, .74, .48$).

Scoring and analysis of the exercise attitude scale

The exercise attitude scale was first scored according to the HBM giving total scores for susceptibility (Su), severity (Se), benefits (Be) and barriers (Ba); the two activity items were also added to give a total activity measure (Ac). Calculation of internal consistency reliabilities showed that all were satisfactory (range .75–.94) except for the Su scale for which examination of corrected item–total correlations suggested the dropping of two items. The modified Su scale had an internal consistency reliability of .94.

Table 3. Correlations of EI scales with Personality

	N	*E*	*O*	*A*	*C*
EI	–.51***	.45***	.24***	.46***	.43***
Intrapersonal	–.27***	.55***	.27***	.15**	.32***
Interpersonal	–.26***	.40***	.25***	.64***	.29***
General mood	–.49***	.45***	.19***	.34***	.28***

Notes: $N = 497$. N = Neuroticism, E = Extraversion, O = Openness, A = Agreeableness, C = Conscientiousness
**$p < .01$ ***$p < .001$

Table 4. Correlations of EI scales and Personality with Exercise Attitudes

	Positive exercise attitude	*Su*	*Se*	*Be*	*Ba*	*Ac*
EI	.05	.05	.04	.07	.00	–.01
Intrapersonal	.03	.03	.03	.03	–.03	–.01
Interpersonal	.08	.08	.05	.09*	.03	–.01
General mood	.07	.07	.05	.09*	–.04	.04
N	–.10*	–.10*	–.07	–.13**	.03	–.14**
E	.06	.07	.02	.09	–.05	.08
O	–.08	–.08	–.06	–.08	.14**	–.11*
A	.02	.02	.01	.03	.09	–.04
C	.03	.03	.03	.03	.01	.00

Notes: $N = 497$. N = Neuroticism, E = Extraversion, O = Openness, A = Agreeableness, C = Conscientiousness, Su = susceptibility, Se = severity, Be = benefits, Ba = barriers, Ac = activity
*$p < .05$; **$p < .01$

An initial factor analysis with extraction of four factors did not support the existence of all the HBM components as separate factors, apart from Ba, where the relevant items did load on a single factor. Examination of the scree diagram suggested instead the existence of two factors, with a second break in slope indicating the possibility of extracting a third factor. Parallel analysis showed that the first three eigenvalues of the correlation matrix (18.62, 5.17, 2.10) were higher than means for a corresponding set of random correlation matrices (1.60, 1.54, 1.49). Examination of the three-factor solution showed that the third factor only had two high-loading items and was therefore not well defined. The two-factor solution was examined in more detail; this analysis was performed using the principal components method and direct oblimin rotation. The two factors explained 56.7 per cent of the variance and were negatively correlated ($r = –.20$). The items with high pattern matrix elements on the second, smaller factor comprised mainly Ba items; the two Ac items also loaded negatively on this factor. The pattern matrix element items on the first factor comprised a mix of items linked to Be, Su and Se had the appearance of assessing positive vs negative attitudes to exercise, with high loadings being found for items related to benefits of exercise not directly related to health (e.g. *Doing physical exercise helps me feel more positive and optimistic*), items relating to health protective or promoting aspects of exercise (e.g. *It is important to exercise in order to maintain strength and flexibility*; *It is important to follow medical advice about taking sufficient exercise in order to avoid health problems*) and items relating to negative perceptions of potential health problems that might arise from lack of exercise (e.g. *Having heart disease would shorten my life expectancy*). Internal consistency reliabilities for the first and second factors were .98, .89. As the second factor was highly correlated ($r = .95$) with the Ba scale, scores on this factor were not analysed further. With regard to the very high internal consistency reliabilities for the factors, it should be noted that these, being computed on the sample from which the scales were originally derived, are likely to be inflated compared to population values because these estimates capitalize on chance inter-item correlations.

Correlations among the scales

Table 3 shows the correlations between EI scales and personality traits. Table 4 shows correlations of exercise attitude, the HBM scales and activity with EI and personality. It can be seen that the medium-to-large correlations of the EQ-i:S scales and personality found previously (e.g. Austin et al., 2005) also exist in the current sample. Associations of exercise attitudes with EI and personality can be seen to be sparse and weak, with N associating negatively with two of the HBM scales, susceptibility and benefits, with activity score, and with attitude to exercise, while O is associated negatively with activity score and positively with perception of barriers to exercise. Total EI was not correlated with any of the scales tapping exercise attitudes, although small significant correlations were observed between the EI subscales of interpersonal and general mood with exercise benefits.

Table 5. Correlations of EI, Personality and Exercise Attitudes with Exercise Behaviour

	Regular Exercise	*Times*	*Hours*	*Exercise score*
EI	.14**	.08	.07	.12**
Intrapersonal	.10*	.11*	.12**	.15**
Interpersonal	.12**	.09	.06	.11*
General mood	.12**	.09	.09	.12**
N	–.14**	–.07	–.09	–.12**
E	.12*	.12*	.15**	.16**
O	.04	.03	–.01	.03
A	.11*	–.04	–.04	.01
C	.11*	.03	.00	.06
Positive exercise attitude	.19***	.31***	.28***	.32***
Su	.17***	.28***	.25***	.28***
Se	.15**	.30***	.26***	.30***
Be	.21***	.31***	.30***	.33***
Ba	–.18***	–.15**	–.24***	–.22***
Ac	.21***	.23***	.27***	.29***

Notes: N range 466–494. N = Neuroticism, E = Extraversion, O = Openness, A = Agreeableness, C = Conscientiousness, Su = susceptibility, Se = severity, Be = benefits, Ba = barriers, Ac = activity
*$p < .05$; **$p < .01$; ***$p < .001$

Exercise behaviour correlations with other measures

The 'regular exercise' items were summed to give a composite score of self-assessed past, present and future exercise tendency. The internal consistency reliability of this composite was .75. The 'hours per week' items were summed with an accounting for intensity included by weighting 'strenuous' at 3.0, 'moderate' at 2.0 and 'mild' at 1.0; autumn/winter and spring/summer totals were added, giving an activity-weighted measure of exercise hours over the year. A similar composite was calculated for exercise times per week. Because both totals were positively skewed, due to a minority of participants having very high scores, both were square root transformed; this reduced the skewness of the 'times' measure to non-significant levels, but the distribution of 'hours' measure remained somewhat skewed. Since all the exercise behaviour measures were found to be positively intercorrelated, a total exercise score was obtained by extracting and scoring the first unrotated principal component (explaining 70.3% of the variance) from these measures. Use of this approach allows the behavioural measures (which are on different scales: yes/no, times per week, hours per week) to be aggregated to produce a composite measure which captures the variance shared by them, and which represents an aggregate behavioural tendency (Ajzen, 2005); the interpretation of the first component as a general factor is appropriate given that the correlations form a positive manifold (e.g. Bartholomew, Steele, Moustaki, & Galbraith, 2002). The score obtained from this analysis will subsequently be referred to as 'exercise score'.

Table 5 shows associations between the exercise behaviour scores and other measures. It can be seen that there are a number of significant positive correlations between EI and exercise behaviour, with overall EI and the Intrapersonal, Interpersonal and General Mood sub-scales all correlating positively with exercise score. Exercise attitude is positively associated with the exercise behaviours, as would be expected, and the HBM scales and the activity score also show the expected associations with exercise behaviour, i.e. all scales other than Ba are positively and significantly correlated with the behavioural measures, while Ba shows significant negative associations. These attitude/behaviour associations provide a validity check for the attitude scale. There are also significant associations between exercise behaviour and personality traits, with N associating negatively and E positively with exercise score, although C does not correlate positively with this score as expected, showing a significant correlation only with the regular exercise measure.

Group differences in exercise behaviour

Females were found to have a significantly lower exercise score than males (t [462] = 3.95, $p < .001$, Cohen's $d = .37$). Because of the composition of the sample, with relatively few older respondents, age effects on this score were investigated by dividing the sample into two groups corresponding to age 25 and under ($N = 383$) and over 25 ($N = 103$). Younger participants scored higher than older participants (t [454] = 5.99, $p < .001$, Cohen's $d = .56$). The kinesiology students scored significantly higher than the remainder of the sample (t [459] = 8.15, $p < .001$, Cohen's $d = .76$).

Modelling

The associations in Tables 4 and 5 were examined further by means of structural equation modelling. In view of the age and gender associations found above, the analyses were based on partial correlations

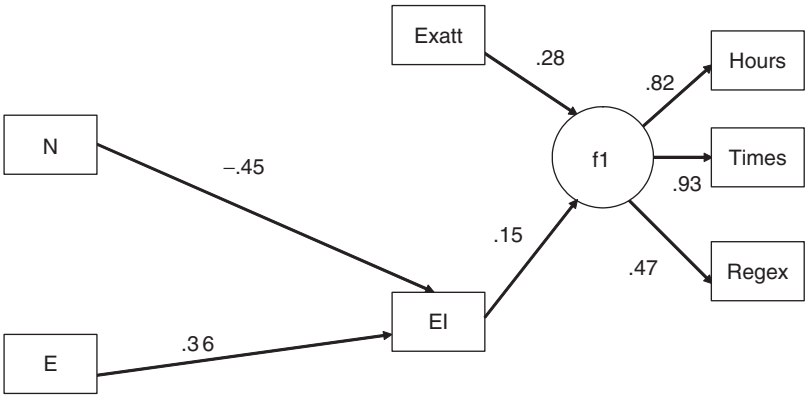

Figure 1. Structural equation model for associations of personality, EI and exercise attitude with exercise behaviour Exatt = exercise attitude, Regex = Regular Exercise, Hours, Times = number of hours, times exercise per week, E = Extraversion, N = Neuroticism

controlling for age and gender. Modelling was done on the 452 participants who had complete data on all measures. The initial model was constructed on the basis that all the exercise behaviour measures would load on a factor, as suggested by the large proportion of variance explained by the extraction of one principal component. It was hypothesized that there would be a significant path between exercise attitude and this latent factor, and that EI would mediate the association between personality and exercise behaviour. Only those personality traits (E and N) identified from Table 4 as predictors of exercise score were included in the model. In view of the weak correlations between personality and exercise attitude, the role of attitude as a potential mediator of effects of personality on behaviour was not included. Initial modelling confirmed this structure, but there was a large residual suggesting that a correlation between E and N should be included in the model. The final model, shown in Fig. 1, had good fit indices: normed fit index .97, non-normed fit index .98, comparative fit index .99, RMSEA .044. The χ^2 value was significant (χ^2 (13) = 24.40, p = .03) but χ^2 per degree of freedom was acceptable at 1.88. The standardized off-diagonal average covariance matrix residual was somewhat high at .046. The Wald test did not suggest the deletion of any model paths.

Discussion

Determining the causes and correlates of exercise attitudes and of actual exercise behaviours is of critical importance to improving health and wellness across the life span. In an era where there is a wealth of data extolling the benefits of exercise to both physical and psychological well-being, it appears that simply presenting such information is not sufficient to change the attitudes and behaviours of all who receive it. Examples of the incomplete positive effects of presenting health-related information alone (e.g. massive advertising campaigns in the media) include the continued high incidence of cigarette smoking in the face of warnings about its deleterious effects on health, or the ongoing reports of new HIV cases despite the educational campaigns targeting risky sexual activities. Thus the search continues for individual differences variables such as those identified in the personality and self-regulation literature that might be associated with particular health-related behaviours such as exercise, or the changing of attitudes that in turn might promote more healthy life styles. Studies have demonstrated a relationship between the Big Five personality traits and exercise behaviours (e.g. Courneya & Hellsten, 1998) and more recently Austin et al. (2005) have suggested that EI may play either a direct or indirect role in facilitating health behaviours.

This study further examined the associations of personality and EI with exercise behaviour and more specifically with health belief model components. Exercise behaviour was found to be positively associated with Extraversion and negatively related to Neuroticism as expected, but there was less evidence for associations with Conscientiousness, with only

one exercise component being significantly positively related. This finding is surprising in view of the robust findings of Conscientiousness/health behaviour associations in other studies, summarized in a recent meta-analysis (Bogg & Roberts, 2004). The association of Conscientiousness only with self-report of taking regular exercise but not with times or hours per week suggests that the mechanism here may be one in which high C promotes exercise vs non-exercise rather than relating to the amount of exercise taken. Overall EI score was found to be associated with taking exercise, with associations also being found for the interpersonal, intrapersonal and general mood subcomponents. These findings are in accord with the potential mechanisms for EI/exercise associations discussed in the introduction involving social and mood regulation effects.

The factor analysis of the exercise attitude scale did not strongly support the attitude structure proposed by the HBM, although a separate barriers factor did emerge; the expected associations between HBM components and personality were not found and indeed some associations with N were in the opposite direction to those reported previously (Courneya & Hellsten, 1998; Harris et al., 1984; Kawash et al., 1980). The finding, not previously reported, that O is associated with higher levels of perception of barriers to exercise is an interesting one, suggesting that high-O individuals may show greater ingenuity in finding rationalizations for not exercising. Personality associations with exercise attitudes were weak; the only significant association at the level of the overall exercise attitude scale was a negative correlation with N, showing that high-N individuals in this group had a more negative attitude to exercise, as well as reporting doing less exercise than their low-N counterparts.

Structural equation modelling provided evidence that EI mediates the relationship between personality and exercise behaviour, providing some support for the idea of EI acting in a similar manner to coping. This potential mediating role of EI provides a mechanism to explain the observed associations of personality factors with health behaviours, including exercise. The extent to which EI can be regarded as having coping attributes and its overlap with standard coping measures, for which there is some preliminary evidence (Saklofske et al., 2007) require further investigation.

The detailed interpretation of associations of self-report EI and personality and health behaviours such as exercise is complicated by the medium-to-large correlations found between self-report EI and personality. Investigations of self-report EI/personality associations have shown that self-report EI is related to but distinct from major personality traits (Petides, Pita, & Kokkinaki, 2007) and has incremental validity over personality in the prediction of a range of outcomes related to health and to academic and occupational performance (Petrides, Fredrickson, & Furnham, 2004; Saklofske et al., 2003; van der Zee & Wabeke, 2004), but more work on this issue is needed.

EI–health associations are also of applied interest, because EI skills can potentially be enhanced by training (e.g. Caruso & Wolfe, 2001). Such training might play a role in health-promotion programmes with changes to EI skills as well as attitudes and coping being targeted. Personality–health associations can also provide indications of how someone's personality profile is relevant to their health needs; the results from the present study suggest that individuals scoring high on N (and possibly also those scoring high on O) would benefit from targeted help in developing an exercise programme.

Limitations of the present study include the use of a student sample. It would be important to examine whether the personality/EI/exercise associations found in the present study would be replicated in a more general sample. The HBM-based scale did not perform as expected, in that the expected factor structure did not emerge. It would be of interest to construct a revised version of this scale with a wider range and type of items in order to obtain a more complete picture of the structure of attitudes to exercise. It would also be useful in future work to examine associations of performance as well as self-report EI with exercise attitudes and behaviour, since the former provide a more direct approach to the assessment of skills such as mood management which have been highlighted in the present study as being relevant to health behaviours. Studies using both performance and self-report EI measures would in addition allow the strength of their associations with exercise attitudes and behaviour to be compared.

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