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Personality and Individual Differences 36 (2004) 1921–1932

www.elsevier.com/locate/paid

Personality and self-determination of exercise behaviour

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Received 13 January 2003; received in revised form 30 June 2003; accepted 11 August 2003

Abstract

There is extensive evidence that personality traits are associated with health-related behaviours, but less evidence regarding the underlying mechanisms. In this study, we examined the relationships between personality and self-determination of exercise behaviour. Users of a sports centre completed personality scales (the NEO Five Factor Inventory supplemented with the Eysenck Personality Questionnaire Psychoticism scale) and exercise self-determination scales (Behavioural Regulation in Exercise Questionnaire which measures extrinsic, introjected, identified and intrinsic forms of regulation). Analyses were restricted to 182 individuals in the maintenance stage of exercise participation. Partial correlation analysis was used to examine the relationships between each personality scale and the self-determination scales, controlling for other personality scales, gender and age. Neuroticism was associated with more introjected regulation, extraversion with more identified and intrinsic regulation, openness with less external regulation, conscientiousness with less external regulation and more intrinsic regulation, and psychoticism with more external regulation. Relating these findings to self-determination theory (Deci & Ryan, 2000), it is speculated that extraverted individuals are able to feel self-determined because exercise can satisfy the need for relatedness, conscientious individuals because exercise can satisfy the need for competence. Furthermore, conscientious individuals may have greater wherewithal to advance along the continuum of behavioural regulation.

Keywords: Personality; Self-determination; Motivation; Physical exercise

1. Introduction

There is extensive evidence that personality traits are associated with health-related behaviours (Wiebe & Smith, 1997) even if the findings are not always consistent (see Vollrath & Torgersen,

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0191-8869/$ - see front matter
doi:10.1016/j.paid.2003.08.021

2002). Courneya and colleagues have studied the relationship between the five-factor model of personality and exercise participation, finding participation to be associated with lower neuroticism, higher extraversion, and higher conscientiousness (Courneya, Bobick, & Schinke, 1999; Courneya & Hellsten, 1998; Rhodes, Courneya, & Bobick, 2001; see also Conner & Abraham, 2001; Marks & Lutgendorf, 1999). Various researchers employing an Eysenckian model of personality have found exercise participation to be associated with one or more of lower neuroticism, higher extraversion, and lower psychoticism (e.g., Arai & Hisamichi, 1998; Davis, Elliott, Dionne, & Mitchell, 1991; Davis & Fox, 1993; Kirkcaldy & Furnham, 1991; Potgieter & Venter, 1995; Szabo, 1992; Yeung & Hemsley, 1997b); although Yeung and Hemsley (1997a) found that, among participants referred to an aerobics programme, higher extraversion predicted lower attendance.

Less research has been devoted to the psychological mechanisms by which personality traits affect health-related behaviour (Bermúdez, 1999; Hoyle, 2000). One possible mechanism is motivational. Researchers have examined the associations between personality traits and exercise participation motives, but it is hard to discern a consistent pattern in the findings. Davis, Fox, Brewer, and Ratusny (1995) studied the associations of neuroticism, extraversion, and psychoticism with six exercise motives (weight control, sexual attractiveness, general appearance, fitness/health, mood improvement, and enjoyment). In multiple regression, neuroticism related positively to all motives except fitness/health; extraversion positively to weight control, general appearance, and enjoyment; and psychoticism inversely to fitness/health. Hsiao and Thayer (1998) studied the associations of neuroticism and extraversion with five motives (health-fitness, weight control, general appearance, mood improvement, and socialization). In ANOVAs, those high on neuroticism were higher on mood improvement and lower on health-fitness. Courneya and Hellsten (1998) studied the associations of a five-factor measure of personality with six motives (health, appearance, weight control, social, stress management, and enjoyment). In multiple regression, extraversion and conscientiousness related positively to health; openness to stress management; and extraversion and openness to enjoyment. However, the study of such surface (descriptive) motives does not in itself reveal much about the underlying motivational processes. For this we turn to Deci and Ryan's (1985, 2000; Ryan & Deci, 2000) self-determination theory.

Self-determination theory is founded on the premise that there are innate psychological needs: for *autonomy* (to feel self-determining in one's actions rather than feeling controlled or obliged to act); for *competence* (to feel competent in dealing with one's environment); and for *relatedness* (to feel that one has satisfying and supportive social relationships). Self-determination theory also recognises a distinction between intrinsic and extrinsic motivation. When intrinsically motivated, individuals engage in a behaviour for the inherent pleasure and satisfaction that they derive from taking part in the behaviour; individuals will be intrinsically motivated if they are meeting innate psychological needs. When extrinsically motivated, individuals engage in a behaviour in order to attain separable outcomes or external rewards. Participation motives of the kind studied by Davis et al. (1995), Hsiao and Thayer (1998), and Courneya and Hellsten (1998) may differ in their intrinsic versus extrinsic quality, but they cannot be decisively classified as either intrinsic or extrinsic. The extent to which a particular participation motive reflects intrinsic or extrinsic motivation will depend upon its meaning for the individual and could vary across persons, times or situations.

Furthermore, rather than simply contrasting intrinsic and extrinsic motivation, self-determination theory posits a more differentiated view of extrinsic motivation. It proposes that there are

different ways in which a person's behaviour can be regulated and that these different forms of behavioural regulation form a continuum of self-determination. When *externally regulated*, the individual's behaviour is non-self-determined and controlled by external demands and contingencies. When regulated by *introjection*, an individual has internalised such external controls and applies them to the self, typically in order to avoid guilt or maintain self-esteem. In this case the person's behaviour is only partially self-determined. When regulated by *identification*, behaviour is more self-determined as the individual engages in the behaviour in order to achieve personally valued outcomes. When regulated by *integration*, the person engages in the behaviour because it is fully congruent with their sense of self. Integrated regulation is similar to *intrinsic regulation* in that the behaviour is engaged in with no sense of compulsion (either externally or internally imposed), and is therefore fully self-determined. It differs from intrinsic regulation in that the behaviour is still undertaken in order to achieve separable outcomes, rather than for the satisfaction inherent in taking part in the activity per se.

By adopting a self-determination theory perspective it may be possible to elucidate the motivational processes by which personality traits influence engagement in health-related behaviours such as exercise. In the present study, therefore, we studied the relationship between personality and the extent to which exercise behaviour is regulated in a self-determined fashion. In so doing, we employed a five-factor model of personality, but we also heeded the debate between three-factor and five-factor personality theorists. Eysenck (1992) has argued that agreeableness and conscientiousness are merely manifestations of the more fundamental personality dimension of psychoticism, whereas Costa and McCrae (1992a) have insisted that agreeableness and conscientiousness are themselves fundamental personality dimensions. In the present research we included, along with the NEO Five Factor Inventory (NEO-FFI: Costa & McCrae, 1992b), the Psychoticism scale from the Eysenck Personality Questionnaire (Eysenck & Eysenck, 1991). We also considered Costa and McCrae's (1995) contention that if agreeableness and conscientiousness are both manifestations of a single underlying personality dimension, then Agreeableness and Conscientiousness scales ought to correlate positively with each other, they ought to show similar patterns of correlations with other variables, and their composite (mean) ought to show even stronger correlations with the other variables.

2. Method

2.1. Participants

Participants were recruited from people attending a sports centre in the south-east of England. Quota sampling was used to ensure a fairly equal balance of males and females. Individuals were approached in public areas of the sports centre. Having given informed consent, they completed the questionnaires in a designated area. In total 214 persons completed questionnaires. It turned out that five of these persons were not regular exercisers (they were not in action or maintenance stages of change). As we were interested in the relationships between personality and self-determination among individuals who currently exercise, these five were removed from the dataset (leaving only those in action or maintenance). Preliminary analyses (see Section 3) fuelled concern that stage of change (action versus maintenance) might confound the relationships between personality and

self-determination variables. Consequently, subsequent analyses were restricted to individuals in the maintenance stage. This made the effective N 182, of whom 90 were male and 92 female.

2.2. Measures

2.2.1. Stage of change

Stage of change in exercise participation was measured by a five-category measure, as previously used by Ingledew, Markland, and Medley (1998). This asked participants to tick the one statement that best described them: "I currently do not exercise regularly, and I am not thinking of doing so for at least the next six months" (precontemplation); "I currently do not exercise regularly, but I am thinking of doing so sometime in the next six months" (contemplation); "I currently do not exercise regularly, but I am taking active steps to do so in the very near future" (preparation); "I currently exercise regularly, but I have only begun doing so within the last six months" (action); and "I currently exercise regularly, and I have done so for longer than six months" (maintenance).

2.2.2. Self-determination of exercise behaviour

Self-determination was measured using the Behavioural Regulation in Exercise Questionnaire (BREQ: Mullan, Markland, & Ingledew, 1997). This comprises four scales: External Regulation (four items); Introjected Regulation (three items), Identified Regulation (four items), and Intrinsic Regulation (four items). Validity evidence has been provided by Mullan et al. (1997), Mullan and Markland (1997), and Wilson, Rodgers, and Fraser (2002). Individuals' scale scores were computed as the mean of their nonmissing item scores. In addition, following common practice (see Ryan & Connell, 1989), a Relative Autonomy Index (RAI) was computed to represent overall self-determination, such that a more positive score represented greater self-determination:

$$\begin{aligned}\text{RAI} = {} & 2 * \text{Intrinsic Regulation} + \text{Identified Regulation} - \text{Introjected Regulation} \\ & - 2 * \text{External Regulation}\end{aligned}$$

2.2.3. Personality

Personality was measured using the NEO Five Factor Inventory (NEO-FFI: Costa & McCrae, 1992b) and the Psychoticism scale from the Eysenck Personality Questionnaire—Revised (EPQ-R: Eysenck & Eysenck, 1991). The NEO-FFI comprises 12 items for each of Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness, and the EPQ-R Psychoticism scale comprises 32 items. The NEO-FFI items are statements with a *strongly disagree* to *strongly agree* response format whereas the EPQ-R items are questions with a *no* or *yes* response format. We wished to intermingle the items with a common response format. We were able to do this by using a five-point *definitely false* to *definitely true* response format; in piloting, we found this to be acceptable to participants, more so than a *disagree* to *agree* response format.

2.3. Analytical procedure

Correlations were used to assess the relationships of stage of change (action versus maintenance) with the personality and self-determination variables. The pattern of correlations was such that some relationships between personality and self-determination variables might be confounded by stage of change (see Section 3). Therefore, subsequent analyses were restricted to individuals in the maintenance stage. Correlations were used to assess the relationships of gender and age with personality and self-determination variables, and the relationships within and between personality and self-determination variables. The pattern of correlations was such that some relationships between personality and self-determination variables might be confounded by other variables (see Section 3). Therefore, partial correlations were used to further assess the relationships between personality and self-determination variables. These partial correlations involved controlling for gender and age only, for other personality variables only, and for gender, age and other personality variables together. We also computed, for each individual, the mean of their Agreeableness and Conscientiousness scale scores, and included this composite variable in the correlations and partial correlations.

We chose to report partial correlation rather than semi-partial correlation or regression coefficients on the following grounds. The partial correlation coefficient was the correlation between a personality variable and a self-determination variable after *both* had been residualised for the confounding variables, whereas a semi-partial correlation coefficient would be the correlation between residualised personality and *non*residualised self-determination. Hence, partial correlation was preferable to semi-partial, as a means of controlling for confounding. The partial correlation coefficient quantified the contribution of a personality variable to explaining variance in a self-determination variable, whereas a regression coefficient would quantify the contribution of the personality variable to predicting scores on the self-determination variable. Hence, partial correlation was preferable to regression, given that our research question was more theoretical than practical. By reporting the partial correlations of each five-factor personality variable with each self-determination variable, controlling for the other four factors, we were able to convey the relative strengths of the five factors in explaining variance in self-determination.

3. Results

Those in the maintenance stage of change ($n = 182$) compared with those in the action stage of change ($n = 27$) were higher on Extraversion (correlation between stage and Extraversion, $r = 0.16$, $N = 209$, $p = 0.02$) and Conscientiousness ($r = 0.15$, $p = 0.03$); they were also lower on External Regulation ($r = -0.25$, $p < 0.01$), and higher on Identified Regulation ($r = 0.30$, $p < 0.01$), Intrinsic Regulation ($r = 0.22$, $p < 0.01$) and the RAI ($r = 0.27$, $p < 0.01$). Thus there was a possibility that stage of change might confound the relationships between personality and self-determination variables. Given that the number in the action stage was small, it was decided to eliminate this possibility by restricting all subsequent analyses to those in the maintenance stage of change ($N = 182$).

The descriptive statistics and zero-order correlations for gender, age, personality and self-determination variables are shown in Table 1. At the 0.05 level, females compared with males were higher on Agreeableness and lower on Psychoticism. Age correlated negatively with Extraversion and Psychoticism and positively with Conscientiousness; age also correlated negatively

Table 1
Descriptive statistics and correlations

Variable	Mean	SD	Cronbach's alpha	Correlations												
				1	2	3	4	5	6	7	8	9	10	11	12	13
1. Gender[a]	–	–	–	–												
2. Age	36.46	14.54	–	0.13	–											
3. Neuroticism	1.52	0.71	0.82	0.13	−0.11	–										
4. Extraversion	2.78	0.53	0.76	0.08	−0.27**	−0.32**	–									
5. Openness	2.40	0.53	0.66	0.12	0.00	−0.01	0.13	–								
6. Agreeableness	2.75	0.48	0.69	0.43**	0.11	−0.17*	0.22**	0.00	–							
7. Conscientiousness	2.92	0.55	0.80	0.11	0.24**	−0.44**	0.28**	0.09	0.22**	–						
8. Mean of Agreeableness and Conscientiousness	2.83	0.41	–	0.33**	0.23**	−0.40**	0.32**	0.06	0.75**	0.82**	–					
9. Psychoticism	0.98	0.37	0.79	−0.38**	−0.36**	0.16*	−0.20**	−0.03	−0.60**	−0.48**	−0.69**	–				
10. External Regulation	0.37	0.59	0.80	−0.03	−0.18*	0.28**	−0.14	−0.16*	−0.20**	−0.33**	−0.34**	0.29**	–			
11. Introjected Regulation	1.69	1.01	0.69	−0.05	−0.30**	0.20**	0.05	−0.02	−0.13	−0.15*	−0.18*	0.16*	0.18*	–		
12. Identified Regulation	3.45	0.56	0.66	0.05	0.15*	−0.24**	0.29**	0.06	0.17*	0.25**	0.27**	−0.18*	−0.42**	0.19*	–	
13. Intrinsic Regulation	3.52	0.58	0.88	0.13	0.12	−0.23**	0.37**	0.02	0.20**	0.35**	0.36**	−0.27**	−0.35**	−0.07	0.51**	–
14. Relative Autonomy Index	8.06	2.58	–	0.11	0.28**	−0.36**	0.28**	0.10	0.27**	0.42**	0.45**	−0.36**	−0.78**	−0.47**	0.57**	0.75**

Note. $N = 182$ for descriptive statistics and correlations, 161–181 for Cronbach's alpha. For all scales, the minimum possible scale score is 0, maximum 4.

[a] Positive correlation between gender and another variable means females were higher on the variable.

* $p < 0.05$.

** $p < 0.01$.

with External and Introjected Regulation and positively with Identified Regulation and the RAI. This raised the possibility that age might confound the relationships between personality and self-determination variables. Extraversion, Agreeableness and Conscientiousness correlated positively with each other and negatively with Neuroticism and Psychoticism which in turn correlated positively with each other; each personality scale also correlated with one or more BREQ scales. This raised the possibility that personality variables might confound the relationships between other personality variables and self-determination variables. There were also correlations between the BREQ scales, as would be expected given that they represent a continuum of self-determination.

The correlations and the partial correlations between personality and self-determination measures are shown in Table 2; the correlations are repeated from Table 1 for ease of comparison. Generally, the correlations and partial correlations between a given personality dimension and the four aspects of self-determination (External Regulation, Introjected Regulation, Identified Regulation, and Intrinsic Regulation) conformed to a progressive pattern: positive through to negative or negative through to positive. Generally, controlling for gender and age had less impact on the correlations than did controlling for other personality dimensions. When controlling for gender, age *and* the other personality dimensions, Neuroticism correlated positively with Introjected Regulation and negatively with the RAI. Extraversion correlated positively with Identified Regulation and Intrinsic Regulation and with the RAI. Openness correlated negatively with External Regulation. Conscientiousness correlated negatively with External Regulation, positively with Intrinsic Regulation, and positively with the RAI. Psychoticism correlated positively with External Regulation and negatively with the RAI.

Agreeableness and Conscientiousness correlated significantly positively with each other (Table 1). Agreeableness correlated significantly with gender whereas Conscientiousness correlated significantly with age (Table 1). Whereas Conscientiousness correlated significantly with self-determination measures after controlling for gender, age and other personality dimensions, Agreeableness did not (Table 2). The mean of Agreeableness and Conscientiousness produced correlations with other variables that were similar to (never notably larger than) those produced by either Agreeableness or Conscientiousness alone (Tables 1 and 2).

4. Discussion

In the present study, personality was found to be related to the varying forms of behavioural regulation. Neurotic individuals were more likely to be regulated by internalised pressures (introjected regulation). Extraverted individuals were more likely to be regulated by the perceived worth (identified regulation) and pleasurability (intrinsic regulation) of exercise. Open individuals were less likely to be regulated by external pressures (external regulation). Conscientious individuals were less likely to be regulated by external pressures (external regulation) and more likely to be regulated by the perceived pleasurability (intrinsic regulation) of exercise. If the Relative Autonomy Index is taken as a gauge of overall self-determination, then individuals who were less neurotic or more extraverted or more conscientiousness were more likely to be self-determined. The relationships, though significant, were not strong (the relationships prior to controlling for other personality dimensions were stronger).

Table 2
Correlations and partial correlations

Personality measure	Self-determination measure				
	External Regulation	Introjected Regulation	Identified Regulation	Intrinsic Regulation	Relative Autonomy Index
Correlations					
Neuroticism	0.28**	0.20**	−0.24**	−0.23**	−0.36**
Extraversion	−0.14	0.05	0.29**	0.37**	0.28**
Openness	−0.16*	−0.02	0.06	0.02	0.10
Agreeableness	−0.20**	−0.13	0.17*	0.20**	0.27**
Conscientiousness	−0.33**	−0.15*	0.25**	0.35**	0.42**
Mean of Agreeableness and Conscientiousness	−0.34**	−0.18*	0.27**	0.36**	0.45**
Psychoticism	0.29**	0.16*	−0.18*	−0.27**	−0.36**
Partial correlations controlling for gender and age					
Neuroticism	0.27**	0.18*	−0.23**	−0.25**	−0.37**
Extraversion	−0.20**	−0.04	0.35**	0.41**	0.38**
Openness	−0.16*	−0.02	0.06	0.01	0.10
Agreeableness	−0.20**	−0.11	0.15*	0.16*	0.24**
Conscientiousness	−0.30**	−0.08	0.22**	0.33**	0.37**
Mean of Agreeableness and Conscientiousness	−0.33**	−0.12	0.24**	0.33**	0.41**
Psychoticism	0.26**	0.05	−0.13	−0.22**	−0.28**
Partial correlations controlling for other personality dimensions					
Neuroticism controlling for E, O, A, and C	0.16*	0.18*	−0.10	−0.02	−0.19*
Extraversion controlling for N, O, A, and C	0.02	0.15*	0.19**	0.28**	0.10
Openness controlling for N, E, A, and C	−0.15*	−0.04	0.02	−0.04	0.07
Agreeableness controlling for N, E, O, and C	−0.13	−0.11	0.08	0.09	0.17*
Conscientiousness controlling for N, E, O, and A	−0.21**	−0.07	0.12	0.24**	0.27**
Mean of A and C controlling for N, E, and O	−0.25**	−0.14	0.15*	0.25**	0.32**
Psychoticism controlling for N, E, and O	0.26**	0.15*	−0.11	−0.21**	−0.30**
Partial correlations controlling for gender, age, and other personality dimensions					
Neuroticism controlling for E, O, A, and C	0.13	0.16*	−0.08	−0.02	−0.16*
Extraversion controlling for N, O, A, and C	−0.03	0.05	0.25**	0.31**	0.21**
Openness controlling for N, E, A, and C	−0.15*	−0.03	0.02	−0.05	0.07
Agreeableness controlling for N, E, O, and C	−0.13	−0.07	0.06	0.04	0.13

(*continued on next page*)

Table 2 (*continued*)

Personality measure	Self-determination measure				
	External Regulation	Introjected Regulation	Identified Regulation	Intrinsic Regulation	Relative Autonomy Index
Conscientiousness controlling for N, E, O, and A	−0.18*	0.00	0.06	0.19*	0.20**
Mean of A and C controlling for N, E, and O	−0.22**	−0.05	0.09	0.17*	0.23**
Psychoticism controlling for N, E, and O	0.21**	0.03	−0.01	−0.09	−0.17*

Note. $N = 182$. N = Neuroticism, E = Extraversion, O = Openness, A = Agreeableness, C = Conscientiousness.
* $p < 0.05$.
** $p < 0.01$.

Although Agreeableness and Conscientiousness correlated positively with each other, there were differences in their associations with other variables, and the mean of Agreeableness and Conscientiousness produced correlations with other variables not notably larger than those produced by Agreeableness or Conscientiousness alone (and rather similar to those produced by Psychoticism). These findings suggest (cf. Costa & McCrae, 1995) that, for the purposes of the present study, agreeableness and conscientiousness are better treated as separate constructs rather than being subsumed under a higher-order construct.

The findings that neuroticism, extraversion, and conscientiousness are related to self-determination of exercise behaviour are consistent with previous evidence that these particular personality dimensions are related to exercise participation per se (see Section 1). The findings for extraversion and conscientiousness may have an explanation in self-determination theory (Deci & Ryan, 2000). We speculate that extraverted individuals are able to feel self-determined because exercise can satisfy the need for relatedness, whereas conscientiousness individuals are able to feel self-determined because exercise can satisfy the need for competence. In the same vein, the specific finding for openness (inversely associated with external regulation) may reflect need for autonomy. The specific finding for neuroticism (associated with introjected regulation) may simply reflect the general tendency of neurotic individuals to experience negative affect (Watson & Pennebaker, 1989). These interpretations cannot be more than speculative, given that we have only just begun to examine the relationships between personality traits and self-determination.

The specific findings for conscientiousness merit further consideration. Conscientiousness is of particular interest because (as well as being related to exercise participation) it has been found to be associated in a health-promoting direction with a wide range of health-related behaviours: various indices of health-related behaviour (Avia et al., 1995; Booth-Kewley & Vickers, 1994; Ingledew & Brunning, 1999; Lemos-Giráldez & Fidalgo-Aliste, 1997); risky behaviours such as smoking (Friedman et al., 1995; Vollrath, Knoch, & Cassano, 1999), drinking (Friedman et al., 1995; Stewart, Loughlin, & Rhyno, 2001; Vollrath et al., 1999) and sexual behaviour (Hoyle, Fejfar, & Miller, 2000; Vollrath et al., 1999); and specific preventive behaviours such as adopting mammography (Siegler, Feaganes, & Rimer, 1995), protecting against sun exposure (Castle, Skinner, & Hampson, 1999) and confining smoking behaviour in view of the risk posed by radon (Hampson, Andrews, Barckley, Lichtenstein, & Lee, 2000). It is unlikely that such health-pro-

moting behaviours are inherently fulfilling in the first instance. So why are conscientious individuals more likely to persist with them? A naive suggestion might be that conscientious individuals force themselves to persevere with activities in spite of finding them unfulfilling. Yet in the present study conscientious individuals felt less externally regulated and more intrinsically regulated. A more fitting suggestion would be that conscientious individuals find a way of making the activities fulfilling. Little, Lecci, and Watkinson (1992), based upon their finding that conscientiousness was positively associated with the "meaning" (importance, enjoyment, self-identity, and absorption) of personal projects, suggested that "conscientious individuals have the capacity to render enjoyable the projects that are required of them by others or to transform mundane activities into estimable undertakings" (p. 521). In self-determination theory terms, we speculate that conscientious individuals possess the wherewithal to advance along the continuum of behavioural regulation, from external to integrated regulation. In theory, anyone can advance along this continuum, but perhaps less conscientious individuals require more encouragement (e.g., Deci, Eghrari, Patrick, & Leone, 1994) and support (e.g., Williams, 2002). Further testing of these ideas will require studies of how personality relates to individuals' progression over time along the continuum of behavioural regulation.

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