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RESEARCH

Understanding (de)motivating interaction styles of healthcare professionals in training: a profile approach

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Abstract
Self-management is important for people coping with chronic diseases. The self-determination theory (SDT) emphasizes the role of healthcare professionals' (HCPs) (de)motivating interaction styles in either supporting or thwarting patients' self-management behavior. Since developing (de)motivating interaction styles starts during education, this study aimed to identify profiles among HCPs in training based on their (de)motivating interaction styles and to assess how these profiles differ in sample characteristics, SDT-beliefs, and self-efficacy in self-management support. Cross-sectional data were collected using self-reported questionnaires among nurses (n = 125) and physiotherapists (n = 257) in training (total participants: n = 382). Cluster analyses were performed to identify the profiles followed by chi-square tests and MANCOVA-tests to assess profile differences. Five profiles were identified, labelled as: motivating (16%), active (22%), undifferentiated (29%), demotivating (17%) and inactive (17%). The motivating profile contained fewer men (10%), while the demotivating profile had a higher proportion of men (52%) compared to the whole sample distribution (28%). Fewer nursing students were categorized to the active profile (20%) compared to the overall sample distribution (33%). Higher SDT-beliefs and self-efficacy in self-management support were noted in the motivating and active profiles as opposed to the demotivating and inactive profiles. These results contribute to a better understanding of healthcare students' interaction styles during patient self-management support. In education of HCPs, a focus on improving SDT-beliefs and self-efficacy in self-management support, may help HCPs to improve their interaction profile towards people with chronic diseases.

Keywords Healthcare students · Self-determination theory · (de)motivating interaction styles · Profile analysis · People with chronic diseases · Self-management support

Introduction

The prevalence of chronic diseases is rising worldwide and accounts for 70% of global deaths (WHO, 2020). Chronic conditions have a negative impact on people's quality of life, and community and economic costs (WHO, 2020). Therefore, patients' self-management

Extended author information available on the last page of the article skills are important to minimize those negative effects (Ladner et al., 2021). Managing chronic conditions themselves enable people to live well by feeling competent and adequately managing their chronic conditions (i.e., symptoms, treatments, lifestyle changes, activities of daily life, and consequences of health conditions on psychosocial, cultural and spiritual domain) (Ladner et al., 2021; Ma et al., 2022). Healthcare professionals (HCPs) play a key role in supporting patients' self-management (Barlow et al., 2002; Ladner et al., 2021; Ma et al., 2022). To this end, HCPs need to master five behavioral competency categories as described in the 5As model of behavior change: assess (i.e., assessing patients' motivation and beliefs), advise (i.e., providing information and instruction), agree (i.e., shared decision-making and mutual goal setting), assist (i.e., assisting patients with overcoming barriers in daily living) and arrange (i.e., follow-up care) (Glasgow et al., 2003). However, despite the added values of HCPs' self-management support (Achten et al., 2022), research revealed that self-management support from nursing students (Duprez et al., 2017; Hutting et al., 2020) and physiotherapists (Duprez et al., 2017; Hutting et al., 2020) is not optimal. A qualitative study among physiotherapists highlighted several areas for improvement, including insufficient knowledge of self-management support, a lack of tools to support self-management and a gap in training related to communication skills (Hutting et al., 2020). The development of these self-management support skills starts during education, ensuring that they are able to support patients by the time they graduate. This highlights a notable gap in understanding HCP (in training)-patient interactions to foster a supportive and motivating healthcare climate conducive for self-management.

Healthcare professionals' interaction styles from a self-determination theory perspective

Behavioral theories, such as the Self-determination theory (SDT), identify underlying mechanisms and provide insights into motivating interactions for supporting self-management. SDT is an empirically based framework on human motivation with applications in different life domains including health, physical activity and education (Ryan & Deci, 2017). It explains the psychological principles underlying motivation to promote optimal functioning and health (Gillison et al., 2019). Central in the theory are the three basic psychological needs: autonomy (i.e., feeling empowered and having choice), competence (i.e., feeling capable and competent) and relatedness (i.e., feeling close to and valued by others).

According to SDT, interaction styles of HCPs are an important contextual factor in influencing patients' experience of satisfaction or frustration of their basic psychological needs (Ryan & Deci, 2017; Teixeira et al., 2020). In alignment with the classification of these needs, SDT has recommendations regarding how HCPs interact with patients. The theory outlines that autonomy-supportive interactions support patients' autonomy, while structuring interactions foster patients' competence. In contrast, controlling interactions thwart patients' autonomy and chaotic interactions undermine their competence. These motivating (i.e., autonomy-support and structure) and demotivating (i.e., control and chaos) interaction styles have been conceptually described before (Ryan & Deci, 2017; Vansteenkiste et al., 2020) and empirically supported among HCPs (Duprez et al., 2021; Vancampfort & Mugisha, 2022). Research in the healthcare setting confirmed an association between the (de)motivating interaction styles and patient outcomes (Chan et al., 2009; Haerens et al., 2021).

When HCPs are autonomy-supportive they identify, nurture, and develop patients' interests, preferences, and personal goals. Autonomy-supportive strategies include offering meaningful choices, using inviting language, and accepting patients' input (Duprez et al., 2020; Hagger & Protogerou, 2020). Research has shown that patients of autonomy-supportive HCPs report positive outcomes such as greater need satisfaction, less need frustration, more autonomous motivation, enhanced treatment motivation, and improved rehabilitation adherence (Chan et al., 2009; Haerens et al., 2021; McGrane et al., 2014). When HCPs are structuring, they provide patients with clear information about what to do and how to achieve the desired outcomes by offering help, guidance, and feedback. Although, less studies focused on patient outcomes of structuring HCPs, it has been shown that a structuring interaction style promotes patients' self-efficacy and sense of competence to manage their chronic conditions (Duprez et al., 2020) and therefore support patient's self-management.

Controlling HCPs ignore the perspective of their patient, introducing pressuring interactions to control how the patient acts, thinks, or feels. A controlling HCP is related to patients feeling obligated and experiencing more need frustration, controlled motivation, and negative emotions (e.g., pressure, frustration, boredom) (Haerens et al., 2021; Hagger & Protogerou, 2020) leading to not supportive for patient's self-management support. Lastly, chaotic HCPs are inconsistent, awaiting or abandoning, leaving patients confused about what to do and how to achieve their self-management goals (Aelterman et al., 2019; Duprez et al., 2021). Evidence on outcomes of a chaotic style is currently limited in health care but is theoretically linked to thwarting patients' needs (Ng et al., 2012; Ryan & Deci, 2017). Namely, chaotic behaviors of their HCP can frustrate patients' autonomy, relatedness and competence. For example, when HCP provide no directions at all, patients are uncertain how to manage their chronic disease during daily life, they may feel a loss of control over their treatment (autonomy frustration), struggle to maintain meaningful relationships with HCPs (relatedness frustration), and doubt their ability to manage their chronic conditions effectively (competence frustration) (Ryan & Deci, 2017).

Profiles of HCPs' (de)motivating interaction styles

HCPs apply the four interaction styles to varying extents during patient interactions, which contributes to their interaction profile (Aelterman et al., 2019; Duprez et al., 2020). Based on a person-centered approach, interaction profiles can be identified by clustering the two motivating and two demotivating interaction styles based on a typical coherence of the styles per HCP (Landau & Ster, 2010; von Eye & Bogat, 2006). Currently, there is however little understanding of the natural co-occurrence of motivating and demotivating interaction styles in HCPs, and more specific among HCPs in training. One study has explored the prevalence of combinations of (de)motivating interaction styles among nurses in practice (Duprez et al., 2020) and identified four interaction profiles: motivating (i.e., high on autonomy-support and structure, low on control and chaos), demotivating chaotic (i.e., high on chaos, average on control, low on autonomy-support and structure), active (i.e., high on all interaction styles) and undifferentiated (i.e., average on all interaction styles), with 20%, 18%, 24% and 38% of the participants, respectively (Duprez et al., 2020). Interestingly, only a limited number of practicing nurses were categorized in a motivating profile and the undifferentiated profile contained a third of the participants. The latter indicates that many nurses do not know how to interact with patients while supporting them towards self-managing their life with their chronic disease. Specific focus on these competencies may already be needed during HCP education and acquires a better understanding of healthcare students' (de)motivating interaction profiles and their correlates.

Correlates of HCPs' (de)motivating interaction styles and profiles

Insight into correlates of interaction profiles is needed to know what to focus on in HCP education. SDT-based research has already explored correlates of individual (de)motivating styles in various domains (Matosic et al., 2016), but research on correlates of interaction profiles in health care is scarce. The study by Duprez et al. (2020) stands as a lone example, describing socio-demographic variables in relation to nurses' separate interaction styles and found significant differences in styles according to gender, age and years of work experience. Female nurses were found to be more autonomy-supportive, with no gender differences observed in structure, control and chaos. Younger nurses (age group 23–29) reported less autonomy-support than older ones (age groups above 40), while nurses older than 50 years were more controlling than younger ones. More experienced nurses reported employing more control compared to their less experienced counterparts. Finally, older and more experienced nurses reported using more structuring approaches, with no differences noted in autonomy-support and chaos. Still, that study focuses on individual interaction styles, while it is important to recognize that HCPs do not use solely one interaction style, but rather a combination of all four styles to varying extents. Therefore, evidence on understanding how socio-demographic variables differ according to HCPs' (in training) (de) motivating interaction profiles is needed. Given the patterns observed in individual styles, it can be hypothesized that similar patterns may emerge across profiles, such as women being more likely to exhibit a motivating profile.

Besides socio-demographic variables, personal factors may also be associated with HCPs' in training (de)motivating interaction profiles. Empirical studies in the education and sports domains already showed that personal factors are associated with separate interaction styles, such as beliefs about the effectiveness of implementation, feasibility of implementation, and self-efficacy beliefs (Matosic et al., 2016; Occhino et al., 2014; Reeve et al., 2014; Stebbings et al., 2015). However, evidence in the healthcare domain, specifically concerning interaction profiles, is lacking. In the intervention study conducted by Aelterman et al. (2014), correlations were identified between the effectiveness beliefs and feasibility beliefs of physical education teachers, and their self-reported practices of autonomy-support and structure. However, that study did not encompass demotivating styles or interaction profiles. Based on their insights about individual motivating interaction styles, a similar relationship is assumed between HCPs' (in training) interaction profiles and their effectiveness and feasibility beliefs of SDT-based strategies. Additionally, HCPs (in training) with higher self-efficacy in supporting self-management (i.e., HCP perceived ability to support self-management) are more likely to exhibit supportive behaviors (van Hooft et al., 2016; Whitlock et al., 2002). Although, at this stage, the above has not yet been examined in the healthcare context.

Present study

In the chronic disease management landscape, the role of self-management cannot be overstated. Yet, HCPs (in training) face challenges in effectively supporting patients in this endeavor (Duprez et al., 2017; Hutting et al., 2020; van Hooft et al., 2016). Given the impact of (de)motivational interaction styles on patients' self-management behaviors (Ryan & Deci, 2017), it is essential to understand the extent to which combinations of motivating and demotivating interaction styles are adopted by HCPs (in training) (Landau & Ster, 2010). But also, to discern the prevalence of the profiles and the variables correlating with these co-occurrences. Such insights have the potential to identify areas for improvement when educating self-management support in health care, enhancing patient outcomes. Therefore, this study focuses on self-reports of HCPs in training regarding their interaction styles, recognizing that acquiring self-management support competencies already begins in their education.

The first objective of this study was to examine the self-perception of (de)motivating interaction profiles of HCPs in training, providing insight into the current situation of how HCPs in training perceive themselves to support patients' self-management. For this purpose, a person-centered approach was used to consider the natural co-occurrence of the students' self-reported interaction styles since this approach allows identifying groups of HCPs in training who share similar style characteristics (Landau & Ster, 2010). Based on the assumption that motivating and demotivating interactions are not necessarily opposites, as an HCP may exhibit both motivating and demotivating behaviors depending on the context. We hypothesized to find four healthcare interaction profiles: two profiles characterized by the differential presence of motivating and demotivating styles (i.e., high motivating-low demotivating and low motivating-high demotivating) and two profiles characterized by simultaneously high or low levels of motivating and demotivating styles (i.e., high motivating-high demotivating and low motivating-low demotivating). The second objective was to explore factors that correlate with the interaction profiles of HCPs in training, including sample characteristics, effectiveness and feasibility beliefs of SDT-based strategies, and self-efficacy in self-management support. Based on previous findings, differences in gender representation across profiles are anticipated (Duprez et al., 2020). Additionally, the study delves into the effectiveness and feasibility beliefs of SDT-based strategies and self-efficacy in self-management support. Greater effectiveness and feasibility beliefs and higher self-efficacy in self-management support are expected to align with more motivational profiles (Aelterman et al., 2014), contributing to improved self-management support (Duprez et al., 2020; van Hooft et al., 2016).

Method

Participants and procedure

In this SDT-grounded cross-sectional study, 932 Flemish HCPs in training were invited to participate. For pragmatic reasons, they were registered in the following educational programs: Linking Course (also known as Bridging Course) and Master of Science in Nursing and Midwifery (Ghent University) and Master of Science in Rehabilitation sciences and Physiotherapy (Ghent University and Hasselt University). The Linking Course of Master of Science in Nursing and Midwifery is a one-year transitional program preparing students from 'Bachelor of Nursing' or 'Bachelor of Midwifery' for the 'Master of Sciences in Nursing and Midwifery'. The data collection took place during the academic years 2021–2022 and 2022–2023. The study was explained to the students during an online or in-person course after which they were asked to participate by completing the questionnaire online or on paper. Qualtrics (nursing students) and Pointerpro (physiotherapy students) were used to administer the online questionnaire. Those who completed the questionnaire on paper did this during the in-person class after receiving the study's information. The questionnaires were completed in a confidential manner and data collection were pseudonymized. Participants' gender, birth year and month (i.e. indirect identifiers) were processed in such a way that these personal data could no longer be linked to a specific individual. The survey data itself did not contain (direct) identifying features. The decoding key, kept separately from the data file, was only accessible to the main researcher and principal investigator. To maximize the participation rate, the Ghent University-students that had the opportunity to complete the questionnaire online received a general reminder via e-mail or a notification via the official digital learning environment of Ghent University. Prior to completing the questionnaire, participants gave their written informed consent underlining the voluntary, and pseudonymized nature of their engagement. The study was approved by the Ethical Committee of Ghent University Hospital (BC-11016).

Sample characteristics of HCPs in training included birth year and month, gender (male, female, X), work experience (none, < 5 years, ≥ 5 years), and field of education (nursing and midwifery, rehabilitation and physiotherapy). Only the latter was not self-reported. More than two-thirds of the participants (68.6%) reported having no work experience (i.e. no practical experience outside of their educational program). However, all participants had (limited) experiences through internships. They also had received theoretical classes on behavioral change or MI in earlier years of their studies. Specially, the physiotherapy students at Ghent University had a course about MI in the year prior to the data collection, while those at Hasselt University had received a general communication course during the first two years of their education program. Nursing students, on the other hand, had a brief introduction to the theory of behavioral change but without specific skills training in the bachelor-program. Participant details are provided in Table 1.

Five healthcare students completed the questionnaire twice, only their initial participation was included. Students who did not or only partially filled out the SIS-HCP (see Measurements: Situations In Self-management support—HealthCare Professionals) were excluded (n = 29). Participants with a repetitive response pattern (such as 2, 2, 2, 2, etc.) on a specific questionnaire were reported as missing for that questionnaire (n = 8), as this may indicate haphazard or random completion resulting in response bias. If the participant did not finish the questionnaire (n = 1), only the completed subscales were included. A total of 382 participants were included, resulting in an overall response rate of 41%.

Table 1 Sample characteristics

Age M (SD)	23.4 (4.3)
Field of education N (%)	
Nursing and midwifery	125 (32.8)
Rehabilitation sciences and physiotherapy	257 (67.2)
Gender N (%)	
Female	274 (71.7)
Male	106 (27.7)
X	2 (0.5)
Work experience in healthcare N (%)	
None	262 (68.6)
< 5 years	85 (22.3)
≥ 5 years	35 (9.1)

Measurements

All measurements used in this study included Dutch self-reported questionnaires.

Situations in self-management support—healthcare professionals

The self-reported (de)motivating interaction styles of the HCPs in training were assessed using the reliable and validated vignette-based questionnaire *Situations In Self-management support—HealthCare Professionals* (SIS-HCP), originally developed for nurses (Duprez et al., 2020, 2021) (Supplementary File S1). The SIS-HCP for nurses was slightly adapted to represent the included situation towards the profession-specific situations of physiotherapists (see Supplementary File S1 for the SIS-HCP versions and adaptations). This questionnaire distinguishes the four interaction styles in health care counseling: autonomy-support, structure, control, and chaos (Duprez et al., 2021). Participants scored ten nursing or rehabilitation situations, depending on their field of education, each with four possible reactions to the situation, for example; 'People with chronic diseases need goals': 'I indicate why specific lifestyle adaptations make sense for him' (autonomy-support), 'I offer an overview of possible goals for this patient and guide him during decision making' (structure), 'I determine what goal the patient will pursue' (control), and 'I am waiting and let him set his own goals' (chaos) (Duprez et al., 2021). Participants rated each reaction on a 6-point Likert scale from zero (does not describe me at all) to five (completely describes me). Higher scores indicate greater use of that specific style during interactions with patients. The SIS-HCP has been shown to have a good construct validity and high internal consistency (Duprez et al., 2020, 2021), with McDonald's omega (ω) (Hayes & Coutts, 2020) ranging from 0.79 to 0.83 for the four styles in the present study.

Effectiveness and feasibility beliefs of SDT-based strategies

The effectiveness and feasibility beliefs of SDT-based strategies questionnaire was used to map the beliefs of HCPs in training regarding the effectiveness and feasibility in guiding and treating patients in a need-supportive way (Aelterman et al., 2014) (Supplementary File S2). The questionnaire included 15 SDT-based situations in healthcare practice for which the HCP in training rated their belief regarding its effectiveness (i.e., agreeing with it) and feasibility (i.e., finding it feasible to implement during treatment). Examples are 'I personally find it important to provide choice to every patient' and 'I personally find it important to always integrate as many different elements as possible into my treatment' (Aelterman et al., 2014). The questionnaire was the same for the two fields of education. The 5-point Likert scale ranged, on both parts, from one (not at all) to five (at all). By means of the 15 situations, HCP's effectiveness ($\omega = 0.78$) and feasibility ($\omega = 0.78$) beliefs of SDT-based strategies were quantified separately. A higher score indicates a greater belief in the effectiveness or feasibility of SDT-based strategies and treatment in practice.

Self-efficacy in self-management support

The self-efficacy in self-management support of HCPs in training was assessed using the self-efficacy part (36 items) of the reliable and valid *Self-Efficacy and Performance in Self-management Support* (SEPSS-36) questionnaire (Duprez et al., 2016). The SEPSS is based on the 5As model of behavior change and assesses six behavioral competency categories related to self-efficacy in self-management support in daily practice (Duprez et al., 2016; Glasgow et al., 2003). The six categories are assess, advise, agree, assist, arrange, and overall partnership competencies. The last competency covers attitude toward patient partnership. The students rated their level of confidence in each statement ('I think I can do this') on a 5-point Likert scale ranging from zero (not at all) to four (good), for example: 'asking the patient what he knows about his (chronic) condition' (assess), 'asking the patient for permission before giving information or advise' (advise), 'allowing the patient to determine his own priorities when developing goals' (agree), 'helping the patient to choose the activities that he can realistically perform' (assist), 'consulting and making mutual plans with other HCPs' (arrange), 'considering the (cultural) background of the patient' (overall competencies) (Duprez et al., 2016). The questionnaire was the same for the two fields of education. The six subscales were calculated by averaging their corresponding six items, with McDonald's omega (ω) (Hayes & Coutts, 2020) ranging from 0.68 to 0.84 in the present study. For all parts, a higher score indicates a higher level of competency. The questionnaire had good content and construct validity, and good to very good internal consistency (Duprez et al., 2016).

Data-analysis

Analyses were performed using SPSS Statistics 28. Significance level was consistently set at <0.05 (two-tailed).

Description and preliminary analyses

To describe the study sample, categoric variables were presented as counts (and percentages) and the continuous variables as means (and standard deviations). Prior to the cluster analysis, the normality of each variable was assessed, showing kurtosis and skewness less than $|2|$, indicating normal distributions, which is consistent with previous research (Aelterman et al., 2014; Duprez et al., 2018; van Hooft et al., 2016). Further, internal consistency of the subscales was determined with McDonald's omega, where omegas between 0.70 and 0.95 being considered as good internal consistency (Hayes & Coutts, 2020). Following this, a Pearson correlation matrix was performed to preliminary explore relationships between interaction styles, and effectiveness and feasibility beliefs of SDT-based strategies, and self-efficacy in self-management support.

Person-centered approach

For the first aim, (de)motivating interaction profiles of HCPs in training were generated by performing a combination of hierarchical and non-hierarchical clustering analyses. This person-centered approach takes into account the natural co-occurrence of the styles and identifies groups of HCPs in training who share particular attributes. The clusters allow us to examine how the different interaction styles are combined within a person, here HCP in training (Landau & Ster, 2010). First, the scores of each interaction style were standardized and outliers were identified. Six univariate (values deviating more than three standard deviations from the mean) and one multivariate (using Mahalanobis distance measure, with $p<0.001$) outliers were removed as they can bias cluster solutions. This resulted in a final sample of 375 students. Thereafter, a two-stage clustering procedure was performed

(Nnoaham & Cann, 2020). In the first step, Ward's hierarchical clustering method based on squared Euclidean distances was performed to identify the most optimal number of clusters for the healthcare students (Hair et al., 2018). Hereby, 3- to 7-cluster solutions were identified. We searched for the lowest number of clusters, while still being clinically meaningful. The explained variance of the four interaction styles of the cluster solution had to be at least 50%, to be retained (Hair et al., 2018). Because of this, the 3- and 4-cluster solutions were not found to be strong enough (Appendix 1). From the 7-cluster solution onwards, clusters were identified characterizing less than 10% of all cases, which results in less statistical significance. As the explained variance in the 5- and 6- cluster solution was at least 50%, these solutions were retained. In the second step, for those two k-values (i.e. 5 and 6), K-means cluster analysis was applied for the classification of the clusters. Here, the cluster centers were used as non-random initial cluster centers in an iterative, non-hierarchical procedure (von Eye & Bogat, 2006). Next, the stability of the 5- and 6-cluster solutions were checked by performing a double-split cross-validation. The sample was randomly divided into two subsamples and the two-stage procedure (i.e. Ward and k-means clustering) was applied to each half (Breckenridge, 2000). Averages of clusters from both subsamples were compared with Cohen's Kappa (K), with $K > 0.60$ considered acceptable (Hair et al., 2018). The 5-cluster solution had the best stability in this sample, so it was retained. The distribution explained variance and Cohen's Kappa of the different cluster solutions are summarized in Appendix 1.

Comparing (de)motivating interaction profiles

For the second aim, Chi2 tests were conducted to determine differences in profile distribution of sample characteristics (i.e., field of education and gender). The significant sample characteristics were included as covariates in the subsequent MANCOVA-test with Bonferroni post-hoc to examine differences between the profiles in effectiveness and feasibility beliefs of SDT-based strategies, and self-efficacy in supporting patients' self-management.

Results

Preliminary analyses

Table 2 contains minimum and maximum values (min–max), mean (M), standard deviation (SD), and correlation coefficients of the self-reported (de)motivating interaction styles, effectiveness and feasibility beliefs of SDT-based strategies, and self-efficacy in self-management support.

The Pearson correlation matrix revealed significant correlations between the four interaction styles (see Table 2) with a strong correlation between autonomy-support and structure ($p < 0.001$), and control and chaos correlated moderately ($p < 0.001$). Weak negative correlations were observed between autonomy-support and chaos ($p < 0.001$), as well as between structure and chaos ($p < 0.001$). The correlation matrix also revealed significant correlations between interaction styles and effectiveness and feasibility beliefs of SDT-based strategies, as well as self-efficacy in supporting patients' self-management (see Table 2). Autonomy-support and structure correlated positively with effectiveness and feasibility beliefs regarding SDT-based strategies ($p < 0.001$), and all six competencies of self-efficacy in self-management support ($p < 0.001$). Control only correlated negatively with

Table 2 Descriptive statistics and Pearson's correlations for the study variables

	N	M (SD)	min–max	McDonald's ω	1	2	3	4	5	6	7	8	9	10	11
(De)motivating interaction styles (range: 0–5)															
1. Autonomy-support	382	3.85 (0.55)	1.50–5.00	0.79	–										
2. Structure	382	3.71 (0.61)	1.50–5.00	0.81	0.71***	–									
3. Control	382	1.63 (0.78)	0.00–4.50	0.82	0.06	0.29***	–								
4. Chaos	382	1.22 (0.76)	0.00–4.30	0.83	−0.29***	−0.26***	0.49***	–							
Effectiveness and feasibility beliefs of SDT-based strategies (range: 1–5)															
5. Effectiveness beliefs	382	4.27 (0.36)	2.33–5.00	0.78	0.39***	0.35***	−0.13*	−0.35***	–						
6. Feasibility beliefs	381	3.75 (0.38)	2.80–4.87	0.78	0.26***	0.31***	−0.03	−0.24***	0.50***	–					
Self-efficacy in self-management support (range: 0–4)															
7. Assess	375	2.83 (0.53)	0.80–4.00	0.77	0.33***	0.33***	−0.03	−0.20***	0.32***	0.26***	–				
8. Advise	375	2.68 (0.52)	1.00–4.00	0.68	0.19***	0.17***	−0.01	−0.11*	0.34***	0.21***	0.59***	–			
9. Agree	374	2.76 (0.63)	0.17–4.00	0.84	0.28***	0.31***	0.00	−0.21***	0.29***	0.33***	0.62***	0.64***	–		
10. Assist	374	2.74 (0.62)	0.50–4.00	0.82	0.26***	0.29***	0.01	−0.16**	0.29***	0.27***	0.58***	0.63***	0.78***	–	
11. Arrange	374	2.38 (0.71)	0.33–4.00	0.82	0.21***	0.18***	0.04	−0.13*	0.25***	0.23***	0.51***	0.63***	0.68***	0.70***	–
12. Overall competencies	374	2.81 (0.58)	0.00–4.00	0.80	0.30***	0.21***	−0.10	−0.23***	0.36***	0.31***	0.54***	0.58***	0.65***	0.67***	0.65***

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

effectiveness beliefs ($p = 0.012$). Chaos correlated negatively with effectiveness and feasibility beliefs ($p < 0.001$), and the six self-management support competencies ($p < 0.044$).

Profiles of self-reported (de)motivating interaction styles

To address the first objective, cluster analyses were performed. Based on the considerations explained above and provided in Appendix 1, the 5-cluster solution was retained. Figure 1 visualizes the profiles based on the raw scores and Fig. 2 the z-scores for each interaction style across the profiles. The descriptives of the five profiles are presented in Table 3 with raw- and z-scores for each style within the profiles.

Profile 1 encompassed 16% of the sample and was characterized by students who reported high levels of autonomy-support and structure, alongside low levels on control and chaos. Due to the highly motivating and lowly demotivating levels (based on z-scores), this profile was labelled as 'motivating'. Comprising 22% of the sample, profile 2 was distinguished by students who reported relatively high scores across all interaction styles except for chaos, which was average (based on z-scores). This indicates an active attitude of both motivating and controlling interactions, leading to the labeling of this profile as 'active'. The largest group, profile 3, accounted for 29% of the sample. Based on z-scores, it displayed average scores across all interaction styles, consequently, this undecided profile was labelled as 'undifferentiated'. Profile 4 consisted of 17% of the sample, characterized by HCPs in training who scored average on autonomy-support and structure (based on z-scores), and highest on chaos and control of all profiles. Therefore, this profile was labelled as 'demotivating'. Finally, profile 5 (17% of the sample) was characterized by the lowest scores for the motivating styles, low control (based on z-scores) and relatively

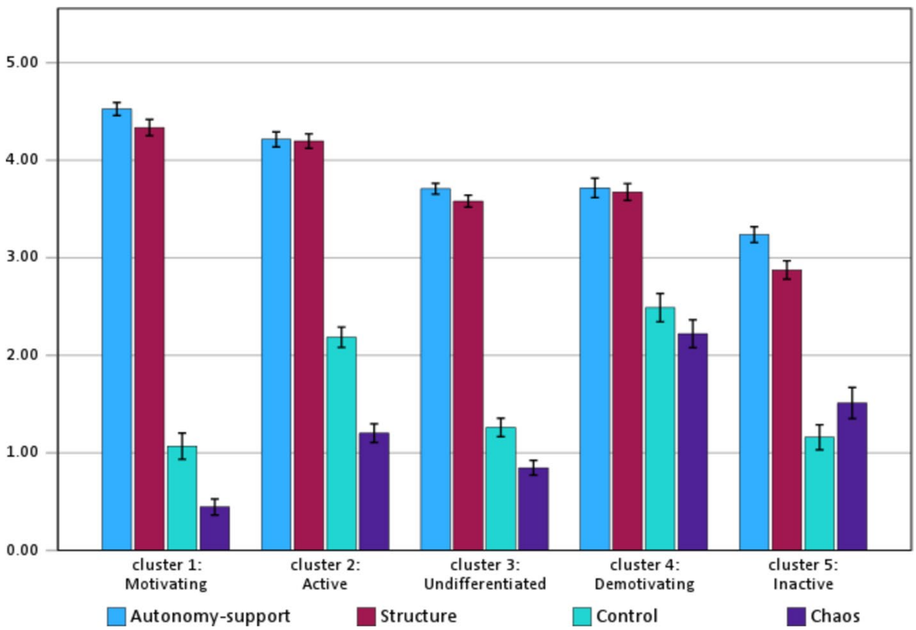


Fig. 1: 5-Cluster solution based on the raw scores of the interaction styles. *Note*: Error Bars 95%CI

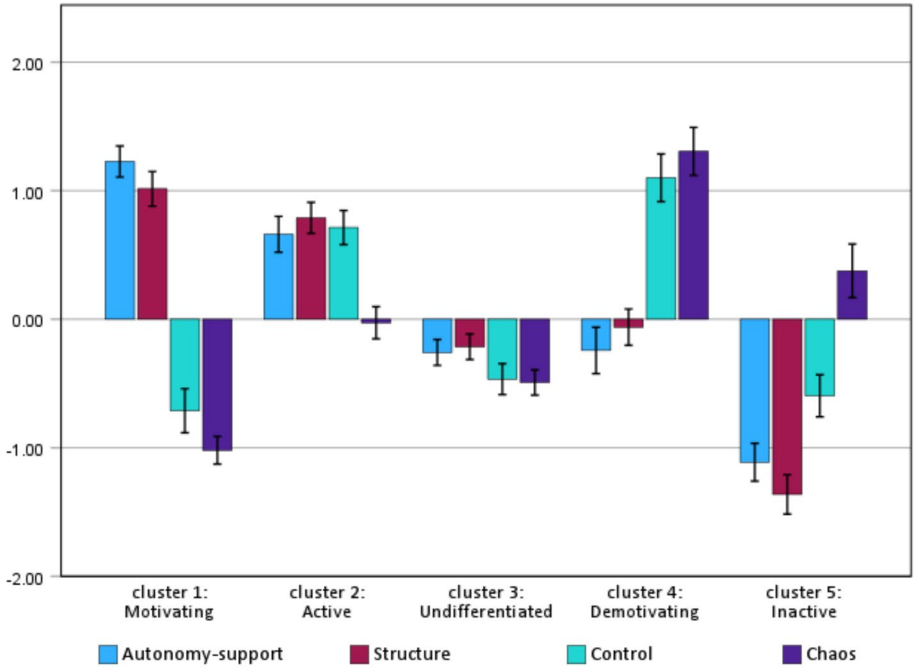


Fig. 2: 5-Cluster solution based on the z-scores of the interaction styles. *Note*: Error Bars 95%CI

high levels of chaos. This might indicate a passive attitude, so this profile was labelled as 'inactive'.

The results of the MANCOVA test with post-hoc Bonferroni correction for the interaction styles (Table 3) showed that the motivating profile had the highest autonomy-support (all $p<0.001$). The active profile was significantly higher than the undifferentiated ($p<0.001$), demotivating ($p<0.001$), and inactive ($p<0.001$) profiles in terms of autonomy-support. The lowest value for autonomy-support was found in the inactive profile (all $p<0.001$). Regarding structure, similar patterns were found, but without a difference between the motivating and active profiles. Those two profiles had the highest structure value (all $p<0.001$). The lowest value of structure was found in the inactive profile (all $p<0.001$). No differences in autonomy-support and structure were found between the undifferentiated and demotivating profiles. For the level of control, the demotivating profile had the highest value (all $p<0.001$, except for active: $p=0.005$), followed by the active profile (all $p<0.001$, except for demotivating: $p=0.005$). Levels of control were equally low in the other three profiles. Finally, regarding chaos, all profiles were significantly different from each other with the highest value for the demotivating profile, followed by inactive, active, undifferentiated, and motivating profiles with the lowest level of chaos (all $p<0.001$, except between active and inactive: $p=0.001$).

Sample characteristics across the (de)motivating interaction profiles

The results of the Chi2-test for field of education ($p=0.028$) and a Chi2-test for gender ($p<0.001$) revealed significantly different distributions of the sample characteristics

Table 3 Descriptives and comparison (MANCOVA with post-hoc Bonferroni correction and Chi²-test) of the profiles

Distribution of profiles n (%)	1 Motivating 60 (16)	2 Active 81 (22)	3 Undifferentiated 108 (29)	4 Demotivating 62 (17)	5 Inactive 64 (17)	F-value$_a$	η^2
Interaction styles (z-scores)							
Autonomy-support	$1.25^{2,3,4,5}$	$0.65^{1,3,4,5}$	$-0.31^{1,2,5}$	$-0.29^{1,2,5}$	$-1.20^{1,2,3,4}$	156.98***	0.63
Structure	$1.02^{3,4,5}$	$0.79^{3,4,5}$	$-0.25^{1,2,5}$	$-0.09^{1,2,5}$	$-1.44^{1,2,3,4}$	195.96***	0.68
Control	$-0.72^{2,4}$	$0.75^{1,3,4,5}$	$-0.47^{2,4}$	$1.15^{1,2,3,5}$	$-0.60^{2,4}$	113.56***	0.55
Chaos	$-1.03^{2,3,4,5}$	$0.00^{1,3,4,5}$	$-0.48^{1,2,4,5}$	$1.39^{1,2,3,5}$	$0.42^{1,2,3,4}$	133.23***	0.59
Interaction styles (raw scores, range: 0–5) M(SD)							
Autonomy-support	$4.53\ (0.26)^{2,3,4,5}$	$4.21\ (0.35)^{1,3,4,5}$	$3.71\ (0.29)^{1,2,5}$	$3.72\ (0.39)^{1,2,5}$	$3.24\ (0.32)^{1,2,3,4}$	156.98***	0.63
Structure	$4.34\ (0.32)^{3,4,5}$	$4.20\ (0.33)^{3,4,5}$	$3.51\ (0.32)^{1,2,5}$	$3.67\ (0.34)^{1,2,5}$	$2.88\ (0.38)^{1,2,3,4}$	195.96***	0.68
Control	$1.07\ (0.52)^{2,4}$	$2.19\ (0.47)^{1,3,4,5}$	$1.26\ (0.50)^{2,4}$	$2.49\ (0.57)^{1,2,3,5}$	$1.16\ (0.51)^{2,4}$	113.56***	0.55
Chaos	$0.45\ (0.32)^{2,3,4,5}$	$1.20\ (0.43)^{1,3,4,5}$	$0.85\ (0.39)^{1,2,4,5}$	$2.22\ (0.56)^{1,2,3,5}$	$1.51\ (0.64)^{1,2,3,4}$	133.23***	0.59
Correlates							
Sample characteristics						Total sample distribution (%)	Chi^2
Field of education							
nurses n(%)	22 (36.7)	16 (19.8)	41 (38.0)	18 (29.0)	27 (42.2)	33.1	10.87*
physiotherapists n(%)	38 (63.3)	65 (80.2)	67 (62.0)	44 (71.0)	37 (57.8)	66.9	
Standardized residual (nurses/physiotherapists)	0.5/− 0.3	− 2.1/1.5	0.9/− 0.6	− 0.6/0.4	1.3/− 0.9		
Gender							
female n(%)	54 (90.0)	51 (63.0)	86 (79.6)	30 (48.4)	49 (76.6)	72.0	35.11***
male n(%)	6 (10.0)	30 (37.0)	21 (19.4)	32 (51.6)	14 (21.9)	27.5	
Standardized residual (female/male)	1.6/− 2.6	− 1/1.6	1 /− 1.6	− 2.2/3.6	0.5/− 0.8		

Table 3 (continued)

Effectiveness and feasibility beliefs of SDT-based strategies (M (SD); range: 1–5)						$F\text{-value}_a$	η^2
Effectiveness beliefs	4.48 (0.30)[3,4,5]	4.35 (0.33)[4,5]	4.26 (0.32)[1]	4.13 (0.34)[1,2]	4.15 (0.33)[1,2]	11.21***	0.11
Feasibility beliefs	3.92 (0.37)[3,4,5]	3.86 (0.43)[4,5]	3.71 (0.35)[1]	3.67 (0.30)[1,2]	3.63 (0.37)[1,2]	7.32***	0.08
Self-efficacy in self-management support (M (SD); range: 0–4)							
Assess	3.03 (0.47)[4,5]	3.02 (0.50)[4,5]	2.83 (0.52)[5]	2.71 (0.41)[1,2]	2.57 (0.54)[1,2,3]	10.28***	0.10
Advise	2.83 (0.55)	2.73 (0.46)	2.64 (0.51)	2.64 (0.50)	2.63 (0.56)	1.77	0.02
Agree	3.05 (0.56)[3,4,5]	2.97 (0.51)[4,5]	2.69 (0.63)[1]	2.59 (0.52)[1,2]	2.52 (0.72)[1,2]	9.47***	0.10
Assist	3.01 (0.57)[3,5]	2.86 (0.52)[5]	2.68 (0.62)[1]	2.73 (0.53)	2.52 (0.69)[1,2]	6.42***	0.07
Arrange	2.51 (0.70)	2.55 (0.67)	2.35 (0.68)	2.29 (0.67)	2.23 (0.80)	2.54*	0.03
Overall competence	2.99 (0.60)[4,5]	3.00 (0.50)[4,5]	2.80 (0.56)	2.61 (0.50)[1,2]	2.68 (0.58)[1,2]	6.90***	0.07

[1]significant difference with profile 1, [2]with profile 2, [3]with profile 3, [4]with profile 4, [5]with profile 5. [a]MANCOVA-test with post-hoc Bonferroni correction *$p<0.05$, **$p<0.01$, ***$p<0.001$

compared to the whole sample (Table 3). The nursing and physiotherapy distribution was in every profile equal to the whole sample, except in the active profile which contained fewer nurses in training (20%) than the whole sample distribution (33%). Furthermore, the motivating profile contained fewer men (10%), while the demotivating profile, contained more men (52%) and fewer women compared to the whole sample (i.e., 28% men). As a result, field of education and gender were included as covariates in the following MANCOVA test with Bonferroni post-hoc correction to examine differences between the profiles in SDT-beliefs and self-efficacy in self-management support.

SDT-beliefs and self-efficacy in self-management support across (de)motivating interaction profiles

To explore how the interaction profiles differ in SDT-beliefs and self-efficacy in self-management support, a second MANCOVA test with post-hoc Bonferroni correction was performed, revealing significant differences between the (de)motivating interaction profiles ($p < 0.001$) (Table 3). The identified profiles were first compared in terms of effectiveness ($p < 0.001$) and feasibility ($p < 0.001$) beliefs of SDT-based strategies (see Table 3). Subsequent post-hoc Bonferroni comparisons indicated that HCPs in training in the motivating profile reported significantly higher effectiveness and feasibility beliefs of SDT-based strategies than students categorized in the undifferentiated ($p < 0.001$, $p = 0.005$, respectively), demotivating ($p < 0.001$, $p = 0.009$, respectively) and inactive (both $p < 0.001$) profiles. Those three profiles did not differ from each other. Further, the active profile was also significantly higher on effectiveness and feasibility beliefs of SDT-based strategies than the demotivating ($p = 0.003$, $p = 0.042$, respectively) and inactive ($p < 0.001$, $p = 0.003$, respectively) profiles.

Next, self-efficacy in supporting patients' self-management was compared between the profiles with MANCOVA with post-hoc Bonferroni correction (see Table 3). Differences between profiles were found for the subscales assess, agree, assist, arrange, and overall competence, whereas no differences were observed for advise. Based on subsequent post-hoc Bonferroni comparisons, the motivating and active profiles scored both significantly higher on self-efficacy to assess than the demotivating ($p = 0.013$, $p = 0.005$, respectively) and inactive profiles (both $p < 0.001$). The undifferentiated profile scored significantly higher on self-efficacy to assess than the inactive profile ($p = 0.013$). No differences were found for assess between the motivating, active and undifferentiated profiles, and between the demotivating and inactive profiles. Regarding self-efficacy to agree, the motivating and active profiles scored significantly higher than demotivating ($p < 0.001$, $p = 0.004$, respectively) and inactive profiles ($p < 0.001$, $p = 0.002$, respectively). The motivating profile also scored significantly higher on self-efficacy to agree than the undifferentiated profile ($p = 0.002$). No differences were found between the motivating and active profiles, and between the undifferentiated, demotivating and inactive profiles. Self-efficacy to assist was significantly higher in the motivating profile than the undifferentiated ($p = 0.006$) and inactive profiles ($p < 0.001$). The active profile was also significantly higher than the inactive profile ($p = 0.012$). No differences were found between the motivating, active and demotivating profiles, and between the undifferentiated, demotivating and inactive profiles. Post-hoc comparisons did not show significant differences between the profiles for self-efficacy to arrange. Finally, the score for overall competence was significantly higher in the motivating and active profiles than in the demotivating ($p = 0.005$, $p = 0.014$, respectively) and inactive profiles ($p < 0.001$, $p = 002$, respectively). There were no differences found between the motivating, active and undifferentiated profiles, and between the undifferentiated, demotivating and inactive profiles.

Discussion

In this study, grounded in SDT, we used the SIS-HCP to assess the self-perception of (de) motivating interaction styles of HCPs in training. Understanding how HCPs in training utilize various interaction styles can highlight areas for enhancing healthcare education and hence improve patient outcomes such as self-management of their chronic disease.

The first objective of this study was to gain insights into naturally occurring combinations of self-reported (de)motivating interaction styles of HCPs in training when supporting self-management for people with chronic diseases. While we hypothesized the presence of four profiles, the 5-cluster solution emerged based on the four SDT-related interaction styles: autonomy-support, structure, control, and chaos. As expected, we found two profiles characterized by the differential presence of motivating and demotivating styles, labeled as 'motivating' and 'demotivating' profiles. Additionally, our expectation to find profiles with simultaneous high or low levels of motivating and demotivating styles was partly confirmed as only an undifferentiated profile with relatively low levels on all styles was found, and no profile with high levels on all styles. However, one profile was characterized by high motivating styles and control and relatively low levels of chaos (labeled as 'active'). Unexpectedly, an additional profile with low motivating styles and control and relatively high levels of chaos (labeled as 'inactive') emerged. Thus, this study favored a five-cluster solution as the strongest, whereas Duprez et al. (2020) identified four profiles. In both the studies, the undifferentiated profile was the most prevalent, comprising 29% of HCPs in training in ours and 38% of practicing nurses in Duprez et al. (2020). The proportions of participants in the motivating, demotivating and active profiles were almost similar in both studies (~ 16%, ~ 17%, and ~ 22% respectively). It should be noted that in the present study, HCPs in training from two health professions (nursing and physiotherapy) were included, while Duprez et al. (2020) exclusively focused on nurses with at least 1 year of work experience. To the best of our knowledge, there are no other person-centered studies on (de) motivating interaction styles in HCPs in training.

It is important to acknowledge that from an SDT perspective not all profiles will be perceived as motivating by patients. In making the assumptions below, however, we need to keep in mind that the profiles were made with z-scores and that the raw scores were not extremely low (for motivating styles) or high (for demotivating styles). Our motivating profile, with high motivating styles and low demotivating styles, can be viewed as the most optimal approach for patients, as HCPs in this profile offer choice, help, guidance, feedback, and acknowledge patient's input (almost) without pressuring or ignoring them and without being awaiting or abandoning (Aelterman et al., 2019; Duprez et al., 2021; Haerens et al., 2021; Hagger & Protogerou, 2020). This approach fosters patients' needs and minimizes barriers in disease management, and therefore encourages autonomous motivation and self-management behavior (Chan et al., 2009; Duprez et al., 2020; Haerens et al., 2021; McGrane et al., 2014; Ng et al., 2012). Contrastingly, the demotivating profile, characterized by high demotivating styles and relatively low motivating styles, represents the least optimal approach for patients (Duprez et al., 2020; Hagger & Protogerou, 2020). Literature shows that chaotic and controlling HCPs thwart patients' needs by ignoring, abandoning or leaving them on their own (Ng et al., 2012; Ryan et al., 2008). The lack of autonomy-support and limited structure might further contribute to patients perceiving it as rather demotivating. HCPs in the active profile demonstrate a motivating approach similar to the motivating profile, but they also displayed behavioral characteristics of a controlling interaction style, such as ignoring and pressuring patients, which can evoke negative emotions (Haerens et al., 2021; Hagger & Protogerou, 2020). In contrast, the inactive profile, considered to be demotivating for patients by reverse reasoning, was characterized by HCPs in training with the lowest levels of motivating styles among all profiles, implying they provide limited choice, help, guidance, feedback, and do not acknowledge patient's input (Haerens et al., 2021; Hagger & Protogerou, 2020). In terms of z-scores, these HCPs demonstrated a pronounced chaotic interaction style, characterized by a wait-and-see attitude. In combination with limited need-support, this chaotic style may result in an inactive approach, leaving patients uncertain about how to manage their disease, potentially contributing to a demotivating perception in the eyes of the patient (Duprez et al., 2021). Finally, in the undifferentiated profile, HCPs in training neither scored high on motivating, nor low on demotivating styles, indicating a level of indecision in their approach to patients. To date, however, the effects of undifferentiated HCPs on patients are unclear, as they neither strongly support nor strongly thwart patients' needs. It should be noted that the potential impact of these profiles on patient outcomes is theoretical (Ng et al., 2012; Ryan & Deci, 2017) and based on associations observed for separate interaction styles. Future research should examine which feelings will dominate in patients when HCPs (in training) adopt combinations of motivating and demotivating styles, each with their varying degrees of support and thwarting.

The study's second objective was to explore differences in sample characteristics, SDT-beliefs, and self-efficacy in self-management support among interaction profiles. While prior research observed that women tend to be more autonomy-supportive than men (Duprez et al., 2020), our profile distribution did not completely support this. Specially, the profile with the lowest autonomy-support (i.e., 'inactive') did not exhibit a disproportionately low proportion of women. However, distinctions were observed in the motivating and demotivating profiles, with men being more prevalent in the demotivating profile (52%) and less in the motivating (10%), contrasting with the one-fourth representation in the overall sample. These findings may indicate that men tend to adopt less motivating and more demotivating approaches than women. This highlights a potential need for men to give more attention to support patient autonomy and offer more guidance. It is noteworthy that less nurses (20%) were categorized in the active profile than the whole sample (33%). Discrepancies between the fields of education may be influenced by variations in professional identity and the specific education programs within each profession. For the SDT-based beliefs and self-efficacy in self-management support, we expected to find higher effectiveness and feasibility beliefs of SDT-based strategies, along with higher self-efficacy in self-management support within more motivating profiles. Our findings support this hypothesis. HCPs in training belonging to the motivating and active profiles scored higher on effectiveness and feasibility beliefs of SDT-based strategies and self-efficacy in assess, agree and overall competence, than the demotivating and inactive profiles. The undifferentiated profile was less consistent with lower scores on SDT-beliefs and self-efficacy in agree and assist than the motivating profile, but higher self-efficacy in assess than the inactive profile. This implies that HCPs with more motivating profiles reported greater agreement with the importance and feasibility of SDT-based strategies, as well as more engagement in shared decision-making and mutual goal setting compared to those in less motivating profiles (Glasgow et al., 2003). No differences were found in the advising and arranging subscales of self-management support, which is unexpected since follow-up care, and providing information and instructions are necessary for autonomy-support and structure. Also, no differences were found between the motivating and active profiles, and between the demotivating and inactive profiles. This may indicate that HCPs in training, regardless of the co-occurrence of their interaction styles, reported similar levels of agreement and feasibility of SDT-based strategies and self-efficacy in self-management support. Another plausible explanation is that there are more variables related to the interaction profiles.

While beyond the scope of the present study aims, the values of the self-reported motivating and demotivating interaction styles in the present sample of HCPs in training were comparable with the findings for nurses by Duprez et al. (2020). This suggests that the self-perception of interaction styles may remain relatively stable after graduating and that there may be similarities between healthcare professions (here nurses and physiotherapists). Also, the present SEPSS-values were compatible with those reported for nurses in practice by Van Hooft et al. (2016) and Duprez et al. (2018), reinforcing the idea that these competences may also not undergo substantial improvement after graduation. Taken together, these similar results suggest shared patterns of self-perception of interaction styles and self-efficacy in self-management support among different healthcare professions, both in education and practice, indicating universality of those important general competences in health care. Therefore, training initiatives that extend beyond the boundaries of specific healthcare professions may be valuable, fostering the development of general competences that transcend specific disciplinary competences. However, more in-depth research is needed to confirm these assumptions.

Strengths and limitations

To the best of our knowledge, this study is the first to explore the natural coherence of self-reported (de)motivating interaction profiles among HCPs in training. Using a person-centered approach provides novel and holistic insights into how HCPs in training combine interaction styles, identified through cluster analysis. This deeper understanding holds potential for refining healthcare education by identifying shared patterns, guiding interventions. Therefore, how these interaction profiles differ across sample characteristics, SDT-beliefs, and self-efficacy in self-management support was explored. We were able to include a substantial sample of HCPs in training in nursing and physiotherapy, which was gender representative for the Flemish student population among both educational fields (Vlaamse overheid, 2023). However, a limitation of the person-centered approach is that the process of labeling clusters can be subjective, and that relying on z-scores may present differences that are not as pronounced in the raw data. Additionally, while a person-centered approach is gaining attention in health care, patient experiences based on an HCP categorized in a specific profile are hypothetical, shaped by variable-centered research and theoretical assumptions rather than empirical evidence.

We decided to ground our study in SDT, choosing it over alternative frameworks like Motivational interviewing (MI). While MI focuses on counseling techniques to facilitate patients' behavior change (Markland et al., 2005; Miller & Rollnick, 2012), SDT provides an empirically based theoretical framework that delves into the underlying motivational processes with increasing applications across various health domains (Ryan & Deci, 2017). Additionally, SDT aligns well with self-management support in HCPs in training, making it a suitable choice for investigating (de)motivational interaction profiles in healthcare settings (Ryan & Deci, 2017).

Despite the new insights, some limitations need to be noted. First, although two fields of education were included, results may not be generalizable to all fields of healthcare education. Therefore, expanding research to include various healthcare professions (in training) could provide insights into diverse professional cultures such as occupational therapists, speech-language therapists, and dieticians. A larger and more diverse sample of healthcare students could also provide a more detailed and reliable analysis of the clustering approach for healthcare students. Additionally, the adaptation of the original SIS-HCP questionnaire, which was initially designed and validated for nurses, to better suit physiotherapists may have influenced its validity for this subpopulation, despite the slight adjustments made. Second, as the questionnaire was administered only once, the direction of influence between the profiles and SDT-beliefs and self-management support cannot be specified. It is possible that beliefs about the effectiveness and feasibility of SDT strategies and self-efficacy in self-management support are determinants of how HCPs in training interact with patients, however, the reverse can also be true, pointing out that the adoption of certain interaction styles determine the beliefs and self-efficacy of HCPs in training. Further longitudinal or experimental research is essential to establish causality. Third, all measures were self-reported, which may have resulted in socially desirable answers. Therefore, multi-perspective measures, such as patient perceptions, could be beneficial to obtain a more accurate insight of HCPs' (de)motivating interaction (profiles). Moreover, patient health outcomes can provide more insight into the consequences of HCPs interaction styles than theoretical assumptions. Consequently, additional longitudinal research is needed to determine the impact of HCPs in training (de)motivating interaction profiles on patients' health outcomes. Finally, only a limited number of correlates were included in the present study. Hence, further research should be conducted on additional variables influencing (de)motivating interaction profiles, for example patients' characteristics (e.g., physical condition, psychological capacity, knowledge, social context) and organizational factors (e.g., work organization, HCPs schedule, daily routine, colleagues) (Kors et al., 2020). Additionally, characteristics of the students themselves (e.g., prior experience, knowledge and competences related to topics such as behavior change, communication strategies, self-management support or MI, for example from previous classes or internships) should be considered. The latter was not explicitly asked, all students had varying degrees of experience with motivating communication. Understanding these factors could provide valuable insights for shaping more targeted educational recommendations.

Educational implications

Understanding the (de)motivating interaction profiles of HCPs in training and its correlates holds potential for refining healthcare education. Approximately one-third of HCPs in training adopted average levels of all styles and another third had a rather demotivating approach. While the raw scores of the motivating styles may seem adequate, the z-score based distribution underscores the opportunity for increased attention towards fostering more motivating interaction profiles. Encouragingly, 38% of the HCPs in training were defined by high values on the motivating styles, but less than half of them also scored low on both demotivating styles. It is crucial for HCPs to acquire competencies to create such a need-supportive and motivating environment during their education, laying the foundation for the professionals they aim to become. To shift to a more motivating profile, careful consideration of the underlying factors is needed.

The findings of this study underscore the potential benefits of providing additional support for men and nurses, who were found to be less inclined to report a motivational profile. Further, given the differences in beliefs of SDT-based strategies and self-efficacy of self-management support across the interaction profiles, integrating SDT-principles and the 5As model of behavior change into the curriculum may enhance HCPs understanding of patients' self-management, which may positively evolve their motivating profiles. However, the cross-sectional design prevents definitive exclusion of the reverse direction in both relationships. Still, it may be valuable to educate HCPs in training about SDT-based strategies during theoretical courses or lectures in order to adopt more motivating interaction techniques (Hagger & Protogerou, 2020). Also, incorporating techniques from Motivational Interviewing can further support the practical implementation of motivating interaction approaches (Miller & Rollnick, 2012; Patrick & Williams, 2012). Mastering the principles of SDT with MI can be achieved in a practical part with for example workshops, live role-plays with real or simulated patients or peers, or feedback on videotapes (Deveugele et al., 2005; Duprez et al., 2022; Hagger & Protogerou, 2020). Workshops or roleplaying can also involve feedback from peers, supervisors, and patients. These educational opportunities require a motivational approach by the educator or mentor toward the students (Lyness et al., 2013). Just as autonomy support by HCPs is beneficial for patients, autonomy support by educators is also beneficial for students. It has a positive influence on students' professional approach to counsel their patients (Lyness et al., 2013).

Implementing the educational implications discussed above into healthcare curricula presents several challenges. While methods like role-play, simulated patients, and educator feedback are proven to be effective (Gilligan et al., 2021), they are also time-intensive and managing them for large groups of students without compromising quality might be a challenge. Additionally, providing meaningful feedback on communication or interaction styles during internships is often hindered by the high workload in healthcare settings (Vander Elst et al., 2016), as well as the fact that mentors may not see themselves as experts in those competences and prefer to focus on how students perform in terms of clinical treatment. Finally, translating theoretical knowledge into actual behavior is a challenge, further complicating the integration of these competences into practice (Greenway et al., 2019; Singh et al., 2024). To bridge this gap, it is essential to foster closer collaboration between universities and clinical settings. Such collaboration could enhance curricula to closer align academic education with the therapeutic competences needed in practice (Singh et al., 2024).

Conclusion

Among HCPs' in training, five (de)motivating interaction profiles emerged, with the motivating profile theoretically viewed as the most favorable, followed by the active profile, the inactive and demotivating profiles were both seen as unfavorable, with the demotivating profile as the most detrimental. The undifferentiated profile (having average values on the four interaction styles) was the most prevalent.

The motivating and active profiles showed the highest beliefs of SDT-based strategies and self-efficacy to assess, agree and overall competence in supporting patients' self-management and lowest in the demotivating and inactive profiles, with the undifferentiated profile in between. This indicates the importance of SDT-beliefs and self-efficacy in self-management support among HCPs in training. Gender and profession disparities highlight the need for targeting educational approaches in health care. These findings suggest that incorporating the SDT-framework into healthcare education may enhance competencies in adopting motivating interactions with patients and promoting self-management support.

Appendix 1

Cluster descriptions

Explained variance: adjusted R^2

# clusters	3	4	5	6	7
Autonomy-support	**0.395**	0.514	0.574	0.574	0.597
Structure	**0.415**	0.617	0.701	0.709	0.709
Chaos	0.508	0.520	0.528	0.593	0.606
Control	**0.346**	**0.403**	0.516	0.542	0.600

Values < .500 are given in bold

Cohen's kappa (K)

# clusters	5	6
Part 1/Part 2	0.644/0.558	**0.444**/0.668
Combined	0.604	0.559

Values < .500 are given in bold

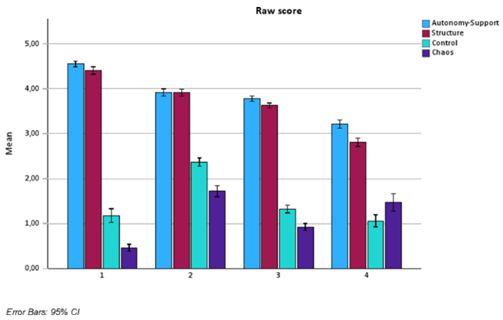
Means interaction styles 3-cluster solution

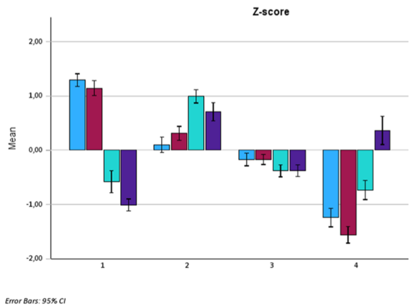
	3	1	2
n (%)	61 (16)	127 (34)	187 (50)
Autonomy-support	4.55	3.92	3.61
Structure	4.41	3.91	3.38
Control	1.18	2.37	1.25
Chaos	0.46	1.72	1.09

Means interaction styles 4-cluster solution

	1	2	3	4
n (%)	61 (16)	127 (34)	131 (35)	56 (15)

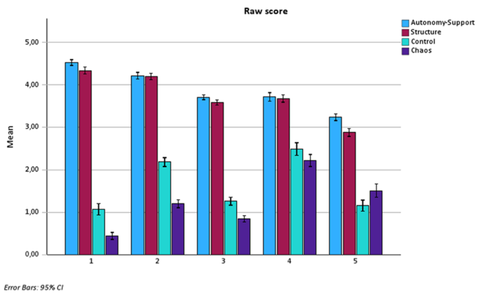
	1	2	3	4
Autonomy-support	4.55	3.92	3.78	3.22
Structure	4.41	3.91	3.63	2.81
Control	1.18	2.37	1.33	1.06
Chaos	0.46	1.72	0.92	1.47

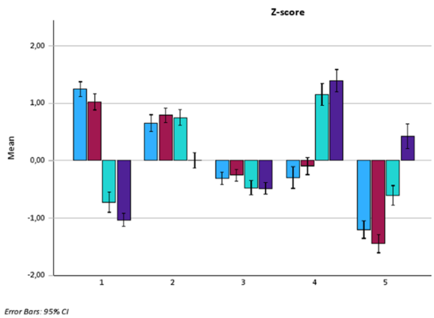




Means interaction styles 5-cluster solution

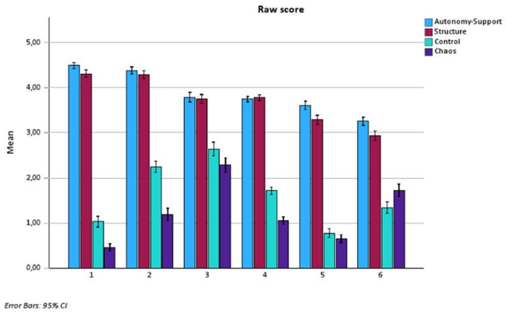
	1	2	3	4	5
n (%)	60 (16)	81 (22)	108 (29)	62 (17)	64 (17)
Autonomy-support	4.53	4.21	3.71	3.72	3.24
Structure	4.34	4.20	3.28	3.67	2.88
Control	1.07	2.19	1.26	2.49	1.16
Chaos	0.45	1.20	0.85	2.22	1.51

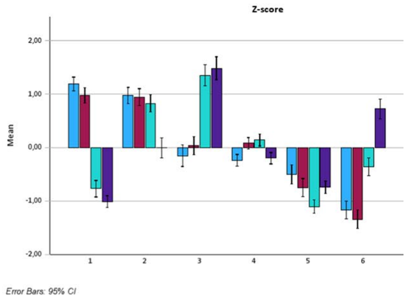




Means interaction styles 6-cluster solution

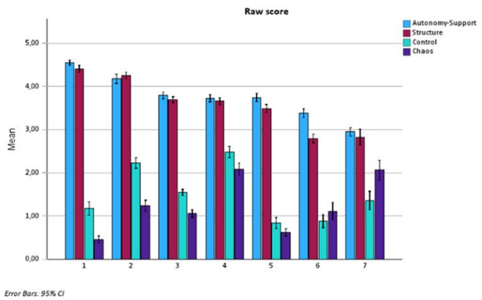
	1	2	3	4	5	6
n (%)	61 (16)	56 (15)	52 (14)	91 (24)	55 (15)	60 (16)
Autonomy-support	4.49	4.38	3.79	3.75	3.61	3.25
Structure	4.31	4.29	3.75	3.78	3.29	2.94
Control	1.03	2.24	2.64	1.72	0.78	1.34
Chaos	0.46	1.20	2.29	1.06	0.66	1.73

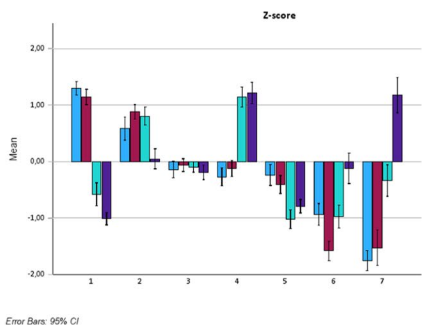




Means interaction styles 7-cluster solution

	1	2	3	4	5	6	7
n (%)	61 (16)	55 (15)	90 (24)	72 (19)	41 (11)	35 (9)	21 (6)
Autonomy-support	4.55	4.18	3.79	3.73	3.74	3.38	2.95
Structure	4.41	4.25	3.69	3.66	3.49	2.79	2.83
Control	1.18	2.23	1.55	2.48	0.84	0.88	1.36
Chaos	0.46	1.24	1.06	2.09	0.62	1.11	2.06





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Data availability Collected data are available upon request to the corresponding author.

Declarations

Competing Interests The authors declare no competing interests.

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