Patient Preference and Adherence

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ORIGINAL RESEARCH

More Than Just Talk: The Role of Therapist Interactions in Patient Adherence

Laura Hesters[1,2], Sofie Compernolle[1,2], Dominique Van de Velde[3], Katrien De Cocker[1]

[1]Department of Movement and Sports Sciences, Ghent University, Ghent, Belgium; [2]Research Foundation Flanders (FWO), Brussels, Belgium; [3]Department of Rehabilitation Sciences, Ghent University, Ghent, Belgium

Correspondence: Laura Hesters, Email laura.hesters@ugent.be

Background: Communication of healthcare professionals (HCPs) plays an important role in patient therapy experiences. According to Self-Determination Theory, HCPs' motivating interaction styles foster these experiences. However, empirical evidence on how patients perceive their HCP's interaction styles and how these perceptions relate to their basic psychological needs, therapy motivation, and therapy adherence remains limited.

Methods: This cross-sectional study included patients who received physiotherapy or occupational therapy (N=346). Participants completed valid and reliable questionnaires to assess their perceptions of their HCP's motivating (autonomy-support, structure) and demotivating (control, chaos) interaction styles, their basic psychological needs (satisfaction, frustration), motivation toward therapy (intrinsic motivation, integrated, identified, introjected, external regulation, amotivation), and therapy adherence. Data were analyzed using Structural Equation Modeling (SEM)-analysis.

Results: The SEM analysis revealed that perceived autonomy-support was positively related to need satisfaction and negatively to need frustration. Perceived control was positively related to need frustration. Need satisfaction, in turn, was positively related to intrinsic motivation, integrated, identified and introjected regulation, while need frustration showed a negative relationship with intrinsic motivation and introjected regulation, and a positive association with external regulation and amotivation. Integrated and identified regulations were positively related to adherence, while external regulation and amotivation showed negative associations.

Conclusion: These findings suggest the importance of HCPs adopting an autonomy-supportive interaction style to foster patients' need satisfaction, promote self-determined motivation, and enhance therapy adherence. Conversely, controlling interaction style undermines patient therapy experiences by increasing need frustration, reducing self-determined motivation and lowering adherence. It is recommended to focus on these components during training.

Plain Language Summary:

What is this summary about?

This research gathered insights among people receiving physiotherapy or occupational therapy. The study examined how patients experience the motivating and demotivating interaction styles of their therapist. It also looked at how these experiences relate to patients' basic psychological needs (feeling supported or frustrated in their autonomy, competence, and relatedness), their motivation for therapy, and therapy adherence.

What are the key takeaways?

- Patients who experienced their therapist as autonomy-supportive experienced more satisfaction of their basic psychological needs and less frustration. Patients who felt controlled by their therapist experienced more frustration.
- When patients felt their basic needs were satisfied, they were more qualitatively motivated, for example, because they found therapy meaningful or personally valuable. When their needs were frustrated, they felt more pressured or even unmotivated.
- The type of motivation matters: patients experiencing more qualitative or self-determined forms of motivation were more likely to adhere to their treatment. Those who felt pressured or unmotivated were less likely to adhere.

What are the main conclusions?

- The research concludes that an autonomy-supportive approach is related to more positive patient experiences, stronger self-determined motivation, and better therapy adherence, while a controlling approach is related to more less favorable variables.
- This highlights the importance of healthcare professionals' communication from the patient's perspective.

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Introduction

People in rehabilitation often need to develop new habits and engage in self-management to support recovery and participation in daily life.[1] Achieving optimal health outcomes requires therapy adherence and long-term engagement. Poor adherence can reduce therapy effectiveness, compromise safety, and increase healthcare costs.[2,3] Healthcare professionals (HCPs) can enhance adherence through education, self-management support, and motivational communication.[1–6] However, more empirical research grounded in theoretical frameworks is needed to explore how patients perceive their HCP's interaction styles, how these perceptions relate to their basic psychological needs, how these needs relate to their motivational quality and their motivation to therapy adherence.

Self-Determination Theory in the Light of Health Care

Patients' Motivation and Needs

Sustained patient motivation for therapy is crucial throughout treatment and fosters long-term self-management.[1,6–8] To effectively support this, understanding of patients' motivation is needed, which can be provided through Self-Determination Theory (SDT).[9] SDT is a motivational theory used in applied domains, including health care.[10,11] It explains the psychological principles underlying motivation to promote optimal functioning and health.[9,12] At its core, the theory focuses on what people need to experience a sense of vitality and well-being. SDT identifies six types of motivational regulation on a continuum, ranging from low to high self-determination (see Figure 1).[9] At the low end is amotivation (ie. lack of motivation for therapy), followed by external regulation (ie. avoiding criticism or meeting expectations of their HCP) and introjected regulation (ie. avoiding guilt or shame, or obtaining pride related to therapy).[13] More self-determined or autonomous types of regulation include identified regulation (ie. recognizing personal relevance of therapy), integrated regulation (ie. therapeutic exercise aligns with personal values), and intrinsic motivation (ie. enjoyment of therapeutic exercise). Patients exhibiting more controlled motivation (ie. external and introjected regulation) or amotivation are more likely to experience maladaptive outcomes, such as fear of failure or anxiety.[11] In contrast, those exhibiting more autonomous motivation are more likely to adopt and maintain health-promoting behaviors, related to improved treatment related outcomes such as increased physical activity, treatment engagement[7,14–16] and exercise adherence.[17] However, a recent study revealed that over one-third of hospitalized people were demotivated to participate in physiotherapy,[18] showing an important barrier to effective rehabilitation. Although these findings underscore the importance of motivation, empirical evidence on the specific relationship along the motivational continuum and therapy adherence remains limited.

According to SDT, three basic psychological needs – autonomy (ie. feeling empowered and having choice), competence (ie. feeling capable and competent), and relatedness (ie. feeling valued and connected to others) – are essential in influencing people's motivation. Interviews with Belgian physiotherapy patients echoed these needs as key motivational factors.[18] SDT

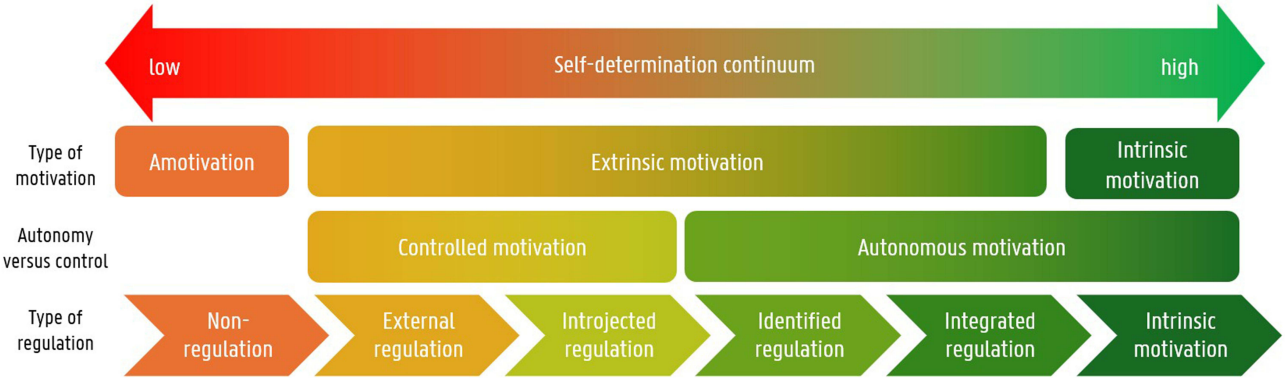

Figure 1 The Motivational Continuum According to Self-Determination Theory.[9]

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states that patients' needs can be satisfied or frustrated, affecting motivational quality.[9] Empirical evidence shows that autonomy and competence satisfaction promote autonomous motivation for physical activity, while autonomy satisfaction is negatively linked to controlled motivation. Unexpectedly, relatedness satisfaction was positively associated with controlled motivation.[16] Conversely, need frustration was related to reduced intrinsic motivation for therapy.[19] Despite growing attention to the relation between patients' needs and motivation in health care, current research is mostly limited to only need satisfaction and autonomous and/or controlled motivation. Hence, there is a need for more empirical research examining how both satisfaction and frustration of the needs are related to different types of regulation along the motivational continuum.

HCPs' (De)motivating Interaction Styles

HCPs play a pivotal role in either supporting or frustrating patients' basic psychological needs through their communication and interaction styles.[9,12,20–23] According to SDT-based research in the healthcare context, four interaction styles can be distinguished: two motivating (autonomy-support and structure) and two demotivating styles (control and chaos).[9,24,25] Autonomy-supportive HCPs identify and nurture patients' interests and goals, by offering meaningful choices, using inviting language, and accepting patients' input.[19,26] Structuring HCPs guide patients with clear instructions, support, and feedback to help achieve the desired outcomes.[9] Controlling HCPs ignore patients' perspectives and pressure to control their actions, thinking or feelings.[11,26,27] Finally, chaotic HCPs leave patients on their own, making them confused about what to do and how. Empirical findings showed that autonomy-support relates positively to need satisfaction among people with rheumatoid arthritis[16] and cancer,[28,29] though need frustration was not assessed. A structuring style is theoretically linked to patients' needs support, enhanced self-efficacy, competence in managing health conditions, and health behavior change.[9] However, no empirical studies have examined the association between a structuring style and patients' outcomes, stressing the need for more research. Conversely, SDT suggests that patients of controlling HCPs experience more need frustration.[9] While direct empirical evidence is lacking, previous studies found that patients reported a greater sense of obligation, less persistence, and negative emotions such as pressure, frustration, and boredom when HCPs are controlling.[11,19,30] Similarly, no studies have yet focused on the associations between a chaotic style and patients, however, it is theoretically linked to patient need frustration.[9,11] To our knowledge, only two studies included the four interaction styles, relying on HCP self-reports without assessing patients' motivation or needs.[26,31]

Bright and Dark Pathways

The previously described constructs can be integrated into a coherent motivational pathway in which patients' perceptions of the interaction styles of their HCP are associated with patients' basic psychological needs, which in turn are related to patients' motivation to engage in therapy, and subsequently patient outcomes.[9] Specifically, when patients experience their HCP as autonomy-supportive and structuring, these motivating interaction styles are positively associated with need satisfaction. Need satisfaction is, in turn, related to more autonomous types of motivation (ie. intrinsic motivation, integrated regulation, and identified regulation), which are related to better health outcomes – a pattern (see Figure 2) which has been described as the bright pathway.[32] In contrast, when patients experience their HCP as controlling and chaotic, these demotivating interaction

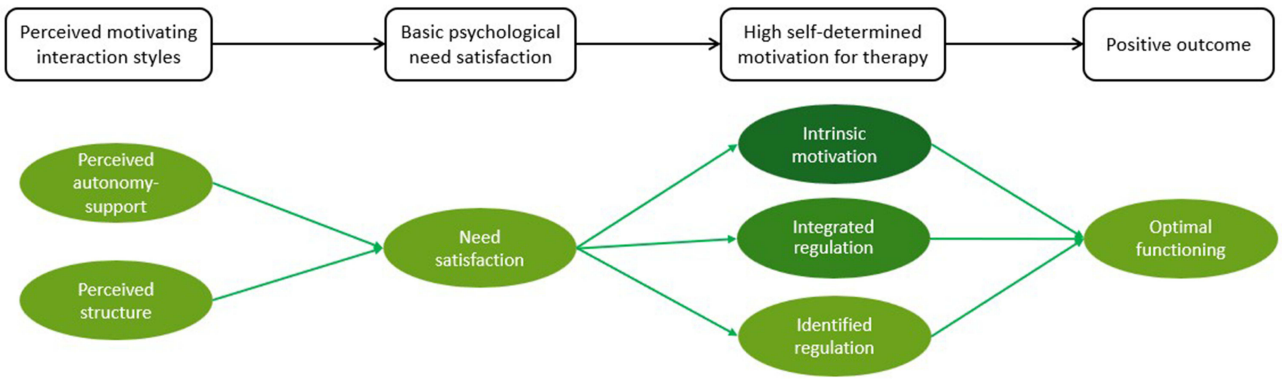

Figure 2 Bright pathway.
Note: green arrow = positive relation.

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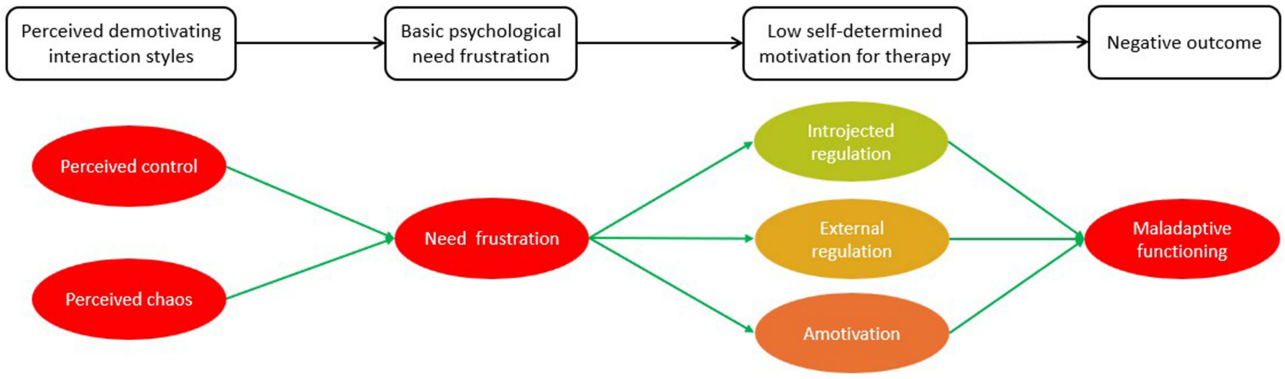

Figure 3 Dark pathway.
Note: green arrow = positive relation.

styles are positively related to need frustration. Need frustration, in turn, is related to more controlled types of motivation (ie. introjected and external regulation) or amotivation, which in turn are linked to poorer health outcomes,[9] forming a maladaptive pathway (see Figure 3) referred to as the dark pathway.[32]

The bright and dark pathways have previously been proposed within SDT[9,32] and supported by empirical evidence across domains such as education,[33–35] sport,[36,37] and, to a more limited extent, health care.[16,38,39] However, research simultaneously examining both the bright and dark pathways in patient experiences is lacking. As a result, it remains unclear whether, and how, these motivational pathways operate in healthcare contexts.

Present Study

Frequent communication-related complaints in care settings and high levels of demotivation toward physiotherapy[18,40] highlight the importance to better understand motivational dynamics between HCPs and patients. SDT provides a valuable framework for understanding how HCPs' interaction styles may influence patients' motivation and health outcomes.[12,20–22] Nevertheless, despite a growing body of SDT-based research across life domains,[9] research on patients' perceptions of HCPs' interaction styles and how these relate to their motivation remains limited. Existing empirical studies have mainly relied on only a subset of the four interaction styles, basic psychological needs, and motivational types of patient regulation.[30,38,41] As a result, the co-occurrence of motivating and demotivating interaction styles, need satisfaction and frustration, and the entire motivational continuum in relation to patient outcomes such as therapy adherence has been largely overlooked. Consequently, current healthcare knowledge provides a fragmented understanding of how (de)motivational processes in therapy shape patient motivation and related outcomes.

Addressing these gaps, the current study extends the literature by simultaneously examining bright and dark pathways – including paths from bright to dark constructs and vice versa (ie. cross-paths; see Figure 4) – while reducing heterogeneity across HCPs by focusing on patients' experiences with physiotherapists and occupational therapists. These healthcare professionals work closely with patients over extended periods and play an important role in health promotion, preventing disability, and facilitating rehabilitation.[20,42] Their sustained therapeutic relationships make them particularly relevant for exploring motivational dynamics underlying the promotion of behavior change.[42] Moreover, patients' perspectives on these relations remain underexplored in research.

Based on theoretical expectations[9] and evidence from related domains,[30,35,38,43,44] it is hypothesized that associations within the bright pathway (ie. motivating interaction styles, need satisfaction, autonomous types of motivation, and components of therapy adherence) and within the dark pathway (ie. demotivating interaction styles, need frustration, controlled types of motivation and amotivation) will be positive (see Figures 2–4). In contrast, associations between bright and dark constructs – ie. cross-paths – are expected to be negative. For example, perceived autonomy-support (a bright pathway construct) is hypothesized to be negatively associated with need frustration (a dark pathway construct) (Figure 4).[30,45]

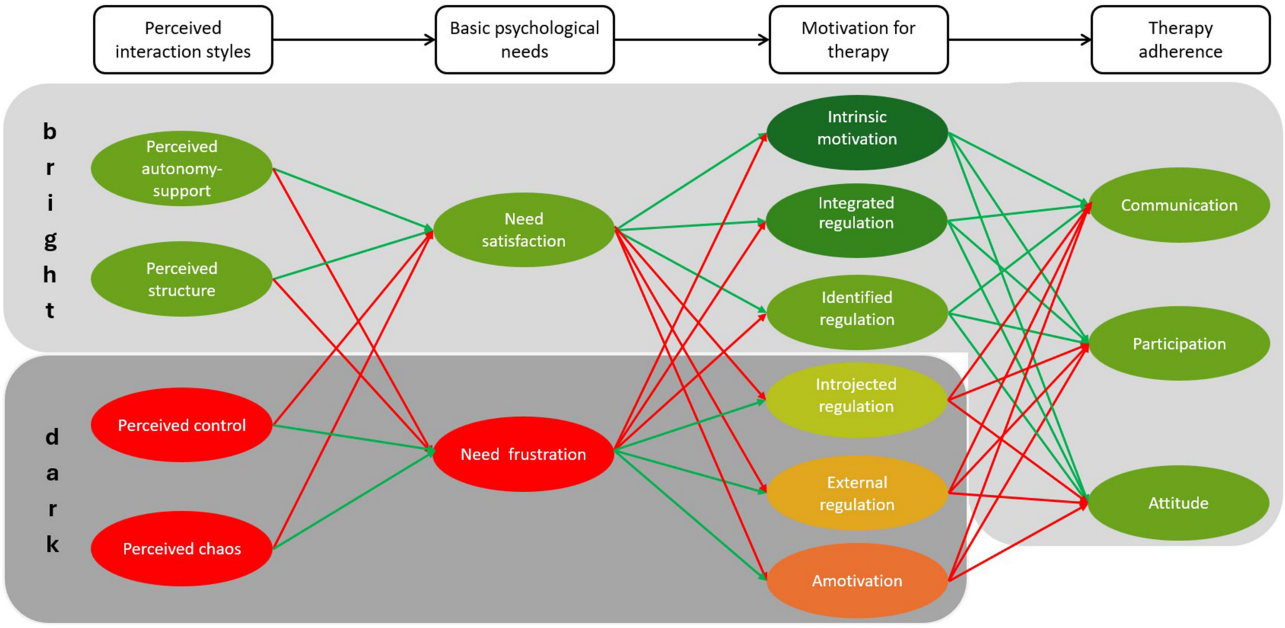

Figure 4 Hypothesized model.
Note: Green arrow = positive relation, red arrow = negative relation.

These findings can offer a more complete understanding of patients' motivational processes related to their occupational therapist or physiotherapist, particularly how therapists' interaction styles are related to patients' basic psychological needs, motivation, and engagement in therapy. By considering the four interaction styles, need satisfaction and frustration, the full motivational continuum, and a patient outcome, this study offers deeper into how patients perceive their therapists' interaction styles and how it relates to their therapy experiences. These insights can support therapists in reflecting on and adapting their interaction styles to better align with patients' motivational needs, inform healthcare education and professional training, and ultimately strengthen patient-centered care and quality of care.

Method

Participants and Procedure

This cross-sectional study included Dutch speaking adults (≥18 years) who follow physiotherapy or occupational therapy. They were recruited through various channels, including personal connections, social media (Facebook, LinkedIn), emails, phone calls to institutions, and – with prior agreement – visits to hospitals or therapy practices. One inclusion criterion was that participants had to be in therapy for an extended period (ie. beyond a one-time session). Exclusion criteria included residing in elderly homes or having cognitive or mental disabilities that could interfere with participation. Data collection occurred between August 2024 and February 2025 using an online questionnaire administered through ResearchElectronic Data Capture (REDCap) hosted at Ghent University.[46] Participants were given the option to complete the questionnaire at their own pace, either from home or at the facility where they were receiving therapy. When participants completed the questionnaire at the facility, a researcher was present during these visits to provide a tablet or computer for online completion. Although participants completed the questionnaire independently, the researcher was available on-site to assist with any technical issues, such as navigating the tablet, in order to minimize additional workload on HCPs. Participants were asked to complete the questionnaire with one specific physiotherapist or occupational therapist in mind. They reported the name of the therapist they chose, which appeared as a reminder throughout the questionnaire. Informed consent was obtained from all participants prior to participation, and both patient and therapist identifiers were pseudonymized to ensure confidentiality. This study was approved by the Ethical Committee of Ghent University Hospital (ONZ-2024-0139). A total of 346 participants were included. Their characteristics are provided in Table 1.

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Table 1 Sample Characteristics

	Total Sample
Age M (SD)	52.0 (19.1)
HCP N (%)	
Physiotherapist	294 (85.0)
Occupational therapist	52 (15.0)
Gender N (%)	
Female	208 (60.1)
Male	137 (39.6)
Prefer not to answer	1 (0.3)
Duration of therapy N (%)	
<6 months	205 (59.2)
6 months–1 year	37 (10.7)
≥1 year	104 (30.1)
Setting N (%)	
Inpatient	44 (12.7)
Outpatient	301 (87.3)

Abbreviations: M, Mean; SD, Standard Deviation; N, Number.

Measurements

All measures in this study consisted of reliable and validated Dutch self-administered questionnaires, with minor wording adaptations to align with the therapy context. An example item for each variable is provided in Appendix 1.

Perceived Interaction Styles

Patients' perceptions of their HCPs' (de)motivating interaction styles were assessed using the reliable and validated vignette-based *Situations In Self-management support – HealthCare Professionals* (SIS-HCP) questionnaire, originally developed for nurses.[24,26] The questionnaire was slightly adapted to the context of patients' experiences with physiotherapists and occupational therapists[31] by replacing the pronoun "I" with "[name HCP]" *and* "the patient" *by* "I". This questionnaire distinguishes the four interaction styles in healthcare counselling: autonomy-support, structure, control, and chaos.[24] Participants rated ten rehabilitation-related situations, each followed by four responses representing the four interaction styles, on a six-point Likert scale from zero ("does not describe [name HCP] at all") to five ("completely describes [name HCP]").[24] Higher scores indicate a greater experience of that specific style by their HCP. The SIS-HCP has been shown to have good construct validity and high internal consistency.[24,26,31] In the present study, McDonald's omega[47] ranged from .80 to .85 for the four interaction styles (see Supplementary Table 1).

Basic Psychological Needs

The *Basic Psychological Need Satisfaction and Need Frustration Scale* (BPNSFS) measures the degree of satisfaction and frustration of the three basic psychological needs (ie. autonomy, relatedness, and competence). Each need is measured through two subscales – one for satisfaction and one for frustration – resulting in six subdimensions in total. The stem of the questions was slightly adapted from "During the training…" to "During the therapy of [name HCP] …" to make it personally relevant for patients. Participants were asked to rate the extent to which they agreed with each of the 24 items via a five-point Likert scale from one ("don't agree at all") to five ("completely agree").[48] Higher subscale scores reflect greater satisfaction or frustration of the respective need. In line with previous studies in coaching and education,[45,49,50] the averages of the three subscales for both need satisfaction and need frustration were calculated, to create composite scores for perceived need satisfaction and frustration. These composite scores demonstrated good internal consistency, with McDonald's omega values of .91 for need satisfaction and .75 for need frustration in the current sample.[47]

Motivational Regulations to Engage in Therapy

The *Behavioral Regulation Exercise Questionnaire* (BREQ-3) was slightly adapted to measure patients' motivation to engage in therapy (instead of exercise).[51] In the questionnaire, "exercise" was replaced by "therapy". BREQ-3 comprises 24 items relating to six types of regulation following the SDT motivation continuum (ie. intrinsic motivation, integrated regulation, identified regulation, introjected regulation, external regulation, and amotivation) on a five-point Likert-scale, ranging from zero ("not true for me") to four ("very true for me"). In the present study, McDonald's omega (ω)[47] ranged from .60 to .90 for the six types of regulation (see Supplementary Table 1).

Therapy Adherence

The *Rehabilitation Adherence Measure for Athletic Training*-Dutch (RAdMAT-NL) measures clinic-based adherence with 16 items using a four-point Likert scale, ranging from one ("never") to four ("always").[52–54] It consists of three subscales: participation/attendance (ie. following the prescribed rehabilitation plan: 5 items), communication (ie. asking questions about rehabilitation: 3 items), and attitude/effort (ie. demonstrating maximum effort during therapy sessions: 8 items). The questionnaire was slightly adapted to enable patient self-report, as the original version was designed for completion by physiotherapists.[52,55] In particular, the wording "my patients" was replaced by "I". In the present study, McDonald's omega[47] ranged from .61 to .89 (see Supplementary Table 1).

Data-Analyses

Preliminary Analyses

Responses exhibiting a repetitive pattern (ie. identical scores across all items, including reversed items) were reported as missing for that questionnaire, as this could indicate haphazard or random completion resulting in response bias. The normality of the variables was checked with kurtosis and skewness with absolute values below two considered indicative of normal distribution. External regulation, amotivation and attitude did not meet the normality criteria (see Supplementary Table 1). Following this, descriptive statistics and bivariate Pearson and Spearman (for non-normal distribution) correlations were conducted using SPSS Statistics 28 to explore relationships between interaction styles, needs, motivation, and therapy adherence. The statistical significance level was consistently set at $p<0.05$ (two-tailed).

Primary Analyses

Afterward, Structural Equation Modeling (SEM)-analyses were performed with the Lavaan package in RStudio 4.2.2 with Satorra-Bentler correction (to account for non-normal distributions) to examine the proposed relations in the hypothesized SDT-based model (see Figure 2). Unlike bivariate correlations, SEM analyses account for measurement error and assess unique variance among latent variables. The measurement model included 15 latent study variables: four interaction styles, need satisfaction and frustration, six types of motivational regulation, and three components of therapy adherence. For scales with more than five items, parcels were created (ie. for the interaction styles and needs). A parcel is an aggregate-level indicator comprising the average score of at least two items.[56] This technique is commonly used to enhance the reliability and stability of the SEM-model.[56] In creating parcels, weaker-loading items were aggregated with stronger-loading items from the same scale to ensure balanced parcels based on Principal Component Analysis to create balanced indicators.[56] Finally, modification indices were reviewed alongside theoretical considerations to identify potential improvements in the fit, and the model was then progressively modified by adding correlational paths suggested by the indices, to achieve the best-fitting model.

Model fit was determined by using Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and Standardized Root-Mean-square Residual (SRMR). A good model fit was defined as $RMSEA<0.05$, $CFI>0.95$ (values >0.90 were considered acceptable), and $SRMR<0.08$.[57]

Results

Preliminary Results

Descriptive statistics including means and standard deviations, or medians and interquartile ranges (for non-normally distributed variables) are shown in Table 2.

Table 2 Descriptive Statistics for the Study Variables

	[a]**M (SD)** [b]***Md (IQ1-IQ3)***
(De)motivating interaction styles (range: 0–5; N = 346)	
Autonomy-support	[a]3.87 (0.77)
Structure	[a]3.83 (0.82)
Control	[a]1.97 (1.05)
Chaos	[a]1.49 (0.90)
Basic psychological needs (range: 1–5; N = 330)	
Need satisfaction	[a]3.75 (0.81)
Need frustration	[a]1.55 (0.47)
Motivation for therapy (range: 0–4; N = 335)	
Intrinsic motivation	[a]2.62 (1.07)
Integrated regulation	[a]2.59 (1.05)
Identified regulation	[a]3.09 (0.68)
Introjected regulation	[a]2.07 (1.09)
External regulation	[b].00 (0.00-0.75)
Amotivation	[b].00 (0.00-0.06)
Therapy adherence (range: 1–4; N = 328)	
Participation	[a]3.77 (0.29)
Communication	[a]3.43 (0.62)
Attitude	[b]3.88 (3.63–4.00)

Note: [a]normal distribution, [b]non-normal distribution.
Abbreviations: M, Mean; SD, Standard Deviation; Md, Median; IQ, Interquartile.

The bivariate Pearson or Spearman (for non-normally distributed variables) correlations are shown in Table 3 and Supplementary Table 2. The correlation matrix revealed significant correlations between interaction styles and basic psychological needs. Both motivating interaction styles showed positive correlations with need satisfaction and negative correlations with need frustration. In contrast, demotivating interaction styles showed fewer significant correlations overall. Both demotivating styles were positively correlated with need frustration. Surprisingly, perceived control was also positively correlated with need satisfaction, while chaos did not show a significant correlation with need satisfaction.

The correlation matrix further revealed significant relationships between need satisfaction/frustration and motivation (see Table 3). Need satisfaction correlated positively with intrinsic motivation, as well as with integrated, identified, and introjected regulation, and correlated negatively with amotivation. Conversely, need frustration correlated negatively with intrinsic motivation and identified regulation, while showing positive correlations with introjected regulation, external regulation, and amotivation.

In addition, the type of regulation was significantly correlated to therapy adherence (see Table 3). Specifically, intrinsic motivation, integrated regulation, and identified regulation correlated positively with participation, communication, and effort. Introjected regulation correlated positively with participation and effort. Conversely, external regulation and amotivation correlated both negatively with communication and effort.

SEM Analyses

The suggested model showed good fit on two out of three criteria (CFI=0.89, RMSEA=0.04, SRMR=0.07). Figure 5 represents the significant paths resulting from the main SEM analysis. Perceived autonomy-support was positively related to need satisfaction and negatively to need frustration. In contrast, perceived control was positively related to need frustration. No relations were found for structure or chaos. Need satisfaction was positively associated with intrinsic

Table 3 Pearson's or Spearman's (for Non-Normal Distribution) Correlation Coefficients for the Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
(De)motivating interaction styles														
1. Autonomy-support[a]	–													
1. Structure[a]	0.87***	–												
1. Control	0.26***	0.39***	–											
1. Chaos[a]	−0.14*	−0.12*	0.40***	–										
Basic psychological needs														
1. Need satisfaction[a]	0.47***	0.52***	0.19***	−0.03	–									
1. Need frustration[a]	−0.27***	−0.30***	0.17**	0.24***	−0.20***									
Motivation for therapy														
1. Intrinsic motivation[a]	0.32***	0.35***	0.15**	0.04	0.58***	−0.25***	–							
1. Integrated regulation[a]	0.29***	0.30***	0.10	−0.02	0.64***	−0.02	0.40***	–						
1. Identified regulation[a]	0.32***	0.34***	0.09	−0.09	0.53***	−0.12*	0.47***	0.66***	–					
1. Introjected regulation[a]	0.20***	0.23***	0.16**	−0.06	0.33***	0.13*	0.21***	0.44***	0.52***	–				
1. External regulation[b]	−0.18***	−0.15**	0.24***	0.30***	−0.13*	0.36***	−0.12*	−0.12*	−0.06	0.09	–			
1. Amotivation[b]	−0.14**	−0.14*	0.21***	0.25***	−0.17**	0.30***	−0.21***	−0.19***	−0.28***	0.03	0.41***	–		
Therapy adherence														
1. Participation[a]	0.14*	0.25***	0.14*	−0.05	0.37***	−0.16**	0.22***	0.27***	0.26***	0.18***	−0.07	−0.05	–	
1. Communication[a]	0.42***	0.40***	−0.05	−0.12*	0.37***	−0.22***	0.23***	0.24***	0.24***	0.10	−0.19***	−0.20***	0.13*	–
1. Attitude[b]	0.34***	0.41***	0.12*	−0.13*	0.49***	−0.25***	0.39***	0.329***	0.37***	0.20***	−0.18**	−0.17**	0.43***	0.46***

Note: [a]normal distribution, [b]non-normal distribution; ***$p<0.001$, **$p<0.01$, *$p<0.05$.

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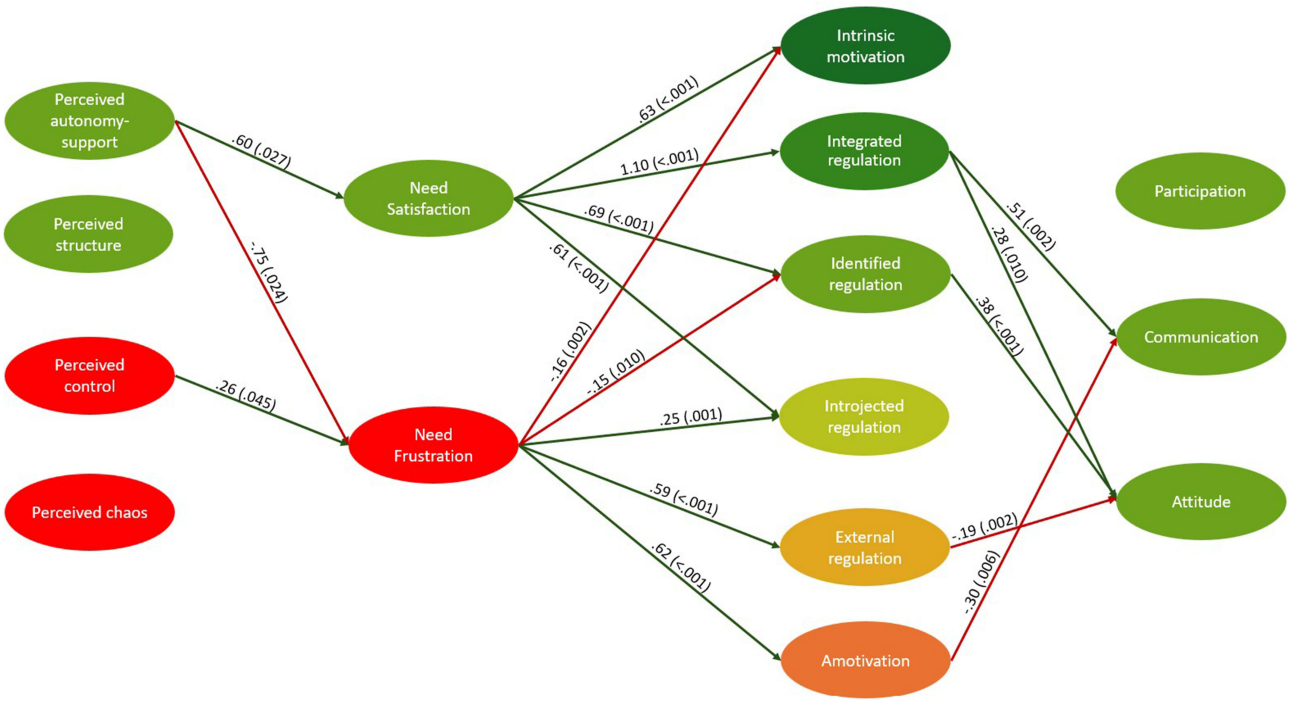

Figure 5 Main SEM analysis with standardized coefficients.
Note: only significant paths are drawn. Green arrow = positive relation, red arrow = negative relation.

motivation, integrated, identified, and introjected regulation. In contrast, need frustration exhibited a negative relationship with intrinsic motivation and identified regulation, and a positive relationship with introjected regulation, external regulation and amotivation. Regarding relationships between motivation and therapy adherence, no type of regulation was related to participation. However, integrated regulation was positively related to communication and attitude. Also identified regulation was positively related to attitude, while external regulation showed a negative association. Finally, amotivation was negatively related to communication.

To assess the results robustness, two additional SEM analyses were conducted as a form of sensitivity analysis (see Supplementary Figure 1), incorporating aggregated variables to reduce model complexity. The first additional SEM analysis combined perceived autonomy-support and structure into motivating style and perceived control and chaos into demotivating style (CFI=0.91, RMSEA=0.04, SRMR=0.07). The second additional SEM analysis retained the motivating and demotivating styles, while also aggregating the types of regulation into autonomous motivation, controlled motivation, and amotivation (CFI=0.94, RMSEA=0.04, SRMR=0.07). Compared to the main SEM analysis three differences emerged (see Supplementary Figure 1). First, the relation between need frustration and autonomous motivation was no longer significant. Second, autonomous motivation was positively related to all therapy adherence components. Third, controlled motivation showed no significant relation to attitude.

Discussion

To our knowledge, this is the first study in health care using the SDT-framework to examine the four interaction styles in relation to patients' basic psychological need satisfaction and frustration, motivational regulation for therapy, and therapy adherence. Overall, our SEM analysis supported the hypothesized associations outlined by SDT,[9] confirming both bright and dark pathways. These findings were further reinforced by the preliminary correlation matrix, which aligned with prior health care[16,28–30,38] and educational[45] research.

On the bright pathway, autonomy-support was positively related to need satisfaction. Previous research among people with cancer also found a bright pathway from autonomy-support to need satisfaction.[29] While the expected bright path between structure and need satisfaction was observed in the correlation matrix, this path was not confirmed in the SEM

analysis. This difference might be due to multicollinearity or a synergistic effect between structure and autonomy-support ($r=0.87$, $p<0.001$). When included simultaneously in the model, their unique contributions to need satisfaction may be attenuated, suggesting these interaction styles may operate in a closely intertwined or synergistic manner. In line with this interpretation, when autonomy-support and structure were aggregated into one motivating style, the bright path persisted. Next, our study showed that need satisfaction was positively related to each component of autonomous motivation toward therapy (ie. intrinsic motivation, integrated regulation, and identified regulation). This confirms our hypothesis and previous research showing that need satisfaction – particularly autonomy and competence – is positively related to autonomous motivation for physical activity, exercises and subjective vitality.[16,17] Finally, regarding the relation between motivation and therapy adherence, our main SEM analysis revealed that both integrated and identified regulation were positively related to attitude, and integrated regulation was also positively related to communication. These findings confirm the SDT-based hypothesis[9] and align with previous studies.[7,15] Surprisingly, intrinsic motivation did not show a significant relationship with any of the components of therapy adherence, and participation was not significantly related to any of the motivational regulation types. These findings contrast with theoretical expectations,[9] prior research,[7,15,16] and the pattern observed in the bivariate correlation matrix. A possible explanation is that patients may not engage in therapy because they inherently enjoy it (ie. intrinsic motivation), but rather because they perceive them as purposeful or necessary for recovery (ie. integrated and identified regulation). This perceived value may encourage patients to ask more questions and invest more effort in therapy, reflecting more engagement in terms of communication and attitude. This highlights a meaningful contextual distinction between rehabilitation settings and other life domains such as sport or education, where behavior is more often driven by enjoyment. Additionally, the relatively low internal consistency of the participation component of therapy adherence may have weakened the estimated associations with the types of motivational regulation, which may have contributed to the non-significant paths in the main SEM analysis. However, the additional SEM analysis, including grouped types of regulation, revealed positive relations between autonomous motivation and all components of therapy adherence. This finding is consistent with a post-surgery study, where autonomous motivation for treatment was positively associated with rehabilitation adherence[38] as well as with the longitudinal study of gym and health club members, where autonomous motivation predicts sustained long-term exercise engagement.[17] Together, this suggests the important role of autonomous motivation in stimulating therapy adherence. Nonetheless, the different findings suggest that these relationships warrant further investigation.

On the dark pathway, control was positively related to need frustration, confirming the SDT-based hypothesis.[9] However, the expected dark path from chaos to need frustration was not found, despite indications in the correlation matrix. Similar to the findings in the bright pathway, this discrepancy may be explained by multicollinearity ($r=0.40$, $p<0.001$) between a chaotic and controlling interaction style (the latter of which did show to be positively associated with need frustration), fading their unique relations. Notably, when control and chaos were combined into a single "demotivating style", the expected dark pathway from demotivating to need frustration emerged, mirroring the bright pathway of motivating style to need satisfaction. Subsequently, as hypothesized, need frustration was positively related to both components of controlled motivation and amotivation. While research of this dark path is lacking in health care, these findings align with results in educational settings.[45,58]

The directions of the significant cross-paths (ie. between the components of the bright and dark pathways) were in line with expectations.[9,28,45] Perceived autonomy-support was negatively associated with need frustration, which was negatively associated with intrinsic motivation and identified regulation. External regulation was negatively associated with attitude and patients experiencing more amotivation asked fewer questions to their HCP about their rehabilitation, supporting the expected negative associations.[9,11,38] Interestingly, while Yu et al[16] and Lau et al[59] reported a positive relationship between relatedness satisfaction and controlled motivation, our findings revealed a positive relation between need satisfaction and introjected regulation only. However, when aggregating the types of regulation, the unexpected positive relation between need satisfaction and controlled motivation also emerged. Additionally, need frustration was negatively associated with intrinsic motivation and identified regulation, but not with integrated regulation, despite the latter being conceptually situated between the other two.[13] The additional SEM analysis revealed no significant relation between need frustration and total autonomous motivation. The diminished relationship implies that negative associations with intrinsic motivation and identified regulation may be too weak or inconsistent to yield a significant overall

association. The cross-paths generally demonstrated fewer significant relationships than within the bright and dark pathways, which is consistent with prior research.[35,39,44,60,61] In line with expectations, significant negative relations emerged between perceived autonomy-support and need frustration, need frustration and higher-quality types of motivation, and low-quality types of motivation and components of therapy adherence. However, the bright and dark pathways do not appear to function as direct opposites, as they do not fully offset another. This indicates that bright pathway components may not fully counterbalance the potentially detrimental relations of the dark pathway components, nor may dark pathway components necessarily undermine bright pathway processes. For example, while a controlling interaction style was positively related to need frustration, it was not significantly negatively related to need satisfaction. Similar, whereas need frustration was positively related to amotivation, need satisfaction was not negatively related to amotivation. Overall, these findings highlight the complexity of patients' motivational processes and underscore the importance of examining the unique contributions of each component.

Although most associations in the correlation matrix and SEM analyses were consistent, some differences emerged that warrant further investigation to better understand their underlying causes. Surprisingly, the correlation matrix showed that patients who perceived their therapist as more controlling also experienced more need satisfaction and intrinsic motivation. However, the positive relation between perceived control and need satisfaction was not supported by our SEM-models. Further exploratory correlation analyses revealed that perceived therapist control was positively correlated with competence satisfaction ($r=0.23$, $p<0.001$) and relatedness satisfaction ($r=0.18$, $p=0.001$) specifically. Although a controlling interaction style is theoretically expected to undermine the need for autonomy, these findings suggest that perceived controlling interaction style may also reflect providing guidance and therapist involvement, which can be linked to greater patients' competence and relatedness satisfaction, respectively.[9] The association between perceived control and intrinsic motivation was not directly included in the SEM analysis and should therefore be interpreted with caution, but the previously described positive association between control and need satisfaction may contribute to the unexpected correlation. A similar pattern has been observed in the educational domain, where students who perceived their physical education teacher as more controlling reported higher intrinsic motivation for physical activity.[11,27,62] Given the limited research mapping these relations – particularly in health care – further research is needed. However, discrepancies between correlation matrix and SEM-model do not necessarily imply the absence of such relationships. They may reflect the SEM-model structure, which accounts for measurement error and tests unique variance among variables, unlike bivariate correlations.

Generally, the SEM analyses confirmed the full structure of the bright and dark pathways. Fewer significant crossing paths were found, suggesting that variables on the bright side may not fully offset the negative relations of those on the dark side – and vice versa.

Strengths and Limitations

This study is the first to holistically explore (de)motivating interaction styles and motivational processes within healthcare settings using the SDT-framework. A first strength is the inclusion of a general patient population, rather than focusing on a disease-specific population. This broader approach includes a wider range of experiences, enhancing the generalizability and applicability of findings across diverse disease-specific settings. Second, all the questionnaires used were reliable and valid within SDT and health care,[24,48,51,52] however some minor wording adaptations were made to tailor the questionnaires more specifically to this study population. Internal consistency was assessed in the current sample using McDonald's omega.[47] While most scales demonstrated acceptable reliability, the measures of amotivation, participation, and communication showed slightly lower omega values ($0.62 \leq \omega \leq .68$), which may have attenuated some associations in the SEM analysis. Despite that, the use of theory-driven models, consistency with prior research,[30,35,38,43,44] and consistent patterns across analyses support the interpretability of the findings. Furthermore, all questionnaires, except RAdMAT-NL, are based on SDT, ensuring a consistent theoretical foundation throughout the study. In addition, although self-reported questionnaires provide valuable insight into general patients' experiences, this approach may be vulnerable to response biases such as social desirability and may not represent the most objective method for assessing adherence. Third, this study simultaneously included various SDT-based constructs: four interaction styles, need satisfaction and frustration, six types of regulation and three components of therapy adherence (the only not-

SDT derived construct). This comprehensive integration provides a more in-depth exploration of patient experiences and how these constructs interrelate within the SDT-framework in the healthcare domain.

Additional limitations should also be acknowledged. First, only two healthcare professions were included, as the SIS-HCP relies on profession-specific vignettes. In addition, participation was higher among physiotherapy patients than occupational therapy patients, possibly due to their profession's lower visibility or unclear role within multidisciplinary teams. This imbalance may have limited the generalizability of the findings across healthcare professions. Second, although the sample size of over 300 participants is substantial, it was relatively limited in relation to the number of variables included in the model. As a result, need satisfaction and frustration could not be divided into separate autonomy, competence and relatedness dimensions. Similarly, direct paths from interaction styles to motivation or from basic psychological needs to therapy adherence could not be included in the model. Third, due to the cross-sectional design, no causal conclusions can be drawn – despite the model's structure being grounded in a theoretical framework.[9,32] Lastly, although the main SEM analysis yielded acceptable overall model fit, the CFI was slightly below the commonly recommended cutoff of .90,[57] suggesting possible minor model misspecifications. Such misspecifications may introduce instability and lead to over- or underestimation of path coefficients, potentially affecting their significance level. Consequently, the strength and robustness of the observed relationships should be interpreted with caution and there remains room for improved model specification. To evaluate the stability of the findings, two simplified models were tested as sensitivity analyses. These models demonstrated improved fit while maintaining similar patterns of associations (see Supplementary Figure 1). The additional models supported the robustness of the original findings, as consistent associations emerged: motivating styles were positively associated with need satisfaction and negatively with need frustration, whereas demotivating styles showed a positive relationship with need frustration. Notably, the paths between need frustration and autonomous motivation and between autonomous motivation and participation differed from those observed in the main model, suggesting that these relationships may be sensitive to model specification and potentially influenced by the relatively lower fit of the main model.

Future Research

Future research is essential to address the limitations outlined above and to provide detailed practical implications. In particular, increasing the sample size would strengthen the statistical power and improve model fit. This expanded sample would enable the inclusion of more complex pathways – such as direct relations from interaction styles to types of regulation – and would allow examining the three basic psychological needs as separate constructs, offering a more detailed understanding of the motivational processes involved in therapeutic settings. In addition, the study population can be broadened by including patient experiences of healthcare professionals beyond physiotherapists and occupational therapists. Including a range of healthcare professions would allow to assess different approaches across professions and enhance the generalizability of the findings. Further, incorporating HCP-reported and observed data can add valuable context to patient-reports. Qualitative methods – such as interviews or observations – would also further enrich insights into patients lived experiences capturing nuances of (context-specific aspects of) patients' experiences across the general population while also offering opportunities to include people with limited cognitive or mental abilities.[63,64] Subsequently, therapy adherence could be assessed more objectively through indicators such as medical or physical stabilization and improvement. Incorporating these types of data could open new avenues to develop more personalized, patient-centered approaches that foster HCP-patient collaboration. Ultimately, this could lead to more effective interventions and healthcare education, enhancing the quality of care and contributing to better therapeutic outcomes.

Furthermore, future studies could incorporate additional patient-related factors – such as disease, disease progression, age, gender, personality, and mood fluctuations – along with HCP-related characteristics – like gender and professional background. This could provide deeper insights into the dynamics of how patients perceive their HCP communication, as well as their basic psychological needs, therapy motivation, and adherence.[65,66] Additionally, exploring maladaptive patient outcomes, such as treatment drop-out and depression, will offer a more comprehensive understanding of the dark pathway.[11] Understanding these dynamics could inform training programs aimed at enhancing HCPs' interaction skills and enable them to more effectively support individual patients' needs.

Finally, as the study results highlight the importance of fostering motivating interaction styles while avoiding demotivating interaction styles, further research should focus on identifying the most effective and feasible methods for implementing SDT-based interventions in healthcare settings, as empirical evidence and practical guidance are currently limited.[12,20,67]

Practical Implications

In this study, patients perceived motivating styles as more prevalent than demotivating ones – an encouraging finding which aligns with previous self-reports by nurses,[26] and nurses and physiotherapists in training.[31] However, it is important to keep in mind that differences in sample populations – since patients of this study evaluated other HCPs than those who participated in the previous studies – as well as the absence of significance testing, limit direct comparison and the drawing of clear conclusions.

Likewise, this convenience sample of patients reported higher levels of need satisfaction than frustration and higher levels of self-determined types of motivation compared to less self-determined types, suggesting a generally positive motivational therapeutic climate. Despite the positive trend, the high number of communication-related complaints[40] and relatively elevated patient demotivation[18] suggest that positive aspects of the bright pathway may not fully counterbalance the challenges posed by the dark pathway. This aligns with the limited cross paths found from the bright to the dark path. These findings carry implications for healthcare education and clinical practice. First, they highlight the need to strengthen communication training in healthcare (education) and professional development. HCPs (and those in training) may benefit from training that helps them recognize and develop autonomy-supportive, structuring, and need-supportive communication, while minimizing controlling, chaotic, and need-thwarting communication. In this regard, training programs for healthcare professionals – during education[68] and in practice[69] – based on SDT may be useful. Such training programs should focus on enhancing therapists' autonomy-supportive behaviors, including providing choices for patients, using inviting language, and considering patients' perspectives. At the same time, training programs should also aim to reduce controlling behaviors, such as ignoring or pressuring patients' actions, thinking or feelings or disregarding their input. To achieve this, training programs may integrate evidence-based educational methods such as tutorials, interactive sessions (eg. role-play), learner-centered approaches (eg. active group work or one-to-one learning), hands-on practice, and reflective exercises.[67,70,71] For example, using video recordings can facilitate professional development by supporting self-reflection and enabling concrete, targeted feedback, particularly for improving interaction skills.[67,70,72]

Second, regularly gathering patient feedback on how they perceive their interactions with HCPs may provide valuable input for reflection and professional growth.[73] Incorporating such feedback tools into standard care processes may improve therapeutic collaboration, boost patient engagement, and ultimately improve therapeutic outcomes.

Conclusion

The present cross-sectional study provides empirical evidence that SDT can help understand patients' therapy adherence. The SEM analysis supports the bright and dark pathways. Our findings suggest that – on the bright side – perceived autonomy-support is positively related to patients' need satisfaction, which, in turn, is positively related to more self-determined types of motivation. Additionally, integrated regulation is positively related to communication and attitude, while identified regulation is positively related to attitude. On the dark side, perceived control is positively related to patients' need frustration, which is negatively related to more self-determined types of motivation, but positively to low self-determined types of motivation. Moreover, external regulation is negatively related to attitude and amotivation of communication.

Together, these findings provide a foundation for future research aimed at improving patients' experiences and therapists' interaction style that increase patients' therapy experiences and adherence. For clinical practice, the results may indicate the importance of patients' perception of therapists' autonomy-supportive and controlling interaction styles as they are related to their needs, motivation for therapy, and subsequently components of therapy adherence. Therefore, targeting therapists' interaction styles may be an important factor contributing to more optimal patient experiences and improved health outcomes.

Data Sharing Statement

Data will be made available upon reasonable request to the corresponding author.

Ethical Approval and Consent

This study was performed in line with the principles of the Declaration of Helsinki. Ethics approval was obtained at the Ethical Committee of Ghent University Hospital (ONZ-2024-0139). Participants were recruited through flyers distributed on social media platforms. No data from social media accounts were collected or analyzed. All participant data were obtained directly from individuals who provided informed consent. The recruitment procedure complied with the terms of service of the social media platforms used.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare no competing interests in this work.

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