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Motivation, treatment engagement and psychosocial outcomes in outpatients with severe mental illness: a test of Self-Determination Theory

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Abstract

Currently, it is unclear whether Self-Determination Theory (SDT) applies to the mental health care of patients with severe mental illness (SMI). Therefore, the current study tested the process model of SDT in a sample of outpatients with SMI. Participants were 294 adult outpatients with a primary diagnosis of a psychotic disorder or a personality disorder and their clinicians ($n = 57$). Structural equation modelling was used to test the hypothesized relationships between autonomy support, perceived competence, types of motivation, treatment engagement, psychosocial functioning and quality of life at two time points and across the two diagnostic groups. The expected relations among the SDT variables were found, but additional direct paths between perceived competence and clinical outcomes were needed to obtain good model fit. The obtained process model was found to be stable across time and different diagnostic patient groups, and was able to explain 18% to 36% of variance in treatment engagement, psychosocial functioning and quality of life. It is concluded that SDT can be a useful basis for interventions in the mental health care for outpatients with SMI. Additional experimental research is needed to confirm the causality of the relations between the SDT constructs and their ability to influence treatment outcomes.

KEYWORDS

motivation, personality disorders, psychotic disorders, self-determination, theory

1 | INTRODUCTION

Self-Determination Theory (SDT) (Deci & Ryan, 2000) claims to provide a universal framework for understanding the individual and environmental factors that produce and shape certain types of motivation and subsequent engagement with behaviour (Deci & Ryan, 2000). It has been suggested that SDT may be useful as a basis for psychosocial interventions for patients with severe mental illness (SMI) (Medalia & Brekke, 2010; Ryan, 2005). The aim of the current study is to investigate the basic process model of SDT in outpatients with SMI. In the following, we will briefly describe SDT, hypotheses for SDT, previous research findings and the specific objectives regarding the testing of this theory in outpatients with SMI.

1.1 | Self-Determination theory (SDT)

SDT describes different types of motives or *reasons* why a person may engage in behaviour, that fall along a continuum of self-determination in the following order from most to least self-determined: intrinsic, integrated, identified, introjected, external and amotivation (Ryan & Deci, 2008; Ryan, Patrick, Deci, & Williams, 2008). For example, identified motivation is evident when a patient recognizes and accepts that treatment is useful for achieving personally relevant goals (Ryan & Deci, 2008), which is more internalized than introjected motivation, which is evident when a patient is driven by feelings of guilt, shame or anxiety, and might feel ashamed or disappointed if he did not remain in treatment.

According to SDT, the different types of motivation become manifest due to the (lack of) support for three basic psychological needs; autonomy, competence and relatedness. Autonomy refers to the need to be the originator of one's actions and the desire for volition and choice. Competence refers to the need to feel capable of achieving desired outcomes, while relatedness is the need to feel close to and understood by others (Deci & Ryan, 2000). Internalization of motivation, which is the process through which reasons for change and motivations for particular behaviours are integrated to different degrees into the sense of self (Deci & Ryan, 2000), may be facilitated by support of the three basic needs. SDT predicts that patients who feel that their therapeutic environment is supportive of their basic psychological needs, will more easily go through the process of internalization and identify with adhering to treatment processes and engaging in behaviour changes, leading to better treatment outcomes compared to those patients who feel thwarted in their needs (Ryan & Deci, 2008). The therapeutic environment can support autonomy by acknowledging the patient's perspective, offering choice (about treatment options) and support initiative while minimizing pressure and control (Ryan & Deci, 2008). Further, when patients are additionally afforded the skills and tools for change and are helped to experience mastery and control over their behaviour, they may gain a sense of competence (Ryan et al., 2008). Relatedness may be supported by involvement with others in an empathic, affectionate and dedicated manner (Silva, Marques, & Teixeira, 2014). Previous research findings on SDT in mental health care, including previous process models that have been examined, are described in the online Supporting Information. Studies have generally shown support for the use of SDT in this context (Barch, Yodkovik, Sypher-Locke, & Hanewinkel, 2008; Medalia & Brekke, 2010; Ng et al., 2012; van der Kaap-Deeder et al., 2014; Williams et al., 2006), although questions remain regarding the way that different types of motivation affect treatment engagement and outcomes in patients with SMI.

The basic process model that will be tested in the current study, is based on previous studies of SDT in health care contexts (Ng et al., 2012; van der Kaap-Deeder et al., 2014; Williams et al., 2006) and on our own previous work on the relationships between autonomy support and motivation types in the current patient sample, of which

the data were gathered in a cluster randomized controlled trial (RCT) (Jochems, Mulder, Duivenvoorden, van der Feltz-Cornelis, & van Dam, 2014; Jochems, van der Feltz-Cornelis, van Dam, Duivenvoorden, & Mulder, 2015). We hypothesized that autonomy support would predict need satisfaction (perceived competence) as well as motivational regulations, while perceived competence would also predict motivational regulations. In turn, motivational regulations were hypothesized to predict clinical outcomes, such that identified and introjected motivation would be positively associated with clinical outcomes whereas external motivation would be negatively associated to clinical outcomes. The three outcomes that were used in the cluster RCT, namely treatment engagement, psychosocial functioning and quality of life were added to the structural model to investigate the associations between SDT constructs and these clinical outcomes. Figure 1 depicts the model that will be tested in the current study.

1.2 | Hypotheses

In evaluating whether a motivation theory such as SDT is a "good theory", we argued that a good theory would be applicable in multiple settings (i.e. different patients groups), be robust against changes across time and would be able to explain clinical outcomes. Regarding the second criterion, it should be noted that, although patients may change in their respective levels of competence and motivation etc. over time, the associations between the constructs in the theory should remain constant across time if the theory is correctly specified. The hypotheses for the current study are as follows:

- **Hypothesis 1.** *It was hypothesized that the process model as outlined in Figure 1 would be plausible. If this model does not turn out to be plausible, we will evaluate which alternative model is more plausible.*
- **Hypothesis 2.** *It was hypothesized that the model would be stable across time (i.e. baseline and one year later), across patient groups (i.e. patients with primarily a personality disorder versus those with primarily a psychotic disorder) and across treatment groups (i.e. Motivation Feedback (MF) versus Treatment as Usual (TAU)).*
- **Hypothesis 3.** *It was hypothesized that the model would show clinical utility by explaining observed variance in clinical outcomes,*

FIGURE 1 Hypothesized conceptual model based on Self-Determination Theory. Note: Thick lines represent theoretically expected regression paths, dotted lines represent theoretically expected inter-correlations of variables. A plus indicates a hypothesized positive relationship between the constructs, a minus indicates a negative hypothesized relationship. Variables reflect patient-rated constructs unless indicated otherwise

including clinician-rated treatment engagement, interviewer-rated psychosocial functioning and patient-reported quality of life.

2 | METHODS

2.1 | Study design

The current longitudinal study constitutes a secondary analysis of a cluster RCT (Jochems et al., 2012). The study was approved by an official medical ethical committee as well as by the scientific committees of the two specialty mental health institutions where the data were collected.

2.2 | Setting

Data were collected between May 2011 and October 2013 from 12 outpatient treatment programmes, including a forensic psychiatric outpatient clinic, three specialized psychotic outpatient treatment programmes and eight several flexible assertive community treatment teams [FACT-teams (van Veldhuizen, 2007)] of two specialty Dutch mental health treatment centres. FACT-teams provide assertive, outreach, community-based, and supportive psychiatric services to individuals with SMI (van Veldhuizen, 2007), such as those with psychotic disorders and severe personality disorders.

2.3 | Participants and procedures

Inclusion criteria for patients were: a primary diagnosis of psychotic or personality disorder, aged 18 to 65 years, undergoing individual outpatient treatment and having a sufficient command of the Dutch language. A clinician was eligible for participation if he or she was the primary health care provider involved with the patient and saw the patient most frequently. Eligible patients on the clinicians' caseload lists were approached and informed by researchers and asked for their signed consent. Both patients and clinicians were asked to fill in questionnaires at baseline and follow-up assessment (12 months after baseline) and additionally, patients were interviewed regarding their functioning in several life domains by independent research assistants at these assessment moments. To enhance the likelihood of participation, patients were given an incentive of 15€ for the baseline and follow-up assessment in the trial.

2.4 | Measures

All measures for the current study were assessed at baseline and at follow-up (12 months after baseline) in the trial in which the current data were collected (Jochems et al., 2012; Jochems et al., 2015). Baseline assessment took place after randomization at clinician-level, such that patients but not clinicians were blind to treatment allocation at baseline assessment.

2.4.1 | Clinical outcomes: Treatment engagement, psychosocial functioning and quality of life

Treatment engagement was measured with the Service Engagement Scale (SES) that was filled out by clinicians. The SES was developed

to measure engagement with community mental health services (Tait, Birchwood, & Trower, 2002). It comprises 14 items that assess availability, collaboration, help seeking and treatment engagement behaviours (including medication adherence). The items are rated on a 4-point scale ranging from 0 (not at all) to 3 (most of the time). The SES has good internal consistency (Cronbach's $\alpha = 0.87$, congeneric estimate of reliability = 0.91 in the current sample) and validity (Jochems et al., 2014; Tait et al., 2002). The SES total scale score was used as the outcome measure in this study, where higher scores denote higher treatment engagement.

The patient's psychosocial functioning was measured with the Dutch version of the Health of the Nations Outcome Scales (HoNOS) (Mulder et al., 2004; Wing et al., 1998). The HoNOS is a semi-structured interview with the patient in which health and social problems of the previous two weeks are quantified. It contains 12 items that refer to behavioural problems, cognitive and physical impairments, symptoms, and social functioning. HoNOS items are scored on a scale from 0 (no problem) to 4 (severe problem). The total scale score is computed by adding the 12 items. For ease of interpretation, we recoded the total score such that higher scores reflected better psychosocial functioning. The administration of the HoNOS was performed by independent research assistants (mostly graduate students in psychology and medicine) who had no involvement in the patient's treatment. The psychometric properties of the total scale score were shown to be acceptable (Wing et al., 1998). Internal consistency was acceptable in the current study (Cronbach's $\alpha = 0.70$, congeneric estimate of reliability = 0.77).

The patient's quality of life was assessed with the Manchester Short Assessment of Quality of Life (MANSA) (Bjorkman & Svensson, 2005; Priebe, Huxley, Knight, & Evans, 1999). The MANSA is a self-report questionnaire that asks the patient how satisfied he/she is in the following life domains: living situation, social relationships, physical health, mental health, safety, financial situation, work situation and life as a whole. The 12 items are scored on a Likert scale from 1 (could not be worse) to 7 (could not be better), which are summed to calculate a total score. Higher scores denote a higher perceived quality of life. The scale is shown to be reliable (i.e. Cronbach's $\alpha = 0.82$ and congeneric estimate of reliability = 0.92 in the current sample) and other psychometric properties are considered satisfactory (Priebe et al., 1999).

2.4.2 | Core theoretical constructs of SDT: types of motivation and need support

Motivation for engaging in treatment as postulated by SDT was measured with the Treatment Entry Questionnaire (TEQ) (Jochems et al., 2014; Wild, Cunningham, & Ryan, 2006) that was administered to patients. The TEQ contains three subscales (external, introjected and identified motivation), each with six items rated on a scale from 1 (strongly disagree) to 7 (strongly agree). The congeneric estimates of reliability for TEQ subscales ranged from 0.72 to 0.78, which was considered adequate (Jochems et al., 2014). In a previous study, we found support for the construct validity of the TEQ (Jochems et al., 2014). Higher scale scores denote higher levels of that type of motivation.

The Health Care Climate Questionnaire (HCCQ) (Williams, Grow, Freedman, Ryan, & Deci, 1996) was administered to patients to assess the degree to which patients perceived their clinician as autonomy

supportive. The HCCQ has 15 items that are scored on a Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). The items are summed up to a total scale score, with higher scores reflecting higher perceived autonomy support. Internal consistency was found to be good (Cronbach's $\alpha = 0.93$, congeneric estimate of reliability = 0.93) (Jochems et al., 2014) and the scale was shown to be valid for patients with SMI (Jochems et al., 2014).

The subscale "Outcome Expectancy" from the Treatment Motivation Scales for Forensic patients (TMS-F) was administered to patients as a measure for the patient's perceived competence in being able to finish the treatment and making and sustaining the behaviour changes learned during treatment. Example items include "I am absolutely certain that I will be able to maintain my new behaviour after the treatment", "I probably do not have enough patience for this treatment" and "I think that my problem behaviour will never really change". The scale consists of nine items rated on a 5-point Likert scale from 0 (totally agree) to 5 (totally disagree). Several items are reverse scored after which the items are summed, such that a higher score on the subscale reflects a higher perceived competence. Internal consistency was good in the current sample (Cronbach's $\alpha = 0.82$, congeneric estimate of reliability = 0.86) and previous studies in forensic psychiatry have provided support for convergent and discriminant validity of the scales of the TMS-F (Drieschner & Boomsma, 2008a, 2008b).

2.5 | Statistical analyses

The analyses were performed in several steps. First, the bivariate relations of variables were estimated using Spearman correlations. Structural equation modelling (SEM) as implemented in Mplus version 7.3 was used to test the hypothesized relationships between autonomy support, perceived competence, types of motivation, treatment

engagement, psychosocial functioning and quality of life as depicted in Figure 1. For a detailed description of the analytical procedures, we refer to the online Supporting Information.

3 | RESULTS

3.1 | Participants and descriptive data

The enrolment of participants took place from May 2011 to September 2012, at which time a total of 57 clinicians and 294 eligible patients were enrolled in the study. Table 1 shows an overview of the patient characteristics. Within the subsample of patients with psychotic disorders, the majority of patients were diagnosed with schizophrenia (48%), schizoaffective disorder (16%), or psychotic disorder not otherwise specified (24%). Within the subsample of personality disorders, 40% had a borderline personality disorder, 13% had antisocial personality disorder, and 26% had a personality disorder not otherwise specified. Most clinicians were female (63%), their mean age was 44 years [standard deviation (SD) = 10.70] and they had a mean of 16 years of clinical working experience in mental health services (SD = 9.30). At 12 months, 253 patients (86%) were re-assessed. The group that was lost to follow-up was significantly more often of non-Dutch ethnicity (48% versus 26%, $p < 0.01$) and more often had a legal mandate for treatment (18% versus 7%, $p = 0.03$) compared to completers.

The correlations between SDT constructs and clinical outcomes are shown in Table 2. Most of the correlations between baseline psychological needs (autonomy and competence) and other variables at baseline and follow-up were medium to high, in the expected direction and reached statistical significance at $p < 0.05$ (two-tailed).

TABLE 1 Baseline characteristics of participating patients, stratified by primary diagnosis

	Total patient sample $n = 294$	Psychotic disorders $n = 199$	Personality disorders $n = 95$
Age, mean (SD)	44 (10.3)	43 (10.3)	45 (10.0)
Male gender, n (%)	179 (60.9)	132 (66.3)	47 (49.5)
Dutch ethnicity, n (%)	208 (70.7)	140 (70.4)	68 (71.6)
Education level, n (%)			
- No education/elementary	108 (36.7)	76 (38.2)	32 (33.7)
- Secondary school	124 (42.2)	75 (37.7)	49 (51.6)
- Upper high school and over	59 (20.1)	47 (23.6)	12 (12.6)
Comorbid substance use problems, ^a n (%) yes	74 (25.2)	42 (21.1)	32 (33.7)
Legal mandate, n (%) yes	24 (6.9)	13 (6.5)	11 (12.0)
One or more previous admissions, n (%) yes	227 (77.2)	159 (79.9)	68 (71.6)
Perceived competence, median (IQR)	31 (28 to 39)	34 (29 to 39)	32 (26 to 38)
Perceived autonomy support, median (IQR)	91 (78 to 100)	90 (75 to 100)	92 (81 to 100)
Identified motivation, median (IQR)	36 (30 to 40)	36 (29 to 39)	36 (30 to 40)
Introjected motivation, median (IQR)	23 (16 to 30)	23 (16 to 30)	23 (17 to 30)
External motivation, median (IQR)	16 (11 to 24)	18 (12 to 25)	13 (7 to 21)
Treatment engagement, median (IQR)	31 (24 to 36)	32 (25 to 37)	28 (24 to 35)
Psychosocial functioning, median (IQR)	9 (6 to 13)	8 (5 to 12)	10 (8 to 15)
Quality of life, median (IQR)	5 (4 to 5)	5 (4 to 5)	4 (4 to 5)

^aSubstance abuse problem was defined as having a DSM-IV diagnosis of substance abuse and/or dependence in the medical record.

TABLE 2 Spearman inter-correlations of variables in the model

	Baseline assessment								Follow-up assessment							
	CO	AS	ID	IN	EX	TE	PF	QL	CO	AS	ID	IN	EX	TE	PF	QL
<i>Baseline assessment</i>																
Perceived competence (CO)																
Autonomy support (AS)	<i>0.45</i>															
Identified motivation (ID)	<i>0.27</i>	<i>0.53</i>														
Introjected motivation (IN)	<i>-0.02</i>	<i>0.22</i>	<i>0.43</i>													
External motivation (EX)	<i>-0.16</i>	<i>-0.15</i>	<i>-0.28</i>	<i>0.13</i>												
Treatment engagement (TE)	<i>0.30</i>	<i>0.26</i>	<i>0.26</i>	<i>0.06</i>	<i>-0.04</i>											
Psychosocial functioning (PF)	<i>0.33</i>	<i>0.19</i>	<i>0.08</i>	<i>-0.06</i>	<i>0.07</i>	<i>0.38</i>										
Quality of life (QL)	<i>0.45</i>	<i>0.29</i>	<i>0.11</i>	<i>-0.03</i>	<i>0.10</i>	<i>0.37</i>	<i>0.57</i>									
<i>Follow-up assessment</i>																
Perceived competence (CO)	<i>0.61</i>	<i>0.35</i>	<i>0.14</i>	<i>-0.03</i>	<i>-0.10</i>	<i>0.23</i>	<i>0.23</i>	<i>0.41</i>								
Autonomy support (AS)	<i>0.41</i>	<i>0.60</i>	<i>0.28</i>	<i>0.09</i>	<i>-0.12</i>	<i>0.32</i>	<i>0.16</i>	<i>0.34</i>	<i>0.58</i>							
Identified motivation (ID)	<i>0.28</i>	<i>0.38</i>	<i>0.54</i>	<i>0.34</i>	<i>-0.11</i>	<i>0.27</i>	<i>0.14</i>	<i>0.13</i>	<i>0.22</i>	<i>0.38</i>						
Introjected motivation (IN)	<i>0.04</i>	<i>0.07</i>	<i>0.27</i>	<i>0.62</i>	<i>0.18</i>	<i>0.14</i>	<i>0.03</i>	<i>0.01</i>	<i>-0.05</i>	<i>0.01</i>	<i>0.40</i>					
External motivation (EX)	<i>-0.17</i>	<i>-0.19</i>	<i>-0.17</i>	<i>0.14</i>	<i>0.52</i>	<i>-0.03</i>	<i>-0.03</i>	<i>-0.03</i>	<i>-0.21</i>	<i>-0.25</i>	<i>-0.15</i>	<i>0.33</i>				
Treatment engagement (TE)	<i>0.26</i>	<i>0.27</i>	<i>0.26</i>	<i>0.10</i>	<i>-0.02</i>	<i>0.65</i>	<i>0.24</i>	<i>0.28</i>	<i>0.34</i>	<i>0.38</i>	<i>0.29</i>	<i>0.09</i>	<i>-0.18</i>			
Psychosocial functioning (PF)	<i>0.30</i>	<i>0.15</i>	<i>0.08</i>	<i>-0.03</i>	<i>-0.04</i>	<i>0.28</i>	<i>0.44</i>	<i>0.36</i>	<i>0.37</i>	<i>0.21</i>	<i>-0.02</i>	<i>-0.06</i>	<i>-0.05</i>	<i>0.25</i>		
Quality of life (QL)	<i>0.39</i>	<i>0.26</i>	<i>0.04</i>	<i>-0.04</i>	<i>0.00</i>	<i>0.21</i>	<i>0.28</i>	<i>0.58</i>	<i>0.49</i>	<i>0.32</i>	<i>-0.02</i>	<i>-0.13</i>	<i>-0.11</i>	<i>0.21</i>	<i>0.61</i>	

Note: Italic typeface indicates $p < 0.05$ (two-tailed).

3.2 | Path analyses

3.2.1 | Test of the SDT process model

First, all observed variables were linearly transformed by a factor of 10 to reduce their variances which allowed Mplus to reach convergence (Muthén & Muthén, 1998–2012). Subsequently, the observed variables were corrected for unreliability resulting in the latent variables. The latent variables were used in the subsequent path analysis, where the process model as depicted in Figure 1 was fitted to the data at baseline (Model 1a) and at follow-up (Model 2a). As can be seen in Table 3, Model 1a provided a bad fit to the data [$\chi^2/df = 7.64$, root mean square error of approximation (RMSEA) = 0.15, Comparative Fit Index (CFI) = 0.92, Tucker–Lewis Index (TLI) = 0.61, standardized root mean square residual (SRMR) = 0.03] as did Model 2a ($\chi^2/df = 14.44$, RMSEA = 0.22, CFI = 0.81, TLI = 0.09, SRMR = 0.04). The

modification indices and standardized residuals suggested that the misfit was most likely due to lacking direct effects between perceived competence and clinical outcomes (treatment engagement, psychosocial functioning and quality of life). Such direct effects were also theoretically plausible (Ng et al., 2012). When these three paths were added, model fit for both measurement occasions improved substantially as can be seen in Table 3. Other rivaling models, including those with the regression path between autonomy support and perceived competence in the opposite direction, additional direct regression paths from autonomy support to clinical outcomes and a model in which autonomy support and perceived competence were simply inter-correlated either provided worse fit to the data or did not improve the fit. Therefore, it was decided to retain Models 1b and 2b for further analyses, which included testing the obtained SDT process model for invariance across time.

TABLE 3 Model fit information

Model	C or U	χ^2	df	χ^2/df	p -Value	RMSEA	90% CI for RMSEA	CFI	TLI	SRMR	AIC	BIC	SS-BIC
1a. Baseline process model (Figure 1)	—	45.85	6	7.64	<0.01	0.15	0.11 to 0.19	0.92	0.61	0.03	4156	4296	4175
1b. Baseline process model (as 1a plus additional paths between perceived competence and outcomes)	—	1.87	3	0.62	0.60	0.00	0.00 to 0.08	1.00	1.02	0.01	4133	4284	4154
2a. Follow-up process model (Figure 1)	—	86.64	6	14.44	<0.01	0.22	0.18 to 0.26	0.81	0.09	0.04	3272	3410	3290
2b. Follow-up process model (as 2a plus additional paths between perceived competence and outcomes)	—	9.75	3	3.25	0.02	0.09	0.03 to 0.15	0.98	0.85	0.02	3238	3388	3258
3a. Baseline and follow-up jointly (as 1b and 2b)	U	143.55	60	2.39	<0.01	0.07	0.05 to 0.08	0.94	0.89	0.08	6829	7168	6876
3b. Baseline and follow-up jointly (as 1b and 2b)	C	177.59	81	2.19	<0.01	0.06	0.05 to 0.08	0.93	0.90	0.08	6814	7075	6850
4a. Baseline process model (as 1b) for psychotic versus personality disorders	U	75.32	6	12.55	<0.01	0.28	0.23 to 0.34	0.86	-0.35	0.02	4134	4436	4176
4b. Baseline process model (as 1b) for psychotic versus personality disorders	C	33.13	27	1.23	0.19	0.04	0.00 to 0.08	0.99	0.97	0.05	4111	4336	4142
5a. Follow-up process model (as 2b) for psychotic versus personality disorders	U	29.38	6	4.90	<0.01	0.17	0.11 to 0.23	0.95	0.50	0.03	3252	3552	3292
5b. Follow-up process model (as 2b) for psychotic versus personality disorders	C	55.47	27	2.05	<0.01	0.09	0.05 to 0.12	0.94	0.86	0.10	3242	3465	3271
6a. Baseline process model (as 2b) for MF versus TAU	U	5.29	6		0.51	0.00	0.00 to 0.10	1.00	1.01	0.01	4144	4446	4186
6b. Baseline process model (as 2b) for MF versus TAU	C	45.45	27		0.01	0.07	0.03 to 0.10	0.97	0.94	0.05	4130	4354	4161
7a. Follow-up process model (as 2b) for MF versus TAU	U	80.99	6		0.00	0.30	0.24 to 0.36	0.85	-0.40	0.02	3258	3557	3297
7b. Follow-up process model (as 2b) for MF versus TAU	C	62.28	27		0.00	0.10	0.07 to 0.13	0.93	0.85	0.11	3254	3477	3283

Note: C or U = Model with either constrained (C) or unconstrained (U) regression coefficients for corresponding measurements at baseline and follow-up. The grey and white shading indicates models that are rivaling (nested) models (similar shading indicates rivaling models). χ^2 = chi-square statistic; df = degrees of freedom; RMSEA = root mean square error of approximation; CFI = Comparative Fit Index, TLI = Tucker–Lewis Index, SRMR = standardized root mean square residual; AIC = Akaike Information Criterion, BIC = Bayesian Information Criterion, SS-BIC = sample size adjusted BIC.

3.2.2 | Test of the SDT process model across time

The test for invariance across time was represented by the MLR χ^2 difference test between the model with all regression estimates constrained to be equal for the corresponding measurements (Model 3b) versus all regression estimates unconstrained (Model 3a), where a non-significant χ^2 -test was considered statistical evidence for the latent path model being invariant across time. Additional information on this procedure can be found in the online Supporting Information. The χ^2 -test did not reach statistical significance ($\Delta\chi^2 = 30.67$, $\Delta df = 21$, $p = 0.08$), which provided support for the hypothesis that the SDT process model was invariant across time. Model 3b was accepted as a plausible model for the representation of SDT and was used in the subsequent analyses. This model is shown in Figure 2, including standardized regression coefficients for the baseline and follow-up measurements. It can be seen in Table 4 that around 26% of the variance of psychosocial functioning and between 31% and 36% of the variance of quality of life was explained depending on the time of measurement.

3.2.3 | Test of the SDT process model across patient groups

To further test the robustness of the SDT process model, it was tested whether the model could be considered invariant across different diagnostic groups of patients. The two groups consisted of those with a primary diagnosis of a psychotic disorder and those with a primary diagnosis of a personality disorder. First, it was tested whether the process model at baseline (Model 1b) could be considered invariant across patient groups by evaluating the χ^2 -test, which did not reach statistical significance ($\Delta\chi^2 = 16.91$, $\Delta df = 21$, $p = 0.73$) and thus provided support for the hypothesis that the SDT process model was invariant across different patient groups at the baseline measurement.

TABLE 4 Variances explained by the SDT process model

Model	Variance (R^2)						
	CO	ID	IN	EXT	TE	PF	QL
1b. Baseline	0.26	0.39	0.10	0.04	0.18	0.26	0.36
2b. Follow-up	0.38	0.22	0.01	0.10	0.24	0.26	0.31

Note: CO = perceived competence; EX = external motivation; ID = identified motivation; IN = introjected motivation; PF = psychosocial functioning; QL = quality of life; TE = treatment engagement. *Italic typeface indicates $p < 0.05$ (two-tailed).*

The same procedure was repeated for the process model at follow-up (model fit is shown in Table 3). Here, it was found that the χ^2 -test for nested models did reach statistical significance ($\Delta\chi^2 = 34.85$, $\Delta df = 21$, $p = 0.03$), which was interpreted as the SDT process model being variant across the patient groups at follow-up. It was explored whether these differences could be explained by loss-to-follow-up (e.g. differences between the sample at baseline and the sample at follow-up) but this was not the case. Subsequently, the regression estimates for Models 5a and 5b were inspected and several discrepancies were found between the two patient groups at the follow-up assessment. Looking at the statistically significant associations in Model 5a, the differences between patient subgroups constituted differences in strength of association rather than direction of association. For example, patients with psychotic disorders showed a stronger positive association between autonomy support and identified motivation compared to those with personality disorders ($\beta = 0.62$ versus $\beta = 0.25$, respectively), and a less strong negative association between autonomy support and external motivation ($\beta = -0.19$ versus $\beta = -0.31$, respectively). Also, regarding the associations between SDT constructs and treatment engagement, it was found that patients with psychotic disorders showed a stronger positive association between perceived competence and treatment engagement ($\beta = 0.39$ versus $\beta = 0.03$, respectively), and stronger negative association between

FIGURE 2 Testing the Self-Determination Theory process model across time on clinical outcomes of treatment engagement, psychosocial functioning and quality of life. Note: The figure represents Model 3b, with all regression coefficients constrained for the corresponding measurements at baseline and follow-up (i.e. indicating that these are invariant across time). Numbers represent standardized regression coefficients for the corresponding path (baseline/follow-up), where boldface indicates that the estimate is statistically significant at $p < 0.05$. Thick lines represent regression paths, dotted lines represent inter-correlations of variables. Variables reflect patient-rated constructs unless indicated otherwise. The inter-correlations between the motivation scales and between the patient's psychosocial functioning and quality of life were as follows: ID with EX = 0.32/0.32, ID with EX = -0.24/-0.03, IN with EX = 0.04/0.28, PF with QL = 0.42/0.61. ID = identified motivation; IN = introjected motivation; EX = external motivation; PF = psychosocial functioning; QL = quality of life

external motivation and treatment engagement ($\beta = -0.17$ versus $\beta = 0.04$, respectively), compared to patients with personality disorders. It should be noted that the variability in the strengths of associations may be due to the intervention in between both measurement moments (Jochems et al., 2015).

3.2.4 | Test of the SDT process model across treatment groups

To further test the robustness of the SDT process model, it was tested whether the model could be considered invariant across treatment groups in the RCT (Jochems et al., 2015). Both at baseline and at follow-up, it was found that the model was different across the two treatment groups (baseline model: $\Delta\chi^2 = 38.49$, $\Delta df = 21$, $p = 0.01$, follow-up model: $\Delta\chi^2 = 38.66$, $\Delta df = 21$, $p = 0.01$). The specific differences that were found between the two treatment groups are described in the online Supporting Information.

4 | DISCUSSION

4.1 | Key findings and interpretation

The results of the current study show that the SDT process model specified to motivation for psychiatric treatment in a sample of outpatients with SMI: (1) shows good fit, (2) is stable across time and different patient groups and (3) is able to explain clinical outcomes such as treatment engagement, psychosocial functioning and quality of life to a substantial degree. These findings suggest that SDT might be a useful foundation for interventions in the mental health care for outpatients with SMI.

Regarding the first hypothesis, it should be noted that the results supported most of the hypothesized paths in the model, except that no statistically significant associations were found between perceived competence and motivational regulations, and between introjected motivation and clinical outcomes. Further, additional paths were required between perceived competence and clinical outcomes which were not *a priori* hypothesized. The necessity of such direct effects between competence and outcomes suggest that the patient's perception of being able to do what the treatment requires is important in achieving actual treatment engagement and realizing favourable psychosocial outcomes and quality of life, independent of the quality of their motivation for engaging in treatment. Alternative models in which autonomy support was directly related to clinical outcomes were not supported by the data. This suggests that the model with indirect effects through competence and motivational regulations was most appropriate. Further, neither did we find support for a model in which the path between perceived competence and autonomy support was reversed, which suggests that gaining a sense of competence may be facilitated by autonomy. Thus, it seems that once patients experience a high degree of choice, respect and relevance of treatment, they are then most likely to also experience competence to learn and do what the treatment requires. These findings are consistent with previous studies in other health-related contexts, which have also found support for the indirect link between perceived autonomy support and health outcomes via perceived competence (Ng et al.,

2012). The strengths of the relationships between SDT constructs and clinical outcomes suggest that especially the patient's perceived competence is imperative for engaging with treatment and achieving a better quality of life, although it should be noted that the current data were correlational in nature and cannot be used to infer causality.

Considering the second hypothesis, we found that the process model was relatively stable across different time points and across different diagnostic groups of SMI patients (i.e. psychotic disorders and personality disorders). This provided further empirical support for the robustness of the SDT process model. The model was, however, slightly different at follow-up assessment for the two patient groups (Model 5a compared to Model 5b). After inspecting the regression estimates, it was found that both patients groups generally showed the theoretically expected associations between SDT constructs, yet to a different degree. For example, the finding that autonomy support was found to show a stronger and more stable relationship to identified motivation in patients with psychotic disorders compared to personality disorders, may indicate that patients with psychotic disorders show more stable continuous benefit from autonomy support in terms of their motivation whereas this may be more fluctuant in patients with primarily personality disorders. Also, looking at the strengths of the different regression estimates, it seems that treatment engagement in patients with psychotic disorders was most strongly associated with perceived competence (independent of the type of motivation), whereas for patients with personality disorders, treatment engagement was most strongly related to identified motivation. These findings may reflect differential effects of the motivational intervention in patients with primarily psychotic disorders compared to patients with primarily personality disorders (Jochems et al., 2015), or alternatively, may be a reflection of different "natural" courses of motivational changes in these groups over time. Either way, these findings could argue for a differential approach to motivational interventions in these two patient groups. Further, the results regarding robustness across treatment groups showed differences between the two treatment groups at both time points. The results suggest that, although *the means* of patient-reported introjected motivation were not statistically significantly different between the two treatment groups as a result of trial treatment (Jochems et al., 2015), it appears that *the relationship between autonomy support and introjected motivation* differed between the treatments from the start and also changed over time. Although speculative, the findings suggest that there may have been an interaction effect between the use of MF and the nature of the health care climate in which it was introduced. That is, MF may have impacted on the therapeutic relationship and on introjected motivation, such that an autonomy supportive health care climate combined with the use of MF may reduce introjected motives. In other words, it seems that the SDT process model and SDT-based interventions may be moderated by certain characteristics of the target population as well as (or in combination with) the health care climate, which warrants further investigation. Although the current study shows preliminary support that SDT constitutes a robust framework for patterns through which patients become motivated to engage in treatment, future studies should investigate potential moderators of the processes described by SDT. The association between SDT constructs and various outcomes may vary in strength as a function of, for

example, treatment duration, duration of illness, patient age, and type of treatment. These analyses were beyond the scope of the current study, but the detection of such moderators may have implications for the design of future SDT-based studies and interventions.

Regarding the third hypothesis, it was found that the SDT process model explained around 18% to 24% of the variance of treatment engagement, around 26% of the variance of psychosocial functioning and around 31% to 36% of the variance of quality of life. Although it is apparent that most variance in the clinical outcomes remains unexplained, these findings compare favourably to most other studies investigating models that include attitude-behaviour relationships (Kraus, 1995). All in all, these findings provide preliminary support for the use of SDT principles such as support of the patient's autonomy and competence to improve treatment engagement and achieve better mental health outcomes in outpatients with SMI.

4.2 | Strengths and limitations

Strengths of the current study include the longitudinal component which allowed for testing of the process model at two time points, demonstrating that SDT is a robust model that has potential as the basis for interventions in outpatients with SMI. Other strengths included a relatively large sample size considering the often difficult to engage patient population, that it was a multi-centre study, the correction for unreliability of measurements and testing of rivaling models.

Several limitations of the current study should be acknowledged. First, there is the possibility of misspecification of the SDT process model. For example, misspecification of the model may have occurred if (some of) the relations in the model were in fact bidirectional. These alternatives were not tested as this is not in line with SDT, but it has been noted that for example, a patient who shows better psychosocial functioning (in terms of better cognitive, social and behavioural functioning) would likely experience more competence in doing what the treatment requires (Ng et al., 2012). However, other alternative models were adequately tested such that model misspecification is unlikely.

Second, several variables were not available in the current data set, such as perceived relatedness, other types of motivation such as intrinsic, integrated and amotivation and/or causality orientations which are also part of the larger holistic theoretical framework of SDT (Deci & Ryan, 2000). Nevertheless, we feel that the constructs that have been recognized as the core constructs of SDT, namely autonomy support and perceived competence (Ng et al., 2012; Ryan & Deci, 2008; Ryan et al., 2008) and different types of motivation, were included in this study. Further, future studies could address relationships between SDT constructs and subscales of the outcomes, as the constructs might relate differently to the total scores versus subscale scores.

Third, the tests in the current study represent cross-sectional associations which cannot be used to infer causality. Based on the preliminary findings of the current study, future studies may reproduce the current identified model and use it to predict (changes in) clinical outcomes. The actual utility of SDT in clinical practice for SMI patients should be proven in experimental studies, preferably by RCTs that aim

to effectively influence patient autonomy and competence. Furthermore, the process model that was tested in the current study was based on previous studies, including a meta-analysis (Ng et al., 2012), that have modelled the effects of SDT constructs disjointly, or in other words, have examined each construct separately in relation to the other constructs. Although our approach adds to the comparability of the current study to previous studies and is a preliminary step towards more research into SDT in this context, the disjoint approach does not take into account possible combinations of different levels of motivation in association with the outcomes. Future studies could benefit from a conjoint analytic approach, such as the ones reported in Jang, Reeve, and Deci (2010) and Haerens, Vereecken, Maes, and De Bourdeaudhuij (2010). Such analyses, could for example include motivational profiles of patients who show high ratings on all types of motivation compared to patients who show low ratings on several or all types of motivation, or including the conjoint effects of high and low autonomy and competence, such that we could further clarify the potential synergistic, additive or antagonistic effects between these constructs.

Finally, our sample largely represents a broad population of outpatients with diagnoses of psychotic and personality disorders with a variety of comorbid psychiatric disorders, which strengthens the generalizability of the study. The incentive of 15€ was introduced with the aim to improve recruitment and follow-up of less motivated and less engaged patients. However, patients with relatively high levels of motivation for treatment, treatment engagement and psychosocial functioning may still have been more likely to participate in and complete the study compared to patients with low motivation, low engagement and poor functioning. Also, the patients included in the current study were already engaged with services for some time (Jochems et al., 2015), whereas future studies may aim to include patients who have just entered or who are in need of help but not yet in contact with services, who are likely to present with a different motivational profile and more variety in levels of functioning and quality of life.

5 | CONCLUSION AND IMPLICATIONS

The current study showed that the relations between perceived autonomy support, perceived competence, types of motivation for engaging in treatment and clinical outcomes were in the directions hypothesized by SDT. These relations were found to be consistent across time and patient diagnostic groups and showed explanatory value, which suggests that SDT can be a useful basis for interventions in the mental health care for outpatients with SMI. The results seem to confirm that the motivational feedback intervention that was tested in the RCT (Jochems et al., 2015) was insufficient in improving patient autonomy and competence compared to usual care. Potentially fruitful future interventions might include (a combination of) more extensive training and monitoring of clinicians in the application of SDT, techniques from motivational interviewing that align with SDT (Deci & Ryan, 2012; Vansteenkiste, Williams, & Resnicow, 2012), accounting for potential problems in (social) cognitive functioning of patients, as well as feedback components. Specific techniques that clinicians may use to support the needs for autonomy, competence and relatedness

have been described in other papers (see, for example, Ryan & Deci, 2008; Ryan et al., 2008; Silva et al., 2014). Experimental studies based on SDT in outpatients with SMI are still scarce, which underlines the need for additional research to confirm the causality of the relations between the SDT constructs and their ability to influence treatment outcomes.

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DECLARATION OF INTEREST STATEMENT

The authors declare that they have no conflict of interest.

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SUPPORTING INFORMATION

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