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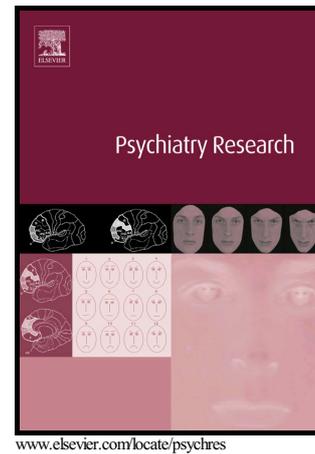
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## PSYCHIATRY RESEARCH

Autonomous motivation is associated with the maintenance stage of behaviour change in people with  
affective disorders

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**Abstract**

The present study examined whether in people with affective disorders motives for adopting and maintaining physical activity recommendations (as formulated by the self-determination theory) differed across the stages of behaviour (identified by the transtheoretical model). A total of 165 (105♀) persons ( $45.6 \pm 14.2$  years) with affective disorders [major depressive disorder ( $n=96$ ) or bipolar disorder ( $n=69$ )] completed the Behavioural Regulation in Exercise Questionnaire-2 and the Patient-centred Assessment and Counselling for Exercise questionnaire. Discriminant and multivariate analyses demonstrated that persons with affective disorders at the early stages of change have less autonomous and more controlled physical activity motives than those at the later stages. Our results suggest that autonomous motivation may have an important role to play in the maintenance of health recommendations in persons with affective disorders. Longitudinal and intervention studies should be designed in people with affective disorders to identify the causal pathways between motives for maintaining health recommendations, effective changes in health behaviour and physical and mental health outcomes.

**Keywords:** physical activity; exercise; bipolar disorder; depression

## 1. Introduction

There is recent evidence which supports physical activity and exercise (a structured form of physical activity) for improving both physical and mental health outcomes of people with depression (Cooney et al., 2013; Josefsson et al., 2014; Rosenbaum et al., 2014; Stubbs et al., 2016). There is also preliminary evidence for the beneficial effects of physical activity and exercise in people with bipolar disorder (Sylvia et al., 2013; Schuch et al., 2015; Vancampfort et al., 2015a). However, only a minority of individuals with depression (Wielopolski et al., 2014) and bipolar disorder (Janney et al., 2014) are able to maintain physical activity and exercise levels at a level compatible with proposed health recommendations. As a result, clinicians face the challenge of promoting patients to meet the recommended physical activity levels.

One of the most commonly adopted models of behaviour change which might be applied for motivating sedentary populations is the transtheoretical model (TTM) (Prochaska and Di Clemente, 1983; Prochaska and Marcus, 1994). The model has been successfully utilised to describe the different phases that individuals with affective disorders pass through in the acquisition and maintenance of health behaviours (Knapen & Vancampfort, 2013; Knapen et al., 2014). The TTM provides a framework for categorising a person's readiness to change their behaviour and includes five stages. With respect to a change in physical activity behaviour, in the first stage, the pre-contemplation phase, individuals are physically inactive and are not thinking about becoming more active within the next six months. During the next contemplation stage, individuals think about becoming more active within the next six months. In the third stage, the preparation stage, individuals are engaging in some physical activity or exercise, while in the penultimate action stage individuals have been regularly active for less than six months. Lastly, the maintenance stage is characterised by sustained regular physical activity or exercise for more than six months. However, the model has limitations, for instance, it is not able to explain motives why individuals adopt an active lifestyle or remain sedentary, nor is it able to identify the mechanisms that underlie the maintenance of specific behaviours.

The self-determination theory (SDT) (Deci and Ryan, 2000) is a motivational theory that provides an insight into such motives. The theory proposes motivation is multidimensional and resides along a continuum. The lowest end of the continuum is identified as amotivation which represents a

general lack of motivation to change behaviour due to discouragement. Following along the continuum, external regulation refers to being physically active or exercising to avoid punishment or criticism or to obtain promised rewards or external appreciation. Introjected regulation refers to the imposition of pressures onto one's own functioning, for instance, by reinforcing one's activity engagement with feelings of guilt, self-criticism, or contingent self-worth. More volitional (or autonomous) forms of functioning include identified regulation, which involves foreseeing the personal importance of physical activity or exercise, and integrated regulation, which implies that physical activity or exercise is brought in harmony with other prevailing life values, such that being active becomes prioritised within one's lifestyle. Finally, intrinsic motivation involves engaging in physical activity or exercise for its own sake, that is, because one finds being active stimulating or enjoyable by itself.

In distinguishing SDT from TTM, SDT highlights the importance of the type or quality of motivation, i.e. maintained engagement in physical activity and exercise regulated to a greater extent by autonomous or volitional motives, rather than by controlled or pressured motives. Consistent with this assumption, recently significant negative correlations were found between the level of physical activity participation during the previous week and amotivation, external and introjected regulations and significant positive correlations with autonomous regulation in people with affective disorders (Vancampfort et al., 2015b). Research is however needed to investigate not only intentions but also maintained engagement in physical activity behaviour over a longer period of time (6-months). In light of the complex and dynamic nature of physical activity and exercise behaviour, it seems unfeasible that a questionnaire focusing on the previous week or month is really able to truly capture a patient's behavioural patterns over a longer term (Soundy et al., 2014). People with depression and bipolar disorder often experience lapses in trying to adhere to physical activity and exercise programs (Vancampfort et al., 2013a). Drop-out from physical activity and exercise programs could be partly attributed to the motivation underlying physical activity and exercise behaviour. Although a longitudinal design would be ideal to answer this question, the maintained engagement in physical activity and exercise can be indirectly captured through the assessment of the stages of change, as has been shown previously in people with schizophrenia (Vancampfort et al., 2014) and in people with severe mental illness in general (Vancampfort et al., 2015c). As previous research (Vancampfort et al., 2015b) demonstrated that there were no differences in motives for being physically active between

people with major depressive disorder or bipolar disorder, both clinical populations were included in the same analyses.

The aim of this study therefore was to evaluate the associations between the TTM stages of change and the motives people with affective disorders give for being physically active as discerned within SDT. A secondary aim was to explore gender differences in the interactions between the TTM stages of change and motives for being physically active as formulated according to the SDT. It was hypothesised that more autonomous forms of motivation (i.e. identified and intrinsic regulations) would be prevalent in more advanced stages of change (i.e. preparation, action and maintenance). In contrast, more controlling forms of motivation (i.e. external and introjected regulations) and in particular amotivation would be more evident in the least advanced stages of change (i.e. pre-contemplation and contemplation).

## 2. Methods

### 2.1. Participants and procedure

Extended details for the procedures undertaken and demographics for participants are identified elsewhere (Vancampfort et al., 2015b). A cross-sectional multi-centre design was used incorporating 14 centres that treat persons with affective disorders (see acknowledgements). One centre declined to participate due to practical reasons. The centres were located across the five Dutch-speaking provinces of Belgium. All patients who had a DSM-IV diagnosis of major depressive disorder or bipolar disorder (American Psychiatric Association, 2000) as diagnosed by the treating psychiatrist, were invited to participate. Individuals were included if they were: (1) inpatients or outpatients, and (2) had a full or partial remittance in symptoms; i.e. individuals were excluded if they were located within an intensive supervision unit and / or were not able to concentrate for at least 20 minutes (as determined by the treating psychiatrist). All questionnaires were self-administered. Questionnaires were checked for missing data after completion by the patient. In case of any missing data participants were requested to add the data missing. No incentive was provided for participation. The study procedure was approved by the participating ethical committees based at each centre. All participants gave their written informed consent.

### 2.2. Behavioural Regulation in Exercise Questionnaire

The Behavioural Regulation in Exercise Questionnaire-2 (BREQ-2) (Markland and Tobin, 2004) was used to explore motives for physical activity. The questionnaire comprises of 19 items relating to motives to be physically active derived from the self-determination theory (Deci and Ryan, 2000). Each item is measured on a five-point Likert-scale, from 0 ('Not true for me') to 4 ('Very true for me'). In accordance with previous research (Vancampfort et al., 2015a) "identified regulation" and "intrinsic regulation" were combined to a single factor labelled "autonomous regulation". This way, the BREQ-2 consisted of four factors: (1) amotivation, (2) external regulation, (3) introjected regulation and (4) autonomous regulation.

### 2.3. Stage of readiness to change

Stages of change as derived from the transtheoretical model (Prochaska and Di Clemente, 1983; Prochaska and Marcus, 1994) were assessed using a modified version of the stage of change

questionnaire from the Patient-centred Assessment and Counselling for Exercise (PACE) questionnaire (Long et al., 1996). For this study, physical activity was defined as moderate intensity activity for 30 minutes at least five days of the week (e.g., physical activities that take moderate physical effort and make you breathe somewhat harder than normal). Participants chose one of five options: “I’m not physically active and I don’t intend to start” (pre-contemplation); “I’m not physically active but I’m thinking about starting” (contemplation); “I’m active occasionally” (preparation); “I’m active regularly and started in the last 6 months” (action); and “I’m active regularly and have been for longer than 6 months” (maintenance).

#### *2.4. Physical activity levels*

The International Physical Activity Questionnaire (IPAQ)-short version (Craig et al., 2003) was used. The IPAQ utilises a 7-day recall period, identifying physical activity undertaken in the morning, afternoon and evening. Data from the IPAQ is summarized according to total minutes of walking, moderate physical activity (e.g., activities that makes one breathe somewhat harder than normal such as carrying light loads, bicycling at a regular pace, or easy swimming), and vigorous physical activity (e.g., activities that make you breathe much harder than normal such as heavy lifting, digging, aerobics, or fast bicycling) per week.

#### *2.5. Statistical analyses*

A multivariate analysis of variance (MANOVA) was used to test for significant differences in BREQ-2 subscale scores across the TTM stages of change and between men and women. Where significant main effects were demonstrated, we followed up with comparisons of differences across groups using one-way analyses of variance (ANOVA) with post hoc tests (Scheffe) (stages of change) or T-tests (gender). Significance level was set at  $p < 0.05$ . Next to this, a discriminant function analysis was used to determine whether the stages of change could be discriminated on the basis of BREQ-2 subscale scores. Variables with structure coefficients greater than 0.30 were used to define the meaning of the functions (Pedhazur, 1982). Stage of change group differences were evaluated by examining the values of the discriminant functions at the group centroids. Positive values indicate that a group scores high on a function while negative values indicate that a group has a low score on that function. Lastly, classification functions for each stage of change group were then generated from the discriminant

functions. The classification functions permit the input of an individual's raw score for each of the BREQ-2 variables to estimate the probability of the membership in each of the stage of change groups. The individual was predicted to belong to the group for which the highest probability estimate was obtained. SPSS 22.0 was used for data analysis (SPSS Inc, Chicago, IL).

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### 3. Results

#### 3.1. Participants

Thirteen of the 14 centres that treat persons with affective disorders (see acknowledgements) provided data. One centre declined to participate due to practical reasons. A total of 165 (105♀) Belgian patients were recruited, including 96 individuals with major depressive disorder and 69 with bipolar disorder. The exact number of who declined participation is unclear due to insufficient data in several participating centres but based on an extrapolation it is estimated that almost 20% of the eligible participants refused. No significant differences in demographical variables were found between participants and decliners for whom data were available. The mean±SD age for the participants was 45.6±14.2 years and the mean±SD body mass index (BMI) 25.2±5.0, for the decliners this was respectively 46.1±12.9 years and 26.1±4.2. Twenty-seven patients (16.4%) were outpatients. The mean±SD minutes of vigorous physical activity, moderate physical activity and walking per week was respectively 40.6±75.0, 79.5±108.4 and 162.9±145.9. No differences between in- and outpatients were observed (data available upon request). There were 67 (40.6%) smokers in the sample who on average smoked 15±9 cigarettes per day.

#### 3.2. Stages of change

Thirteen (7.8%) persons with affective disorders reported being in pre-contemplation, 11 (6.7%) were in the contemplation stage, 35 (21.2%) in the preparation stage, 43 (26.1%) in the action stage, and 63 (38.2%) in the maintenance stage. Due to the relatively small numbers in the first two stages, we followed Mullan and Markland (1997) who combined the two stages of change to form a single stage that was labelled "pre-preparation" (n=24; 14.5%). Means and standard deviations at each stage of change for each BREQ-2 subscale are presented in Table 1.

[Add Table 1 about here]

#### 3.3. Analyses of variance

MANOVA was performed with the BREQ-2 scores as dependent variables and gender and stage of change as independent variables. Overall, the analysis demonstrated only main effects for stages of change (Wilks' Lambda = 0.60,  $F(12,408)=7.3$ ,  $p<0.001$ ) and not for gender (Wilks' Lambda = 1.0,  $F(4,154)=0.16$ ,  $p=0.96$ ). Also no interaction effects for gender by stage of change were found (Wilks'

Lambda = 0.88,  $F(12,408)=1.7$ ,  $p=0.07$ ). Follow-up ANOVA with post hoc Scheffe demonstrated that amotivation and the external, introjected and autonomous regulations differed across the different stages of change. All sub-analyses investigating differences in motivation regulations across stages of change are presented in Table 1. Based on these analyses, the discriminant analysis was not conducted for men and women separately.

#### 3.4. Discriminant analysis

In the discriminant analysis, Box's M was significant [Box's  $M=59.7$ , approximate  $F(30; 33718)=1.89$ ,  $p=0.002$ ]. This indicates the null hypothesis of equality of covariance matrices across groups has to be rejected. Table 2 summarises the findings of the discriminant analysis for the entire group. One function (canonical  $r=0.62$ ; Wilks' lambda=0.60,  $\chi^2=80.6$ ,  $df =12$ ,  $p<0.001$ ) explained 96.8% of the between-groups variability. As judged by the correlations between the discriminating variables and the discriminant function, the function was dominated by autonomous regulations ( $r=0.86$ ) and by introjected regulations ( $r=-0.47$ ). The values of the discriminant functions at the group centroids were examined. The structure coefficients of this function identified that introjected regulations made a significant negative contribution to the discriminant function, while autonomous regulation made a significant positive contribution. The centroid values indicate that the preparation group can be located at the negative end of the continuum and the maintenance group at the positive end.

[Add Table 2 about here]

## 4. Discussion

### 4.1. Main findings

The present study is the first to demonstrate in persons with affective disorders that lower levels of amotivation and higher levels of autonomous motivation are observed in more advanced stages of change. More in detail, persons with affective disorders in the action and maintenance stages were less amotivated and more autonomously motivated toward physical activity and exercise than those in the pre-preparation and preparation stages. The observation that introjective regulation contributed negatively to the between-groups variability (in particular between those in the preparation and maintenance stage) suggests that feelings of being ashamed or guilty, self-criticism and low self-efficacy do characterize the motivational profiles of those initiating a healthy lifestyle but not those who have maintained their behaviour for at least for 6 months.

### 4.2. Practical considerations

One of the greatest challenges facing clinicians is how to motivate people with affective disorders to adopt and maintain health recommendations on the long term (>6months). According to the stages of change framework, behaviour change is best achieved by applying the therapeutic principles and strategies that match with a particular stage (Prochaska and Di Clemente, 1983; Prochaska and Marcus, 1994). Whereas cognitive processes are used by preference in earlier, more motivation-oriented stages of change, behavioural processes would be applied by preference in more action-oriented stages of change (Prochaska and Di Clemente, 1983; Prochaska and Marcus, 1994).

Considering the current research findings, two issues need to be highlighted. First, facilitating autonomous motivation should not be a task limited to a single stage of change. Instead, enhancement of autonomous motivation seems to be critical across the entire behaviour change process. It has been argued previously that the facilitation of autonomy represents a non-specific therapeutic factor, which is important across clinical orientations (Ryan et al., 2011). In order to enhance autonomous motivation, SDT argues that three psychological needs should be fulfilled: (1) the need for autonomy (i.e., experiencing a sense of psychological freedom when engaging in physical activity), (2) the need for competence (i.e., feeling effective to attain desired outcomes), and (3) the need for relatedness (i.e., being socially connected) (Ryan and Deci, 2000). The current study offers

clear indications that these psychological needs should be nurtured across the stages of change. The way health care professionals and the social environment (family, friends and relatives) attend to these needs might however depend on the particular stage of change. More need-supportive components (e.g., acknowledging barriers, offering choice, providing a rationale for behaviour change) (Soundy et al., 2014b) might be hypothesised to be more critical in earlier stages. It might be hypothesised as well that when people with affective disorders perceive their psychological needs to be met, they are more likely to develop and maintain autonomous motivation, leading them to progress across the stages of change. Second, the critical role of more autonomous forms of motivation may especially manifest with respect to the later stages of change. That is, both autonomously and controlled motivated exercisers will weigh up the pros and cons of change in the earlier stages, yet, autonomous forms of motivation are especially required when translating the first efforts into real action.

#### 4.3. *Limitations and future research*

The current findings should be interpreted with some caution due to several methodological considerations. First, this was a cross-sectional study which means that the directionality of the relationships we observed cannot be deduced with certainty. Therefore it is not possible to ascertain whether those in the later stages of change became more autonomous in the regulation of their physical activity behaviour over time as they increased their stage of change, or whether they reached the later stages of change because they were more autonomous from the start. Longitudinal and intervention studies should be designed to identify the causal pathways between the different constructs. Secondly, one should be aware that the majority of the included participants were hospitalised at the time of the study. Previous research in persons with severe mental illness (Vancampfort et al., 2013c) demonstrated that environmental variables are significantly associated with multiple types of physical activity participation. Third, the study contained no data on medication use and could therefore not determine any relationship between autonomous motivation, stages of change and medication use. In the same way, we did not include data on the current states of depression or mania and illness duration.

In conclusion, the current study demonstrates that people with affective disorders presenting with higher levels of autonomous motivation appear to be able to maintain current physical activity recommendations with greater efficacy. We encourage in particular longitudinal and interventional

research that is able to consider the underlying dynamic processes involved in physical activity behaviour change in people with affective disorders.

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**Table 1**

Means and standard deviations and differences in motivational types (BREQ-2 subscales) by stage of change (PACE subscales) (n=165)

Motivational type	Pre-preparation		Preparation		Action		Maintenance		F-value	p-value
	M	SD	M	SD	M	SD	M	SD		
Amotivation	1.2 <sup>a,b</sup>	1.1	1.0 <sup>d</sup>	0.8	0.5 <sup>a</sup>	0.7	0.2 <sup>b,d</sup>	0.5	14.8	<0.001*
External regulation	1.3 <sup>a</sup>	1.0	1.0	0.9	0.9	1.0	0.7 <sup>a</sup>	0.8	2.7	0.047*
Introjected regulation	1.8 <sup>a</sup>	1.1	1.9 <sup>c</sup>	1.0	1.6	1.1	1.1 <sup>a,c</sup>	1.0	3.4	0.019*
Autonomous regulation	1.8 <sup>a,b</sup>	0.8	1.7 <sup>c,d</sup>	1.0	2.8 <sup>a,c</sup>	0.9	3.0 <sup>b,d</sup>	0.8	24.4	<0.001*

M=mean, SD=standard deviation, BREQ-2=Behavioural Regulation in Exercise Questionnaire-2, PACE=Patient-centred Assessment and Counselling for Exercise questionnaire, MANOVA (\*model significant at p<0.05) with post hoc Scheffe when indicated (significance set here at p<0.05): a=pre-preparation versus action, b=pre-preparation versus maintenance, c=preparation versus action, d=preparation versus maintenance.

**Table 2**

Discriminant function analysis using the BREQ-2 motivational types to differentiate stages of change (PACE subscales) (n=165)

<b>Discriminating variable</b>	<b>Function</b>
<i>Motivational regulations</i>	<i>Structure coefficient</i>
Amotivation	-0.28
External motivation	0.20
Introjected regulation	-0.47
Autonomous regulation	0.86
<i>Stages of change</i>	<i>Centroid value</i>
Pre-preparation	-0.95
Preparation	-1.0
Action	0.30
Maintenance	0.75

BREQ-2=Behavioural Regulation in Exercise Questionnaire-2, PACE=Patient-centred Assessment and Counselling for Exercise questionnaire

### **Highlights**

- Persons with affective disorder who maintain their physical activity behaviour are in particular autonomously motivated.
- Professionals should empower patients to generate their own motives for maintaining an active lifestyle.