Article

Team, Career, and Management: Mental Maps of Working Conditions and Intention to Stay of Physicians in Academic Medicine

Joachim Hasebrook[1*], Juliane Hecke[2], Thomas Volkert[2], Maren Singer[1], Juergen Hinkelmann[3], Leonie Michalak[4] and Klaus Hahnenkamp[5]

[1] zeb.business school Steinbeis University, Berlin, Germany
[2] University Hospital Muenster, Clinic for Anesthesiology, Muenster, Germany
[3] Lukas Hospital Dortmund, Clinic for Anesthesiology, Dortmund, Germany
[4] Curacon GmbH, Muenster, Germany
[5] University Medicine Greifswald, Greifswald, Germany
*Corresponding author: joachim.hasebrook@steinbeis.de

Abstract: Job satisfaction has a strong impact on the intention to stay which is an important aspect to counter skills shortage in academic medicine. In an interview study combining qualitative and quantitative methods we investigated how the mental representation of working conditions influences job satisfaction and its impact on the intention to stay. In a first study chief physicians participated in interviews about job satisfaction in academic hospitals. Answers were segmented into statements, ordered by topics and rated according to their valence. In a second study assistant physicians (residents) during and after their training period talked about strength, weaknesses and potential improvements of working conditions. Again, answers were segmented, ordered, rated and used to develop a 'job satisfaction scale'. In a third study, assistant physicians participated in a computer-led repertory grid procedure composing 'mental maps' of job satisfaction factors, filled in the job satisfaction scale and rated if they would recommend work and training in their clinic as well as their intention to stay. Comparing the interview results with recommendation rates and intention to stay show that a negative attitude is linked to high workload and poor career perspectives. A positive attitude towards work environment and high intention to stay are linked to sufficient personnel and technical capacities, reliable duty scheduling and fair salaries. The third study using repertory grids showed that the perception of current teamwork and future developments concerning work environment were the main aspects to improve job satisfaction and the intention to stay. The results of the interview studies were used to develop an array of adaptive improvement measure. The results support prior findings that job dissatisfaction is mostly based on generally known "hygiene factors" and whereas job satisfaction is due to individual aspects.

Keywords: job satisfaction; physicians; turn-over intention; turnover intention; teamwork; skills shortage; interview study; repertory grids

1. Introduction

1.1. Job satisfaction, dissatisfaction, and intention to stay

Employees' job satisfaction and their intention to stay are constantly subject of scientific research. For decades, job satisfaction received lots of attention from various scientific fields, however, it remains a focal point of research concerning management practices.(Zhu, 2017) Measuring job satisfaction serves as an indicator for employees' performance in terms of quality,(Judge et al., 2020) productivity and commitment,(Spector, 1997; Coetzee and Stoltz, 2015) as well as for turnover risks.(Halter et al., 2017; Radford and Meissner, 2017; Yarbrough et al., 2017; De Simone et al., 2018; Judge et al., 2020; Koch et al., 2020; Labrague, 2020; Nikkhah-Farkhani and Piotrowski, 2020; Sillero-Sillero and Zabalegui, 2020) Additionally, research was able to show that satisfied employees are more

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likely to advocate for the organization which can be an important factor in today's labor market.(Judge et al., 2020) All of this accounts for physicians and health care workers as well. Physicians' satisfaction and therefore performances seem to be directly linked to the patients' satisfaction (Haas et al., 2000) and outcomes.(Katz, 1999) This underlines the importance of physicians' job satisfaction as it eventually has an impact on national health outcomes.(Oh et al., 2019)

Among scientific fields and researchers different definitions of job satisfaction circulate. A fundamental definition of job satisfaction refers to the way how people feel about their job and whether they like or dislike it (Spector, 1997) – a rather simple definition frequently used and build upon.(Moorman, 1993; Ajamieh et al., 1996; Armstrong, 2006; Giménez-Espert et al., 2020) If the employees have positive feelings and attitudes towards their job (Ajamieh et al., 1996; Giménez-Espert et al., 2020) and are enthusiastic and happy with their work,(Kaliski, 2007) they account to be satisfied with their job. Other research expand job satisfaction by adding the personal feeling of achievement.(Statt, 2004; Mullins, 2005; Kaliski, 2007) Receiving rewards - equally intrinsically and extrinsically - and perceiving them as rightful is associated with job satisfaction.(Mullins, 2005; Rama-Maceiras et al., 2012; Dall'Ora et al., 2020) Davis et al. (1989) furthermore states that job satisfaction deals with meeting or exceeding the employees' expectations of the job. Moorman (1993) differentiated between affective and cognitive perspectives on job satisfaction where cognitive satisfaction is a more logical and rational evaluation and mental representation of working conditions which are crucial factors to be examined in order to understand job satisfaction (Rodríguez-García et al.; Rama-Maceiras et al., 2012; Heponiemi et al., 2014; Adriaenssens et al., 2015; Dall'Ora et al., 2015; Barken et al., 2018; Kao et al., 2018; Kim and Yi, 2019; Pishgooie et al., 2019; Tawfik et al., 2019; Bautista et al., 2020; Labrague et al., 2020).

There is evidence for various working conditions naturally influencing job satisfaction. Relatively high or fair salary (Kao et al., 2018) and opportunities for promotion for example seem to lead to higher job satisfaction as well as social aspects of work, (Pocztowski, 2003; Armstrong, 2006; Sypniewska, 2014) such as ethical and transformational leadership, (Kim and Yi, 2019; Pishgooie et al., 2019; Tawfik et al., 2019; Labrague et al., 2020; McKenna and Jeske, 2021) sustainable relationships with supervisors (Rama-Maceiras et al., 2012; Dall'Ora et al., 2020) and co-workers (Kim and Yi, 2019; Dall'Ora et al., 2020). A good perceived atmosphere at work (Sypniewska, 2014; Tawfik et al., 2019) are also found to result in high job satisfaction. Conversely, high workload and stress like time pressure have a negative impact on job satisfaction.(Jermsittiparsert et al., 2021) Herzberg (1965) categorized the working conditions influencing job satisfaction into two groups: external and internal factors. External or hygiene factors comprise wages and safety, but also supervisors. Internal factors or motivators consist of higher needs like recognition by others, work performance, development and accountability.

1.2. Work conditions of physicians and nurses

In 2020, Martinussen (2020) examined 21% of all hospital physicians to have the intention to leave their current job for another one. Furthermore, over 20% were indecisive. Various research found that the social climate was a factor favoring the nurses' and physicians' intentions to stay with their employer, (Heponiemi et al., 2019; Martinussen et al., 2020; Nikkhah-Farkhani and Piotrowski, 2020) while the leadership style had a delicate influence on the physicians' intentions to leave.(Stagnitti et al., 2006; Suliman, 2009; Halter et al., 2017; Fontes et al., 2019; Pishgooie et al., 2019; Labrague et al., 2020; Lee and Jang, 2020; Magbity et al., 2020; Martinussen et al., 2020) Negative feelings when experiencing discrimination (Heponiemi et al., 2019), bullying (Adriaenssens et al., 2015; Edmonson and Zelonka, 2019; Park and Choi, 2019; Favaro et al., 2021), conflict with peers (Zaheer et al., 2019; Bautista et al., 2020; Lee and Kim, 2020), high workloads (Perkins et al., 2007; Bautista et al., 2020; Lee and Kim, 2020), understaffing (Sasso et al., 2019), emotional exhaustion (Hoonakker et al., 2013; Vandenbroeck et al., 2017; Sasso et al., 2019), long working shifts (Dall'Ora et al., 2015; Arslan Yürümezoğlu et al., 2019) and stress (Hoonakker et

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al., 2013; Halter et al., 2017; Lee and Jang, 2020; Somville et al., 2020; Chen et al., 2021) also push physicians' and nurses' intentions towards leaving their job behind. Further factors that previously affected the physicians' and nurses' job satisfaction also influence their intention to stay: fair pay (Kao et al., 2018), freedom to do the job (Barken et al., 2018), job autonomy (Stagnitti et al., 2006; Barken et al., 2018) and recognition (Yoder, 1995; Adriaenssens et al., 2015; Hämmig, 2018). But also the work-family conflict or work-life imbalances were found to be factors leading physicians' and nurses' to quit their jobs. (Hämmig, 2018; HakemZadeh et al., 2020; Nikkhah-Farkhani and Piotrowski, 2020) The same accounts for perceived poor career perspectives. (Yoder, 1995; Perkins et al., 2007)

Working conditions such as income (Kao et al., 2018; Oh et al., 2019), managerial (Nassab, 2008; Domagała et al., 2018) or social support and social climate (Stagnitti et al., 2006; Adriaenssens et al., 2015; Dall'Ora et al., 2020) are influencing physicians' and nurses' job satisfaction as well as good relationships with other colleagues (Stoddard et al., 2001; Sibbald et al., 2003; Domagała et al., 2018; Oh et al., 2019), adequate communication among peers (Sibbald et al., 2003). Physicians and nurses value good relations with their patients as they tend to attest higher job satisfaction, if they have adequate time to spend with patients, and if they are able to maintain relationships with them.(Stoddard et al., 2001; Oh et al., 2019) Job satisfaction is found to be further enhanced, if high levels of professional autonomy and freedom are guaranteed and perceived as that.(Stagnitti et al., 2006; Rama-Maceiras et al., 2012; Barken et al., 2018; Oh et al., 2019; Dall'Ora et al., 2020). Social status and reputation is an influencing factor concerning physicians' job satisfaction (Oh et al., 2019). A good working environment overall and flexible work conditions have a positive effect on satisfaction (Stagnitti et al., 2006). In contrast, shift working patterns, (Grainger et al., 1995) high workload (Dall'Ora et al., 2015; Bautista et al., 2020), high job demands (Adriaenssens et al., 2015; Dall'Ora et al., 2020), low job control (Rama-Maceiras et al., 2012; Adriaenssens et al., 2015; Dall'Ora et al., 2020) and long working hours (Leigh et al., 2002; Dall'Ora et al., 2015; Oh et al., 2019; Dall'Ora et al., 2020) significantly lower job satisfaction and may lead to job dissatisfaction, meaning negative feelings and attitudes towards the job. (Armstrong, 2006)

1.3. Consequences of job satisfaction and dissatisfaction

Dissatisfied employees demonstrate decreased performances and loyalty, but increased absenteeism (Aziri, 2011) and, eventually, a higher risk of employee turnover.(Halter et al., 2017; Radford and Meissner, 2017; Yarbrough et al., 2017; De Simone et al., 2018; Judge et al., 2020; Koch et al., 2020; Labrague, 2020; Nikkhah-Farkhani and Piotrowski, 2020; Sillero-Sillero and Zabalegui, 2020) In case of physicians and nurses, in addition to financial consequences (Weninger Henderson, 2020) also patients' safety may be affected: High workload, capacity shortages and dissatisfaction of physicians have significant impact on performance and patients' safety.(Aiken et al., 2002; Catalá-López, 2009) Job satisfaction of caregivers is directly linked to their intention to stay. (Radford and Meissner, 2017; Yarbrough et al., 2017; Nikkhah-Farkhani and Piotrowski, 2020; Rodríguez-García et al., 2021) In turn, dissatisfaction was found to be a driving force for nurses' and physicians' turnover intentions.(Hoonakker et al., 2013; Halter et al., 2017; De Simone et al., 2018; Koch et al., 2020; Labrague, 2020; Sillero-Sillero and Zabalegui, 2020) Just as in case of satisfaction and dissatisfaction, turnover intentions are not the opposite of intentions to stay. (Nanncarrow et al., 2014) Dissatisfaction and intentions to leave is not drawn from the same working conditions as satisfaction and intentions to stay is (Perkins et al., 2007). For instance, nurses might want to stay with the employer because of the great communication between colleagues, but they do not necessarily have the intention to leave because of a lack of communication, but rather because of better career opportunities elsewhere.

Considering increasing skills shortage and endangered patients' safety, it is crucial for hospitals to evaluate employees' job satisfaction as well as their intentions to leave or stay via active retention management as those are important requirements to ensure competence continuity in critical settings that heavily depend on expertise. Additionally,

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various examinations found physicians to be more attached to their profession itself rather than their employer and as physicians are greatly searched for in the labor market, employers have to provide convincing arguments for physicians to stay with them.(Mano-Negrin and Kirschenbaum, 1999) Those arguments must include considerations of job satisfaction and intention to stay.

1.4. Project background and research questions

Prior research has amassed findings on working conditions leading to job satisfaction and dissatisfaction and how satisfaction and dissatisfaction is linked to intention to stay and turnover intentions. Reviews of this research (Halter et al., 2017; Fontes et al., 2019) show that most data are derived from standardized surveys based on certain models such as LMX (Pishgooie et al., 2019; Labrague et al., 2020; McKenna and Jeske, 2021) or Job-Demand-Resources (Hoonakker et al., 2013). Moreover, the results refer to various perspectives, such as career development (Nassab, 2008), economic issues (Weninger Henderson, 2020), or employer attractiveness (Rodríguez-García et al., 2021). In addition, a variety of work conditions, such as fair pay (Kao et al., 2018) shift work (Dall'Ora et al., 2015), and personal perceptions – e.g., concerning recognition (Adriaenssens et al., 2015) and autonomy (Barken et al., 2018) – as well as cohort effects (Gordon, 2017) play an important role to determine job satisfaction and satisfaction and its impact on intention to stay and turnover intention. In summary, despite the overwhelming amount of research data, there is lack of individual perspectives, which can be found in some case studies (Liedtka et al., 1998) or through participatory observation (Morrison and Korol, 2014). We want to bridge the gap between quantitative, model-based research based on standardized surveys and qualitative approaches and bring back the individual perspective to the design of retention programs in hospitals (Shewchuk et al., 2006). In combined quantitative and qualitative research in two different ways: (1) Indirect by combining a qualitative research line with interviews and a quantitative line with surveys, (2) direct by applying Repertory Grids as a method, which combines qualitative and quantitative elements (White, 1996).

Interviews and survey carried out within the „FacharztPlus“ project (further referred to as PhysicianPlus), a project financially supported by the German Ministry of Education and Research (BMBF) and aiming towards finding measures in order to retain physicians in hospitals.(Hasebrook et al., 2016a) Physicians from German university hospitals, residents and physicians, in 15 departments of anesthesiology were interviewed and surveyed.(Hinkelmann et al., 2017) The results were used to evaluate measures to increase job satisfaction in other industries, which have to deal with shift work, a need for an adaptive and at least partly highly qualified workforce, such as professional services, harbor and airport logistics. Positively evaluated measures were adapted and tested in the participating hospitals (Hahnenkamp and Hasebrook 2022).

The research within the PhysicianPlus project was guided by four research questions:

1. How are negative and positive statements individual interviews are structured and how they are interrelated?
2. How are individual negative statements (weaknesses) and positive statements (strengths) are connected to the individual valuation of work and training quality and the intention to stay?
3. How are individual statements and valuations are affected by cohort effects, such as work experience and career stage?
4. How do ‘mental maps’ summarizing individual positive and negative statements of the different cohorts differ with respect to work, training, and intention to stay?

Answers to these research questions should help to reflect on practical implications and to develop and test measures to improve intention to stay and reduce turnover intention of highly qualified staff in hospitals.

2. Method

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2.1. Design

We used qualitative and quantitative methods in a convergent parallel mixed-method design (Alrawashdeh et al., 2021). Our mixed-method approach integrates qualitative and quantitative methods at multiple steps of research (Teddlie and Yu, 2007; Fetters et al., 2013; Moseholm and Fetters, 2017; Alrawashdeh et al., 2021)figure 1).

Interviews. Individuals participated in semi-structured interviews giving them the freedom to mention all aspects concerning their work in the hospital, which were later rated as 'negative' or 'positive' and related to topics derived from the interviews, such as 'vacation scheduling' or 'onboarding processes for new employees'.

Surveys. Two different types of surveys were used: (1) The Net Promoter Score (NPS), and (2) Repertory (or Kelly) Grids.

Net Promoter Score (NPS): The NPS was originally developed to measure customer loyalty (Reichheld, 2003) but is now also in applied in hospitals.(Melissant et al., 2018; Sieja et al., 2019; Garcia-Huidobro et al., 2020; Bosch et al., 2021) especially to measure satisfaction with the work environment (Legerstee, 2013; Vochin et al., 2020). The NPS measures the willingness of a person (a customer or an employee) to recommend a company, a product or working conditions to relevant others, such as family members, friends or colleagues on a scale from 0 (very unlikely) to 10 (very likely). This ensures a thorough self-evaluation whether to recommend a company or not (De Haan et al., 2015). Only responses 9 and 10 are seen as active promotors, whereas responses from 0 to 6 are valued as "sceptical", because only a very positive evaluation leads to active, promoting behavior (Eklof et al., 2020).

Repertory Grids: Based on Kelly's personal construct theory (Blowers and O'Connor, 1995) Kelly Grids (or Repertory Grids) measure the valence of predefined elements in terms of personal constructs. Repertory Grids combine both qualitative and quantitative methods and eliminate interviewer bias, because participants essentially create their own questionnaire (Winter, 2003). The gathered data not only on factors required for success, but the relative importance of each factor to the concept of successful practice (White, 1996). It is a methodology commonly employed in Job Analysis i.e., describing jobs and the attributes required to perform them, and provides the workers' perspective (Hill et al., 2016; Hamad et al., 2017; Burke, 2022). The Repertory Grids were analyzed, visualized as 'mental maps' of job satisfaction and dissatisfaction aspects, and they were related to NPS expressing satisfaction with working conditions, training and intention to stay.

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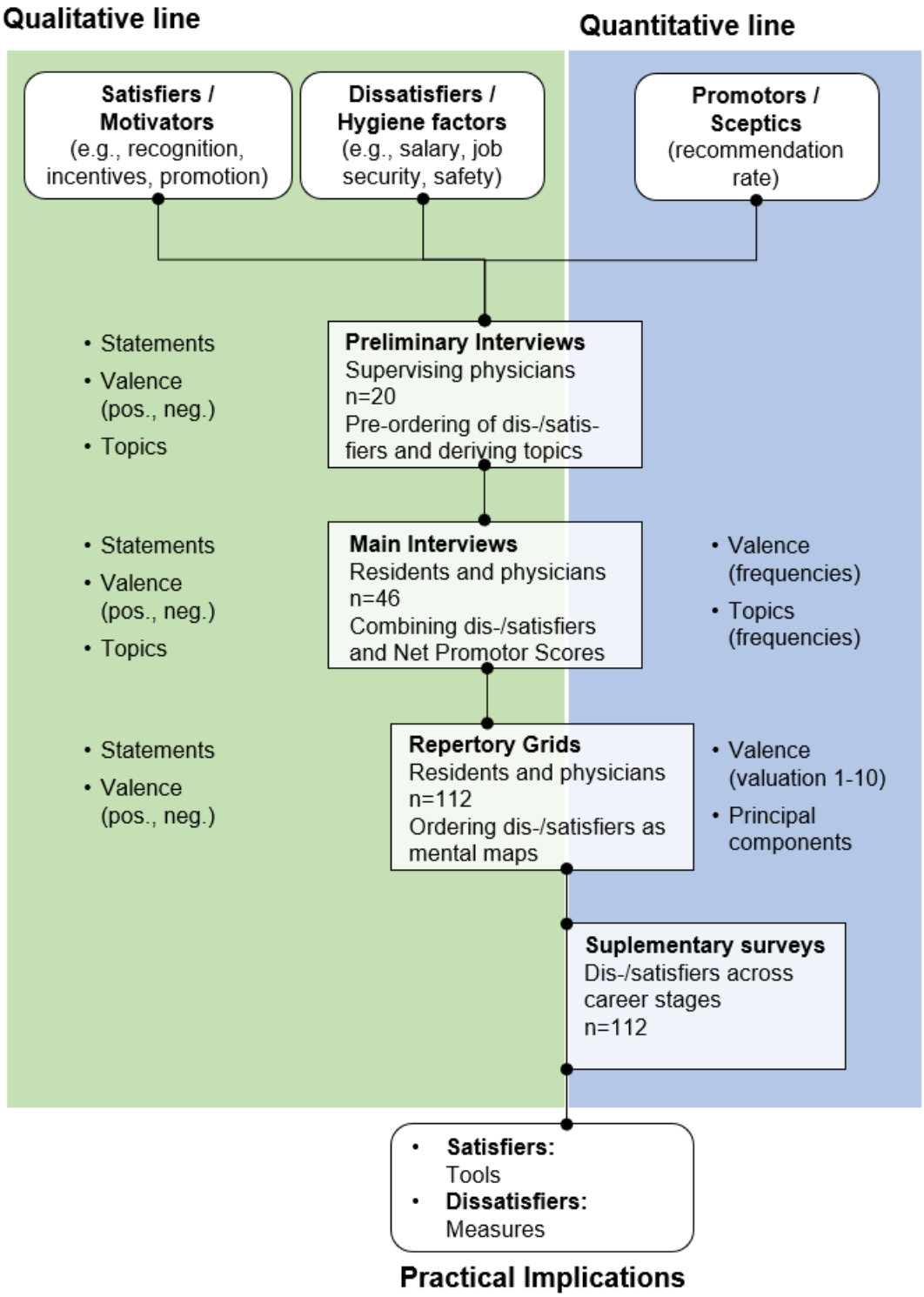

Figure 1. Swimlane of complementary qualitative and quantitative mixed-method design used in the interview study.

2.2. Material and procedure in general

Semi-structured individual interviews were used as a tool for data collection (appendix 1). In a first study chief physicians were interviewed about their experiences concerning keeping or leaving jobs in academic hospitals. The answers were protocolled, segmented into statements and these statements were aggregated by the help of a hierarchical cluster analysis (Husson et al., 2010).

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In a second study residents talked about strengths, weaknesses and potential improvements of working conditions in their hospital within the framework of open, semi-structured interviews. Answers were recorded, segmented into statements, and assigned to the cluster items obtained from the first study. Additionally, all physicians rated their recommendation concerning work environment, career, education and intention to stay applying the NPS procedure.

In a third study, residents from four university hospitals participated in a brief interview including a computer-led Repertory Grid procedure. We asked the participants to respond to eight elements: 1. "Nurses" and 2. "Physicians" (their profession), 3. "clinic today" and 4. "clinic in 5 years' time" (present and future or their workplace), 5. "hospital today" and 6. "hospital in 5 years' time" (present and future of the institution) as well as 7. "clinic management" and 8. "hospital management" (their direct management and general management of the institution). In a first run of the computer-led survey, participants were asked to name a typical feature for each element, e.g., "nurses – team cohesion" or "physicians – high expertise". They were also asked to state whether this feature is positive or negative, e.g., "team cohesion" = positive, and describe the opposite, e.g., "team conflict" = negative. In a second run, the participants responded to pairs of elements, such as "nurses – physicians". They were given their statements from the first run as a scale from 1=negative to 10=positive and evaluated each element on this individual scale, e.g., "Nurses – 1= team conflict to 10 = team cohesion" and "Physicians – 1= team conflict to 10 = team cohesion". As a result, all elements were individually described by each participant with its most relevant features, and the valence of all elements was evaluated on scale from negative=1 to positive=10.

3. Results

3.1. Study 1: Deriving a rating procedure and topic list

3.1.1. Design

In a semi-structured interview chief physicians (residents) were asked to talk about strength, weaknesses and ideas for improvements concerning clinical work, team culture and cooperation, management and leadership, training, and development as well as prospects of the project PhysicianPlus itself (see appendix 1.1). All interview phrases were written down and split up into single statements. These statements were evaluated by independent raters not participating in the interview process, according to valence (positive, negative) and topic affiliation of each statement. The topics were in two steps: Automatic ordering of phrases using cluster analyses, and further refinement during the rating process. The results of this rating procedure form the basis of the main interview study.

3.1.2. Participants

In summary, n=20 residents participated in the interviews, n=4 female and n=16 male persons. In average, they held their positions for 4.4 years and worked for the hospital for 13.6 years.

3.1.3. Method and procedure

Interviews lasted about 45 to 180 minutes (mean 1.5 hours) and were recorded in a written protocol. The protocols were checked by the interviewees, who gave their written consent, that protocols may be used in this research. Protocols were anonymized and coded in a codebook transferring original phrases into abbreviated statements. These were rated according to valence (positive vs. negative) and topic affiliation. Raters used a topic list automatically generated through a cluster analysis of all statements collected in all interviews and refined it step by step during the rating of all interviews. A brief sample of the codebook is shown in table 1).

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Table 1. Excerpt from the codebook to derive short statements from original interview phrases and aggregate them to topics (translated from the German original).

Original phrase	Short statement	Sentiment	Topic
Size and competence in patient care, proud to work "state of the art"	medical expertise, (state-of-the-art, modern), competence	Positive	Quality of training
Differences in position are sometimes played out (let the doctor "run up", let the nurse "fidget")	Playing out differences in position	Negative	Cooperation with nurses
Specialist often is a "motivator" and "explainer" (e.g., that waiting times and short usage times of expensive devices cause costs)	Physician as mentor / supervisor	unclear valence	Quality of supervision

3.1.4. Results

In total, physicians generated 560 positive or negative statements about their work in the clinic. The aggregation of all statements resulted in 20 high level topics. Most items referred to quality of training (14.3%) and workforce planning (12.0%) followed by cooperation and culture (10.2%). Results of the aggregation are shown in table 2.

Table 2. Frequencies and sentiment of topics mentioned in the preliminary interviews with supervising physicians (absolute numbers and percentage).

No	Topic	neg.	pos.	total	% neg.	% pos.	% of total
1	Quality of training	13	67	80	16.3%	83.8%	14.3%
2	Duty scheduling	56	11	67	83.6%	16.4%	12.0%
3	Vacation scheduling	45	2	47	95.7%	4.3%	8.4%
4	Culture / atmosphere	37	20	57	64.9%	35.1%	10.2%
5	Personnel capacity	25	3	28	89.3%	10.7%	5.0%
6	Resources / equipment	25	11	36	69.4%	30.6%	6.4%
7	Leadership	3	24	27	11.1%	88.9%	4.8%
8	Performance orientation	15	1	16	93.8%	6.3%	2.9%
9	Onboarding	18	24	42	42.9%	57.1%	7.5%
10	Working environment	5	9	14	35.7%	64.3%	2.5%
11	Cooperation	10	5	15	66.7%	33.3%	2.7%
12	Technical services	13	2	15	86.7%	13.3%	2.7%
13	Administration	17	4	21	81.0%	19.0%	3.8%
14	Family / Work Life Balance	8	3	11	72.7%	27.3%	2.0%
15	Quality of supervision	9	5	14	64.3%	35.7%	2.5%
16	Salary	1	1	2	50.0%	50.0%	0.4%
17	Career perspectives	16	2	18	88.9%	11.1%	3.2%
18	Flexible work schedules	3	6	9	33.3%	66.7%	1.6%
19	Cooperation with nurses	8	21	29	27.6%	72.4%	5.2%

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20	Working hours	10	2	12	83.3%	16.7%	2.1%
	Sum / mean	337	223	560	62.9%	37.1%	100%

3.2. Study 2: Main interview study

3.2.1. Design

Using the same interview guide, we conducted semi-structured interviews with physicians. They were asked to talk about strengths, weaknesses and suggestions for improvement concerning the clinic in general, work environment, training, management, leadership, and cooperation. At the end of the interview all interviewees were asked to fill-in three quantitative NPS ratings: 1. willingness to recommend the clinic as a workplace, 2. willingness to recommend the clinic's training program, and 3. probability to stay in the clinic for the next five years. They also reported how long they already had worked for the clinic and how long they hold their actual position. Interviews were recorded and transferred into short statements which were rated according to their sentiment (positive, negative) and their affiliation to a topic derived from the preliminary study. We assumed that more positive statements were connected to higher Net Promoter Scores, that represents more recommending the clinic as working and training place and a higher intention to stay. We also expected more positive statements and higher NPS scores the longer a person worked in the clinic and held their job position.

3.2.2. Participants

In summary, n=46 physicians participated in the interviews, n=13 female and n=33 male persons. In average, they worked for the hospital for 7.04 years and held their current position for 3.25 years.

3.2.3. Method and procedure

Interviews included the same questions as in the preliminary study (see appendix 1.2). Interviews lasted about 30 to 140 minutes (mean 60 minutes) and were documented in a written protocol. Protocols were checked by the interviewees, who gave their written consent, that protocols may be used in this research. Protocols were anonymized and rated using the codebook developed in the preliminary study (see table 1). To measure interrater reliability, randomly picked 10 interviews were categorized by two independent raters. All items could be categorized and interrater reliability was r=0.82 (Cohent's Kappa), which indicates a sufficient reliable categorization of the interview items.(Yawn and Wollan, 2005) NPS rated ranged from 1 (recommendation very unlikely) to 10 (recommendation very likely). Recommendation scores were grouped according to the NPS scheme into three groups: Promoting (9-10), neutral (7-8), and skeptical (1-6).

3.2.4. Results

3.2.4.1 Structure and relation of topics

In total, 1,239 positive or negative statements were counted resulting in a frequency table which lists frequencies per topic (see table 3). Most of the statements were negative (67.8%) and mostly addressed the quality of professional training (12.6%), duty (10.3%) and vacation (8.6%) scheduling and aspects of culture and atmosphere in the clinic (8.8%).

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Table 3. Frequencies and sentiment of topics mentioned in the main interviews with residents and non-supervising physicians (absolute numbers and percentage).

No	Topic	neg.	pos.	total	% neg.	% pos.	% of total
1	Quality of training	30	126	156	19.2%	80.8%	12.6%
2	Duty scheduling	111	17	128	86.7%	13.3%	10.3%
3	Vacation scheduling	97	9	106	91.5%	8.5%	8.6%
4	Culture / atmosphere	71	38	109	65.1%	34.9%	8.8%
5	Personnel capacity	69	4	73	94.5%	5.5%	5.9%
6	Resources / equipment	40	31	71	56.3%	43.7%	5.7%
7	Leadership	9	49	58	15.5%	84.5%	4.7%
8	Performance orientation	41	1	42	97.6%	2.4%	3.4%
9	Onboarding	37	42	79	46.8%	53.2%	6.4%
10	Working environment	8	11	19	42.1%	57.9%	1.5%
11	Cooperation	32	7	39	82.1%	17.9%	3.1%
12	Technical services	18	15	33	54.5%	45.5%	2.7%
13	Administration	53	6	59	89.8%	10.2%	4.8%
14	Family / Work Life Balance	16	4	20	80.0%	20.0%	1.6%
15	Quality of supervision	22	10	32	68.8%	31.3%	2.6%
16	Salary	30	1	31	96.8%	3.2%	2.5%
17	Career perspectives	43	2	45	95.6%	4.4%	3.6%
18	Flexible work schedules	7	10	17	41.2%	58.8%	1.4%
19	Cooperation with nurses	22	37	59	37.3%	62.7%	4.8%
20	Working hours	59	4	63	93.7%	6.3%	5.1%
	Sum / mean	815	424	1239	67.8%	32.2%	

Correlations shown in table 4 displaying relations of all mentions of a topic regardless of positive or negative valence (upper, gray-shaded triangle) and relations of the difference between positive and negative statements (lower triangle), that is, whether a topic has gathered more positive than negative statements. Topics in general hardly correlated with each other. Exceptions were highly significant positive correlations ($p<.001$) between the statements concerning duty scheduling and work environment in general ($r=.47$), comments about quality of supervision and personnel capacity ($r=.40$), as well as salary and working hours ($r=.40$). Highly significant positive correlations ($p<.001$) were found between statements about working hours with cooperation in general ($r=.49$) and with salary ($r=.40$). However, there was a negative correlation of onboarding with career perspectives ($r=-.38$). Correlation patterns seem to indicate that the evaluation of work environment is mainly influenced by the quality of duty scheduling and other administrative issues. Workload depends on the quality of cooperation and is seen directly according to the salary paid for it. Career perspectives are linked to the quality of the onboarding process and quality of supervision depends on a sufficient staff capacity.

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Table 4. Intercorrelation of sum of all statements about a topic (upper triangle) and difference of positive and negative statements (lower triangle).

	Training	Duty	Vacation	Culture	Capacity	Resources	Leader-ship	Perfor-mance	On-boarding	Work env.	Coope-ration	Tech. serv.	Admini-stration	Work-Life	Super-vision	Salary	Career	Work flex.	Coop. nurses	Work. hours
Training	1	-.016	-.063	.120	-.046	.094	.234	-.140	.113	.217	.138	.032	.018	-.094	-.074	-.211	.000	.093	-.059	.031
Duty Sched.	-.098	1	.228	.055	.229	.088	-.033	-,297*	,306*	,467**	-.014	.261	.015	.082	.202	-.030	.014	-.019	-.072	.158
Vacation	.097	.226	1	-.086	.182	.284	.204	-.069	.287	.004	-.059	.149	.138	-.180	.099	-.131	.168	.131	-.081	.044
Culture/ Atmo.	-.052	-.054	-.203	1	.108	.181	.090	-.054	-.018	.091	-.043	.241	-.163	.022	.115	.111	-.016	-.018	.233	-.160
Capacity	.083	.010	,391**	.087	1	-.056	.003	-.180	.202	.099	-.267	.122	.071	.264	.030	.233	.000	.100	.200	.262
Resources	.194	-.097	,364*	-,331*	,351*	1	.250	-.158	,296*	-.038	.246	.278	.255	.111	,403**	.182	.277	-.036	.099	-.045
Leadership	.239	-.082	-.147	,346*	-.143	-.178	1	-.105	.139	-.117	.142	.001	.098	-.199	.072	.087	.115	.011	-.200	.155
Performance	-.106	-.084	-.060	-.001	-.014	.115	-.016	1	-.137	-.193	.127	-.122	-.081	-.005	-.092	-.178	-.114	-,370*	-.037	-.153
Onboarding	.281	-.098	.107	-.069	.049	.087	.112	.075	1	.045	.123	.028	.282	-.133	.051	.191	.088	.210	-.088	.242
Work. Env.	.183	.093	.124	-,292*	-.047	.037	-.158	.054	-.035	1	-.052	.119	-.100	.082	-.099	.058	-.109	-.047	-.077	.221

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Cooperation	.039	.200	.100	.097	.104	-.229	-.059	-.078	-.036	.021	1	-,363*	.079	-.047	.038	-.033	,337*	-.189	-.053	.085
Tech. Service	-.102	.077	.065	-.011	,376*	.268	.056	-.058	-.148	.075	-.205	1	-.001	.004	.111	.063	-.033	.090	.116	-.095
Administration	,333*	.120	.058	-.007	.051	.094	-.097	.003	.272	,361*	.167	-.232	1	.099	-.001	.252	-.183	.149	.047	.005
Work-Life	-.081	-.077	.180	.123	.113	.169	-.151	.054	.020	.052	.089	.044	.168	1	.093	.218	-.217	-.109	-.118	-.051
Supervision	.141	.033	.152	-.059	,354*	.187	-.034	.003	-.054	.245	.153	.116	.062	.051	1	.066	.171	-.079	.029	-.133
Salary	-.066	-.039	-.192	-.136	.198	.231	.073	-.189	-.006	.096	.034	.227	.172	.030	-.025	1	-.074	.025	-.091	,399**
Career Pers.	-.107	.014	.041	.046	-.196	-.116	-.134	.027	-,384**	.096	.230	-.165	-.155	-.124	.083	-.164	1	.035	-.025	.000
Work. flex.	,301*	-.019	,296*	-.153	.087	.151	-.052	.017	.218	.087	.021	-,323*	.104	.119	.033	-.107	.022	1	-.056	-.081
Coop. Nurses	.114	-.086	-.047	.093	-.032	-.026	.269	.176	-.215	-.094	-.028	-.037	.056	-.004	.220	.015	-.120	.032	1	.005
Work hours	-.085	.158	.178	-.116	,314*	.122	-.178	.044	-.074	-.237	,489**	.108	-.024	.084	-.076	,402**	-.023	-.052	-.026	1

* p<.05 (2-tailed)
** p<.01 (2-tailed)

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In total, 232 different ideas and suggestions were generated by the interviewees which amounted to 166 statements when duplicates were removed. A majority of 96 suggestions were only mentioned once, 70 by more than one person, and a 'top list' of 22 improvement ideas were proposed by 5 persons or more (see table 5; full list of all suggestions in appendix 2). This top list was used to develop improvement measures in university hospitals participating in the multi-center study.

Table 5. Suggestions concerning improvements with affiliated topics and frequencies of mentions in the interviews.

Suggestion for improvement	Number of persons proposing the improvement
Optimize employee appraisals: regular, structured, binding, more time, more importance, documentation (topic category: personnel management)	27
Making career prospects transparent and offering them, e.g., functional senior physician, senior physician positions (topic category: specialist retention)	23
Longer assignments - do not plug gaps and help out (topic category: specialist commitment)	19
Creating niches/specializations, e.g., outdoor areas, outpatient clinic (topic category: specialist retention)	19
Financial support for further training (topic category: specialist retention)	15
Continue rotation/target agreement discussions also for physicians, not only for residents (topic category: personnel management)	11
Improve tone and appreciation (topic category: specialist retention)	11
Offer language courses - German as a prerequisite (topic category: onboarding)	10
Salary increase (adapted to regional institutions) (topic category: specialist retention)	9
Exemption for further training (topic category: specialist retention)	9
Consider wishes for areas of application and activities (according to intensive WB) (topic category: specialist commitment)	9
Qualify managers and implement what they have learned (topic category: personnel management)	8
Creating a specialist curriculum (topic category: strengths/weaknesses)	8
Promoting a sense of togetherness and exchange, creating at home, e.g., arrangements and rooms for breaks (topic category: strengths/weaknesses)	8
Complete rosters earlier (topic category: specialist retention)	8
Flexibilization of working time/introduction of individual working time models, e.g., part-time, flextime) (topic category: specialist retention)	8
Optimize feedback culture, especially regular feedback, day-to-day feedback (topic category: personnel management)	7
Holiday planning more transparent (online calendar, exchange exchange), more binding (topic category: specialist retention)	7
Use of IT to bundle planning - professionalization (topic category: processes)	7

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Permanent mentor for colleagues from abroad (topic category: onboarding)	7
Creating a better compatibility with social life (topic category: specialist retention)	5
Increase commitment, deadlines and feedback must also apply for superiors (topic category: personnel management)	5

3.2.4.2 Net Promoter Score

Quartile groups were calculated concerning the number of positive and negative interview items (from 1 to 4, group 1 representing the lowest amount of positive and highest number of negative items). These group variables were used as independent variables, NPS as dependent variables in multiple analyses of variance (MANOVA). Table 6 summarizes variables used in the MANOVA. As expected, the grouped frequency of positive interviews items had a significant positive impact on all NPS ratings (work $F[3,42]=6,5$, $p<.01$; training $F[3,40]=3.1$, $p<.05$; intention to stay $F[3,41]=3.8$, $p<.05$). Negative interview items showed only significant main effect on retention ($F[3,38]=3.6$, $p<.05$) and a significant interaction for work NPS: The more positive and less negative items were rated, the higher was work satisfaction ($F[1,7]=3.3$, $p<.05$).

Table 6. Mean frequency of cluster items as a function of promotors, neutrals, and sceptics according to Net Promotor Score (NPS).

Net Promotor Score (NPS)	NPS group	Positive cluster items	Negative cluster items	Total cluster items
Work				
	Promotor	9.5	14.3	32.4
	Neutral	10.2	20.0	37.5
	Sceptic	7.9	17.7	33.6
Education				
	Promotor	8.9	17.3	34.6
	Neutral	9.9	19.4	35.9
	Sceptic	10.0	13.5	31.5
Intention to stay				
	Promotor	10.9	16.0	34.7
	Neutral	10.0	17.7	35.9
	Sceptic	8.0	18.2	33.9

To figure out which topics had a positive or negative influence on the NPS concerning work, training, and intention to stay we applied three canonical discriminant analyses. Frequencies of positive and negative statements were used to predict the three NPS groups 'skeptical' (scores 1-6), 'neutral' (7-8), and 'promoting' (9-10) concerning the ratings about work, training, and intention to stay. Analyses about work and intention to stay classified 100% of the cases correctly, the analysis in view of training 97%. In all cases the discriminant factors explained 100% of the variance. We used Wilks' lambda as test statistics (Klecka et al., 1980; AlKubaisi et al., 2019) to select those items, that substantially contribute to the prediction of the NPS group (skeptical, neutral, promoting) concerning work, training, and intention to stay ($p<.10$; see table 7).

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Table 7. Discriminant analyses predicting NPS work, training, and intention to stay by topics (number of negative and positive statements) with substantially contributing interview topics (p<.10).

	Test of equality of group means			Function coefficients NPS Work		
	Wilks' Lambda	F[2,43]	Sig.	sceptical	neutral	promoting
NPS work						
Duty scheduling neg	.889	2.676	.080	22.184	16.222	18.461
Resources / equipment neg	.773	6.312	.004	-93.904	-41.387	-82.337
Onboarding pos	.889	2.687	.079	87.455	47.461	75.598
Working environment pos	.837	4.186	.022	101.306	63.762	118.113
NPS training						
Personnel capacity neg	,881	2,898	,066	-145.324	-96.222	-93.914
Quality of supervision neg	,868	3,277	,047	-55.565	-15.697	-17.353
Salary neg	,868	3,272	,048	468.645	321.753	302.667
NPS intention to stay						
Duty scheduling neg	.814	4.899	.012	15.245	16.710	20.233
Personnel capacity neg	.890	2.664	.081	-55.562	-71.553	-52.002
Administration neg	.875	3.084	.056	-10.725	-34.100	7.807
Salary neg	.854	3.684	.033	153.915	201.404	78.374
Technical services pos	.896	2.485	.095	-18.857	4.300	-11.582

100% correct classification, 100% variance explained (cf. appendix 3)

Absolute differences of the function coefficients between NPS groups indicate that aspects like workload, predictability of duty schedules, career perspectives, technical and administrative support, appreciation from and cooperation with colleagues and superiors as well as payment play an important role with either a clearly negative (poor career perspectives, low salary) or positive (excellent career outlook and sufficient income) connotation. In addition to these aspects, function coefficients for work-life balance, staff capacity, performance orientation, cooperation and career perspectives differ largely regardless whether work training or intention to stay was concerned (see full results of the discriminant analyses in appendix 3). All aspects with high frequency of positive mentions play supportive role for the intention to stay. In contrast, the factor 'salary' shows only a negative impact on the intention to stay, if the frequency of negative mentions is high. This finding supports the function of 'salary' as dissatisfier or hygiene factor (Herzberg, 1965; Kao et al., 2018). Based on the results of the discriminant analyses and on topics suggesting improvements we reduced the interview topic list to 14 top issues and ordered them in a polarity scale describing dissatisfiers on the one side and satisfiers on the other (see appendix 4).

3.2.4.3 Cohort Effects

All participants were grouped in quartiles according to the length of their stay in their current position, group 1 with the shortest and group 4 with the longest stay. Work experience had a great influence on work satisfaction and retention as can be seen in table 8. As predicted, the results of the MANOVA showed, that employees evaluated their

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work better the longer they worked in the clinic (F[3,12]=3.3, p<.05), whereas the specific position did not have a significant impact. Unexpectedly, the longer employees stayed with the clinic, the more interview items were generated (F[3,42]=3.4, p<.05)) with a lower amount of negative items (F[3,42]=2.9, p<.05). This effect is vindicated when calculating the ratio of positive and negative items: The ratio of negative items declined with length of stay (F[3,42]=4.2, p<.05).

Table 8. Means ratings for of willingness to recommend (Net Promotor Score, NPS) as a function of career stage (and standard deviation).

Career stage	Willingness to recommend		
	NPS work	NPS training	NPS intention to stay
resident in training	7.86 (1.89)	7.39 (2.28)	5.33 (3.47)
resident at/after end of training	6.27 (2.60)	7.23 (1.66)	4.14 (2.68)
non supervising physician	7.42 (1.75)	6.13 (2.33)	5.52 (2.69)
supervising physician	8.35 (1.94)	7.24 (1.64)	5.47 (3.76)
Total	7.43 (2.12)	6.96 (2.13)	5.16 (3.16)

3.3. Study 3: Mental Maps from Repertory Grids

3.3.1. Design

Job satisfaction is highly individual construct changing largely over different career stages (Gordon, 2017). We, therefore, used the Repertory Grid technique in order to create 'mental maps' visualizing personal mental constructs concerning work satisfaction (Winter, 2003; Hill et al., 2016). In addition, we checked for changes of NPS with regard to different career stages. To this end, we used the polarity scale of job satisfiers and dissatisfiers derived from the main interview study (see appendix 4) to predict NPS concerning work, training, and intention to stay.

3.3.2. Participants

In order to generalize from our previous results, we included more university hospitals and employees in the main study. We recruited n=112 physicians, n=48 female and n=64 male persons, working in four university hospitals, who did not participate in one of the preceding studies. In average, they held their positions for 5.2 years and worked for their hospital for 6.9 years. The participants' positions covered the complete range of career steps: n=40 held the position of supervised residents in training stage, and n=24 at the end of their vocational development or shortly after working as assistant physicians, n=31 persons were non-supervising physicians and n=17 were supervising physicians.

3.3.3. Method and procedure

All participating physicians were invited to the study by their chief physicians and received a comprehensive document about the study procedure. Subjects then expressed their consent via email. No names or other identifiable features were recorded. Participants filled in a brief NPS survey concerning their work satisfaction, satisfaction with training and personal development, their intention to stay in the clinic for the next five years as well as the 'PhysicianPlus satisfaction scale' (cf. fig. 2). Repertory Grids were performed as an anonymized, computer-based survey in the procedure described above (see section "Material and procedure in general"). The entire computer-based survey took 20 to 30 minutes.

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3.3.4. Results

3.3.4.1 Net Promoter Score

We calculated NPS groups concerning work conditions, training and personal development as well as intention to stay in the clinic for at least the next five years. The NPS concerning work conditions (F[3,106]=3.75;p<.05) and training (F[3,106]=3.23]; p<.05) differed significantly across hospitals. Working conditions in anesthesiologic clinics in general differ to a large extend in terms of size, scope, cooperation with other disciplines and staff structure (Hinkelmann et al., 2018). Thus, the following analysis was calculated with the number of the hospital as a covariate in order to control for this source of variance. Using means of the job satisfaction scale we calculated four quartile groups (very satisfied, satisfied, dissatisfied, very dissatisfied). We took the four groups as independent variables and NPS ratings as dependent variables. In line with our expectations, NPS scores for work (F[3,106]=24.56; p<.001), training (F[3,106]=8.78; p<.001), and intention to stay (F[3,106]=4.85; p<.01) differed significantly as a function of job satisfaction group (see figure 2). As shown in figure 2, only ratings concerning work and training by subjects with high job satisfaction supported a promoting attitude. We also calculated the NPSs in percent, that is, the percentage of promotors (scoring 9 or 10 on the NPS scale) minus the percentage of sceptics (scoring 6 or below). In hospitals, low positive can be expected from 0% up to +15% (West et al., 2009; Sieja et al., 2019). However, in this study the NPS concerning intention to stay was always rated negative regardless how high or low job satisfaction was (NPS from -26% to -70% with an average intention to stay of -42%). The NPSs concerning work conditions were mostly positive with a sharp decline for the least satisfied group (from -61% to +63%, average +10%). The pattern was just the other way round for the NPSs concerning training: Only the most satisfied quartile group showed a positive NPS (+26%, ranging from -33% to +26%, average -12%).

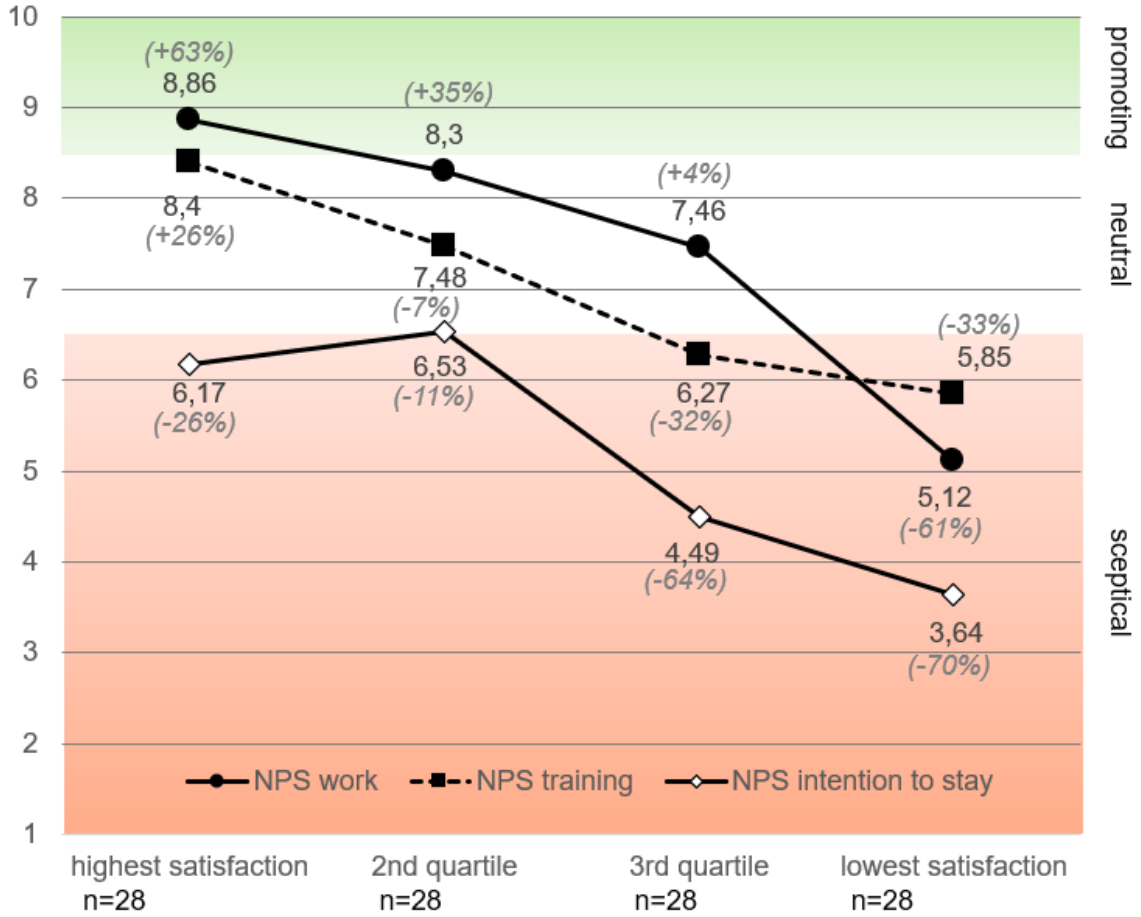

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Figure 2. Rating of willingness to recommend work conditions, training and intention to stay *(and NPS in %)* as a function of quartile groups of mean of PhysicianPlus job satisfaction scale.

3.3.4.2 PhysicianPlus Satisfaction Scale

The 14 items PhysicianPlus job satisfaction scale had a satisfactory reliability of Cronbach's alpha = 0.78. In other preliminary studies the PhysicianPlus scale which is based on the well-known employees promotor scale was already used in the same setting (Hasebrook et al., 2016b; Hinkelmann et al., 2017; Hahnenkamp et al., 2018) but also in different settings such as the project „rural/rescue".(Hasebrook et al., 2022) Here, the scale was found to be highly reliable with an Cronbach's Alpha of 0.91 while in prior studies in the same present setting, the reliability was examined to lay at 0.78.(Hahnenkamp et al., 2018) In this study, mean ratings show a positive attitude and vary between 1.5 and 3.4 (with 1 o 5 indicating a more positive and 6 to 10 a more negative evaluation) with "purposeful work" being the best and "demanding working hours" the worst evaluation (see table 9).

Table 9. Item statistics for polarity scale (PhysicianPlus job satisfaction scale).

	Mean of Likert Scale (1-10)											
Item	1	2	3	4	5	6	7	8	9	10	Std. Dev.	Item-tot. Corr.
appreciation and support by colleagues		1.85									0.95	,220
appreciation and support by superiors		2.09									1.06	,387
regard of personal goals			2.55								1.40	,559
reliability promises kept			2.99								5.56	,117
foresighted planning			3.06								1.80	,399
sufficient information in time			3.04								1.49	,448
decisions comprehensible			2.68								1.42	,391
self-directed work		2.28									1.20	,148
challenge but not overwhelmed			2.51								5.51	,053
useful purposeful work		1.54↑									0.94	,304
good working environment											1.62	,321
fair salary			2.68								1.68	,355
good career perspectives		2.45									1.40	,403
working hours manageable			3.43↓								1.19	,353

↑=best valued item, ↓=worst valued items

It is noteworthy that all significant intercorrelations between the items of the PhysicianPlus satisfaction Scale were positive suggesting that all items are positively connected to a general concept of job satisfaction (see table 10). The item with highest intercorrelations with almost all other items was "regard of personal goals", whereas the item "reliability of promises kept" was not significantly interconnected to other items. This may indicate that in the staffs' opinion a clinic regarding personal goals causes a positive attitude towards work whereas broken promises are singular events playing a (negative) role as 'hygiene factor'.

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Table 10. Item intercorrelation of PhysicianPlus job satisfaction scale.

No		1	2	3	4	5	6	7	8	9	10	11	12	13
1	appreciation and support by colleagues													
2	appreciation and support by superiors	.39**												
3	regard of personal goals	.26**	.51**											
4	reliability promises kept	0.02	0.06	0.19										
5	foresighted planning	0.09	.21*	.36**	0.09									
6	sufficient information in time	.24**	.40**	.41**	0.11	.51**								
7	decisions comprehensible	0.15	.47**	.51**	0.07	.25**	.55**							
8	self-directed work	.19*	.22*	.33**	-0.03	0.03	.35**	.23*						
9	challenged but not overwhelmed	0.02	-0.01	0.08	-0.01	0.16	-0.06	-0.04	-0.09					
10	useful purposeful work	0.10	.20*	.27**	0.08	.20*	.23*	0.16	0.12	0.06				
11	good working environment	0.12	.21*	.33**	0.03	0.16	.34**	.31**	.19*	0.04	0.16			
12	fair salary	0.13	0.14	.29**	.19*	.25**	0.11	0.18	-0.09	0.09	.21*	.22*		
13	good career perspectives	0.16	.40**	.45**	0.04	0.18	.38**	.37**	.26**	0.06	.28**	.36**	.28**	
14	working hours manageable	0.12	0.17	.21*	0.08	.33**	.30**	.19*	0.11	0.12	.24*	.22*	.30**	0.12

* p<.05 (2-tailed), ** p<.01 (2-tailed)

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We checked to what extend the PhysicianPlus satisfaction scale is able to predict NPS ratings. To this end, we calculated a discriminant analysis summarizing all three NPS ratings summing up how many times a person promoted work, training, or intention to stay from 0 (no promotion) to 3 (promoting all three aspects). The results show that regarding personal goals, providing sufficient information, making comprehensible decisions by superiors, opening career perspectives and providing a good working environment were the most important factors differentiating between promotors and non-promoters (cf. table 11; mean ratings and standard deviations as a function of NPS scores are listed in appendix 5).

Table 11. Discriminant analysis predicting number of promoters concerning work, training, and intention (from 0=none to 3=all three) by items of the PhysicianPlus satisfaction scale (p<.10).

	Test of equality of group means					Fisher's function coefficients			
Items	Mean	SD	Wilks' Lambda	F[3,106]	Sig.	promotes none	promotes one NPS	promotes two NPS	promotes three NPS
appreciation and support by colleagues	1.85	0.95	0.97	1.30	0.28	1.539	.892	1.484	1.352
appreciation and support by superiors	2.09	1.06	0.94	2.17	0.10	-.099	.674	-.303	.967
regard of personal goals	2.55	1.40	0.89	4.56	0.00	-.575	-.982	.089	-.790
reliability promises kept	2.99	5.56	0.96	1.61	0.19	.010	-.013	.143	.008
foresighted planning	3.06	1.80	0.91	3.52	0.02	.755	.589	.363	.421
sufficient information in time	3.05	1.49	0.84	6.80	0.00	-.368	-.460	-.185	-.637
decisions comprehensible	2.68	1.42	0.82	7.91	0.00	1.229	.887	.437	.351
self-directed work	2.28	1.20	0.97	1.06	0.37	.929	1.199	.972	1.008
challenge but not overwhelmed	2.51	5.51	0.99	0.37	0.77	.055	.022	.036	.015
useful purposeful work	1.54	0.94	0.94	2.43	0.07	.921	.533	.819	.370
good working environment	3.78	1.62	0.86	5.74	0.00	1.150	1.015	.730	.685
fair salary	2.68	1.68	0.95	1.70	0.17	-.231	.437	-.197	.230
good career perspectives	2.45	1.40	0.78	10.26	0.00	1.143	.602	.056	.225
working hours manageable	3.43	1.19	0.95	1.90	0.13	1.875	1.567	1.747	1.509
100% correct classified, 100% variance explained						-13.763	-10.397	-8.879	-7.431

3.3.4.3 Repertory Grids

Using the Kelly Grids method, we got representations of 'mental landscapes' showing the mental distance between elements (with reference to a specific definition), and whether they were rated more positively or negatively. Figures 3 and 4 contain orthogonal coordinate systems with the extracted factors of the first two components (full details of the factor analysis can be found in appendix 6). An interesting difference between promotors and sceptics concerning work was, that promotors created a 'we and they' position with physicians, clinic, and clinic administration close together in contrast to hospital administration and hospital in general. Skeptical persons however tended to distinguish between medical staff (physicians and nurses) and the rest. Persons with high intention to stay had a more positive perception of the university hospital's future (element 'Hospital in 5 years') than employees with low intention to stay. They connected the hospital's

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future it with positive features like 'foresightful', 'future oriented', and 'balanced' as compared to sceptics, who chose characteristics like 'sufficient staff', 'economic efficiency', and 'structured'.

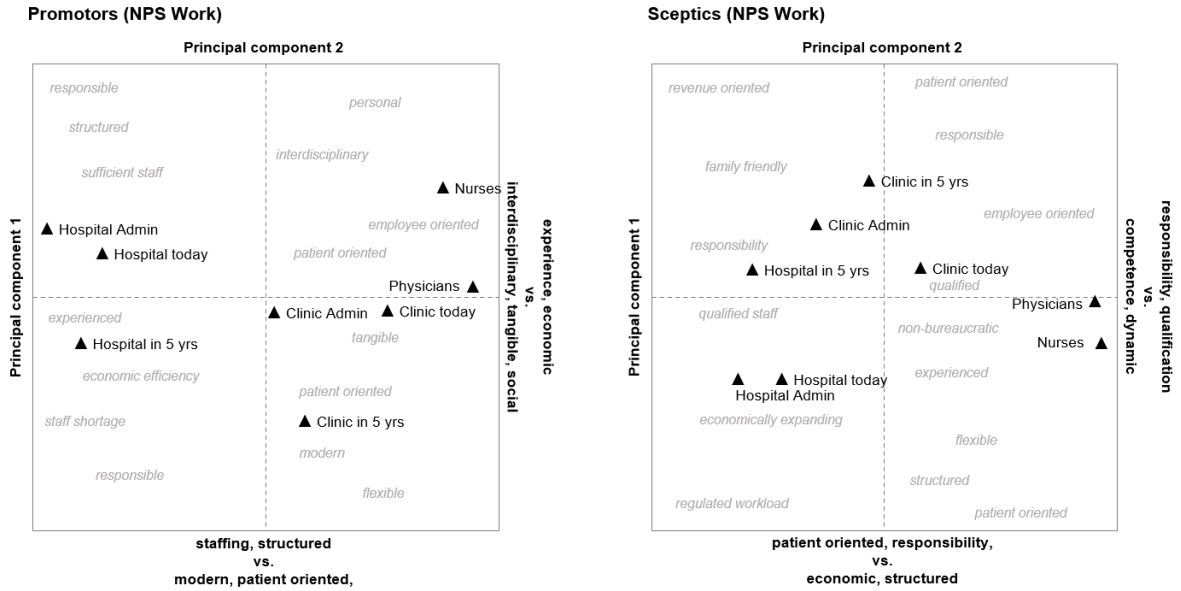

Figure 3. Kelly grids of promotors (left) and sceptics (right) regarding 'recommending work' (NPS).

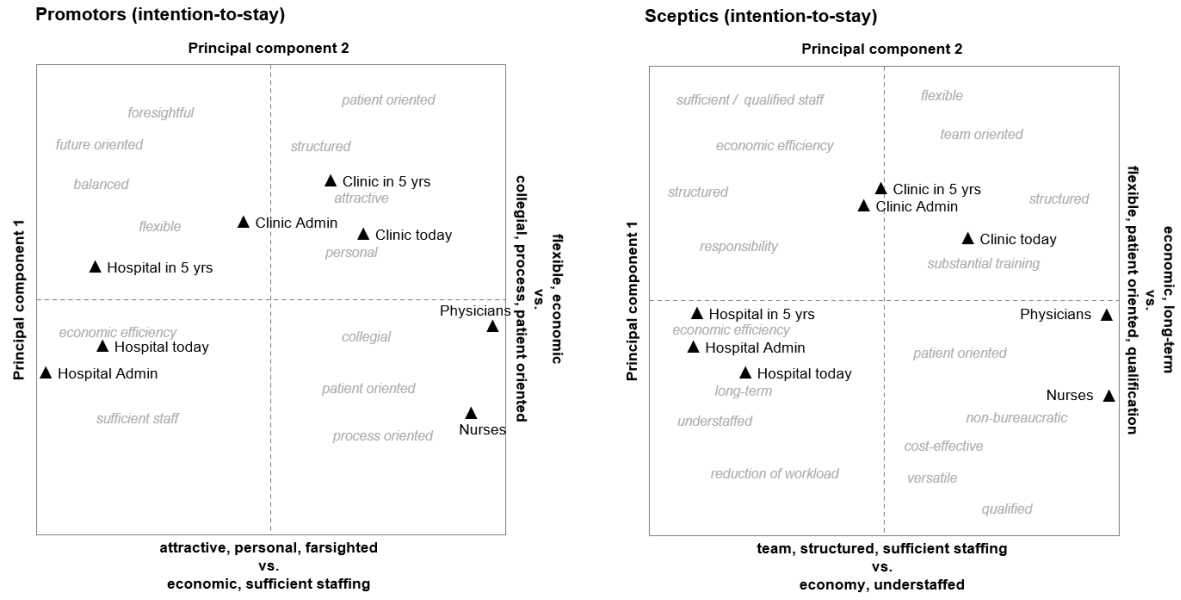

Figure 4. Kelly grids of promotors (left) and sceptics (right) regarding retention (intention-to-stay).

4. Discussion

4.1. Job satisfaction, dissatisfaction, and intention to stay

Just eliminating factors which elicit job dissatisfaction, does not automatically lead to higher satisfaction: Whereas high workload and unpredictable staff planning plus duty rosters lead to dissatisfaction, recognition by superiors as well as regular and systematic appraisal interviews are the most important factors driving job satisfaction. The interview data and multiple discriminant analyses show a high stability of reasons to leave – mostly referring to unfavorable management, staff planning, workload and low income. It also shows that reasons to stay are highly individual, such as regarding personal goals.

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Decisions rely on a balance between perceived efforts to stay and gains from the job, e.g., work-family culture and further education offered by the university hospital. This balance is hard to maintain when personal growth by means of medical trainings decreases during the career, but workload accelerates. The position as a chief physician seems to offer the best balance and highest retention with less strenuous work (e.g., no shift work), better income and more discretionary competence.

4.2. Formal representation of job satisfaction

Comparing 'job promotors' to 'job sceptics' by repertory grids indicates that an important difference between these two groups may lie in a 'hope for a better future' and high affinity for the employer on the one hand in contrast to hopelessness and a notion of extraneousness at work on the other. Highly trained and qualified physicians, like the subjects in this study, are more attached to their profession and their discipline than to the actual clinic or hospital they work for (Choi et al., 2011). Moreover, the mental maps generated by Repertory Grids procedures in our study show that the very same factors may be seen as negative by some individuals and positive by others (Younge and Marx, 2016; Mathimaran and Kumar, 2017).

4.3. Limitations and future research

Aim of our explorative interview-centered methods used in the pre-study is to identify and accumulate new topics, hygiene and personal factors influencing job satisfaction and intentions to stay for physicians. Open interviews can lead to new insights, because the range of questions and answers is not limited. Furthermore, systematic reviews of instruments measuring job satisfaction and job retention reveal, that the instrument in use mainly influences the factors and interactions which can be identified (e.g. Singh, 2019; Rombaut, 2020). Several standardized tools are available from scientifically validated tests (e.g. Van Saane, 2003) and commercial testing packages (e.g. Riechmann, 2013). All standardized tools necessarily operate with a standard set of questions or items restricting the range of potential answers and justifying the use of our interview format for explorative purposes. However, in the conducted interviews, the participants did not bring up new topics or interrelations between them which prevents the study from providing new considerations of the matter. In addition, conducting and evaluating qualitative interview data is a highly resource demanding task and cannot be implemented as a routine evaluation process. Here, an alternative for further research could be advised.

In order to combine standardized quantitative and open qualitative study methods we applied Repertory Grids as a quantitative method to describe qualitative data. The results derived from this computer-led survey technique very much depend on the usability and visual front-end of the software applied. In summary, employee survey needs careful planning in view of how efficient and standardized the inquiry may be and how open and explorative it has to be.

Also, the paper is not sufficient to measure the impacts of various factors influencing job satisfaction and intentions to stay as well as the impacts of interrelations due to the methods used. We were only able to identify the factors generally impacting the matter. For distinguishing the different impacts of factor, e.g., whether high workload has a bigger impact on job dissatisfaction than unpredictable staff planning, further research with alternative methodical approaches is necessary.

4.4. Practical implications

Although direct impact measurement was not part of the PhysicanPlus project, some of the project's measures and tools are in use in different hospitals – thus giving some indirect evidence supporting our findings. During the PhysicianPlus project four aspects to foster intention to stay and to lessen turnover intention were developed and afterwards implemented: 1. Employee appraisal, 2. training in fellowship programs, 3. Computer-assisted duty and vacation scheduling, and 4. corporate benefits.

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Employee appraisal to further career prospects and transparency. Better and more frequent feedback and employee appraisal was the most suggested improvements (see table 5). Referring to samples of employee appraisal interviews in professional service firms – consultants, lawyers, and financial services – a PhysicianPlus interview guide has been implemented based on the PhysicianPlus Satisfaction Scale. Both, interview guide and scale, are in use in several university hospitals and have already made their way into some smaller hospitals, as well (Spiegelberg, 2022). Users report that the guide helps them to lead structured and focused interviews providing employees with a clear understanding of their strength, needs for further development, and career prospects, such as participating in sought-after training programs.

Specialized training courses as a fellowship program. The positive aspect with most mentions was training and career development (see table 3). Therefore, we implemented highly specialized training curricula in the style of fellowship programs carried out in hospitals outside Germany: Experts from hospitals in the Netherlands, United Kingdom, United States, and New Zealand reported about their programs. In the PhysicianPlus project, three fellowship programs started with up to twelve attendees, each: Neuro-anesthesia, cardio-anesthesia, and special child-anesthesia. Participants of these training programs reported that they were willing to stay in the hospital for another one or two years when their participation is guaranteed.

Improved duty and vacation scheduling. The aspect with the most negative mentions was duty and vacation scheduling (see table 3). Further investigation showed that two aspects cause dissatisfaction: Unreliable time planning (e.g., changes on short notice), and mental under- or overload when individual skills and competences did not match job demands. Human planers are not able to consider all organizational and individual demands, thus, coming up with poor plans. Drawing from highly sophisticated workforce planning systems in airport and harbor logistics, we created algorithms for vacation and duty scheduling. The vacation planning supports fair and more transparent vacation planning considering aspects such as private care (e.g., young children or old parents) or sacrificing vacation plans to support the clinic in prior seasons. We also developed a competence-based workforce planning model for physicians in large hospitals. As a proof-of-concept we implemented the model as a SQL database. The PhysicianPlus planning model has been adopted by professional workforce planning software.

Corporate benefits. The interviewees generated a great variety of good ideas, which sometimes were tailored to the specific situation of the hospital they were working for (table 5 and appendix 2). Therefore, we encouraged minor but meaningful changes, such as providing drinking water and healthy snacks in a central operation theatre, a comfy lounge for physicians for relaxation, informal chats, and seatwork. Several hospitals adopted a corporate benefit program from professional service firms providing employees with valuable goods and services at reduced prizes (Hahnenkamp and Hasebrook, 2022). These hospitals reported that their employees valued the benefit program as a special sign of appreciation for their work.

4.5. Conclusion

The study was conducted in German university hospitals with physicians from 15 different anesthesiology departments. 66 physicians participated in the qualitative data gathering, 112 additional physicians contributed to the repertory grid survey which added quantitative value. Because of the methods used and physicians participating, we were able to focus on individual factors and the physicians' personal agenda and goals. This is following the line of reasoning that improving individual living conditions are not a matter of defining standardized treatments top-down for well-defined subpopulations - in the case residents and physicians in university hospitals - but deriving measures bottom-up by summing up individual profiles, if possible, and always focus on the individual improvement, and not arbitrary groups of individuals (see review in (Hayes et al., 2020)). The present study can provide valuable insights here.

As many studies present a close connection between job satisfaction and retention, the general recommendation is to increase satisfaction to increase the retention of medical staff (Nantsupawat et al., 2017; Jackson et al., 2018). Systematic literature research demonstrates that workload, stress and leadership affect dissatisfaction and turnover, but the results for factors associated with job satisfaction are not consistent (Coomber and Barriball, 2007; Johna, 2018). Likewise, there is no connection between job satisfaction and retention supported by our data: Minimizing dissatisfaction does not automatically lead to more satisfaction and more satisfaction does not necessarily lead to higher retention. Especially physicians in university hospitals are a highly qualified and mobile workforce who show higher identification with their job and medical discipline than with their employer. Consequently, improvements suggested by the physicians in our study focused on personal growth and individual work-life-balance and not on eliminating dissatisfaction factors like poor career prospects. As a result, university hospitals reacted offering regular and systematic appraisal interviews and individual mentoring for all physicians as well as a wide range of other measures ranging from bonus programs to fellowships for specialized trainings (Nasir and Mahmood, 2018). Mentoring provided by experienced supervising physicians leads to highest satisfaction and retention scores. These mentors also help to select the right measures in order to meet the needs of both the individual physicians and the hospital in general.

In summary, in accordance with other research, results show that team coherence (Kim and Yi, 2019; Zaheer et al., 2019) and hope for improvement concerning work environment (Tummers et al., 2013; Rombaut and Guerry, 2020) are the main aspects to retain highly skilled staff. Active retention management is needed but currently underrated and not carried out systematically (Singh, 2019). As intention to leave is recognized easily, regular, brief employee surveys help to identify human resource risks in advance. Intentions to stay are highly individual and cannot be answered with a small set of measures. A systematic set of retention measures is needed (Gerson, 2002; Verlander and Evans, 2007) which helps hospital management developing individually tailored activities in order to satisfy individual demands of high skill workers.

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Ethical Statement: As no patients or medical treatment were involved and only adults voluntarily participated in this study the responsible ethics committee of the Physicans' Chamber Westphalia-Lippe (ÄKWL) decided that an ethical statement was not required. Nevertheless, a member of ÄKWL's ethics committee became member of the PhysicianPlus project board supervising the entire project. According to German law (Betriebsverfassungsgesetz., BVerfG) any employee survey or interview must be approved by the works council, in this case, the council for the academic staff. A council representative also participated in the project's supervisory board.

Data Availability Statement: The dataset analyzed for this study can be found in the ResearchGate data respository]. **Note:** SPSS data files used to calculate the statistical analyses presented in this study are stored as data repository within ResearchGate at https://www.researchgate.net/publication/365616201_Data_PhysicianPlus_Main_Interview_Study, DOI: 10.13140/RG.2.2.28770.61122.

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Conflicts of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Appendices

Appendix 1: Interview guide preliminary and main interviews

A1.1 Interview Guide, Pre-Study
(Translation of the German original)

Dear physicians,

the first phase of our *Project PhysicianPlus* is running to the fullest. As already announced, we want to achieve with the joint project that your work is even more oriented to your individual needs, competencies and goals.

Central to the success of this project is therefore above all your opinion and active cooperation. We would like to create the basis for this through an initial conversation, in which we would like to obtain your opinions, suggestions and wishes for the *PhysicianPlus* project and get to know you personally. Topics include the special features of the UKM (University Hospital Muenster) and your clinic in terms of organization and leadership.

We would be very pleased if you would be available to us in the course of the next few weeks for a 30-45 minutes one-on-one conversation. For a better coordination of the discussions, we have created an overview of the dates and would like to ask you to enter your desired date stating your name. All entries are anonymous and are not visible to your colleagues. We will then send you a separate appointment confirmation by email.

At this point, we would like to emphasize once again that the results of the discussions are treated as strictly confidential and used exclusively for the *PhysicianPlus* project. The evaluation will only be carried out summarily, which means that no conclusions can be drawn about your person. The minutes made after the interview will be sent to you and can make comments on them. The results will only be used after your written approval.

We look forward to your cooperation and the discussions with you!
Sincerely,
[…]

Joint project PhysicianPlus

- Conversation Guide -

Interlocutors

Function:
Hospital since:
Specialist since:

Interviewer:
Date/Time:

Personal introduction
- What are your tasks within the clinic?

Special features Clinic
- What do you experience as a special strength of your clinic?
- Where do you see vulnerabilities?
- Do you have any suggestions on how to counteract the weaknesses?
- Would you recommend a friend or colleague from another clinic to work as a specialist in your clinic?
  (0 = very unlikely; 10 = extremely likely)

0	1	2	3	4	5	6	7	8	9	10
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

- Would you recommend a friend or doctor from another clinic to complete further training as a specialist in your clinic?
  (0 = very unlikely; 10 = extremely likely)

0	1	2	3	4	5	6	7	8	9	10

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☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

- Do you know any reasons why specialists have left the clinic?

- What would have to be done so that specialists continue to work at the clinic for a longer period of time (2-5 years) after completing their further training?

- How could this be achieved?

How do you experience the cooperation with the different employee groups (nurses, administration, technical service)?
- How do you assess the cooperation between doctors at all hierarchical levels?

Organization and leadership culture

- How do you assess the personnel planning processes at your clinic (planning of services, holidays, additional qualifications)?
- What could be done better from your point of view?
- Are there enough resources at your clinic to successfully cope with your tasks (personnel, materials, equipment, financial resources)?
- What regular forms of personnel management and support do you experience (e.B feedback, appraisal or development interview with the supervisor)?
- What would you like to improve or supplement?

Staff development

- How did you experience your own induction at the clinic? What would you possibly improve?
  From your point of view, how good is the induction of non-German-speaking colleagues? What should be improved?

Perspective of specialists in the clinic

- Do you like the goals of the "PhysicianPlus" project?
- Which goals should be supplemented or adapted if necessary?
- How would you like to be informed about project results?

- Do you think that you will still work for this clinic, 5 years ago?
  (0 = very unlikely; 10 = extremely likely)

0	1	2	3	4	5	6	7	8	9	10
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

- At the end of our conversation, do you have any comments or hints about the Project PhysicianPlus?

A1.2 Main Interviews with Repertory Grids

(Translation of the German original)

Invitation to an interview

Dear Lady, Dear Sir,

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we write to you from the office of the joint project PhysicianPlus. As already announced, we would be pleased if you could be available to us in the course of the project in the next few weeks for a 60-minute one-on-one conversation.

We would like to ask you about your experiences and wishes regarding your everyday work. On the one hand, the interview is based on a guideline, on the other hand, we will conduct part of the interview with software support. By participating in this interview, you are creating an important basis for further project work and actively contributing to the success of the project.

For the coordination of the first interviews, we have created an overview of the dates and would like to ask you to enter your desired date stating your name. All entries are anonymous and are not visible to your colleagues. We will then send you an appointment confirmation by e-mail. If none of the suggested dates appeal to you, please let us know a possible alternative date.

At this point, we would like to emphasize once again that the results of the individual discussions are treated strictly confidentially and used exclusively within the framework of the PhysicianPlus project. The evaluation will only be carried out summarily, which means that no conclusions can be drawn about your person.

If you have any questions about the project or the interviews, please do not hesitate to contact us. An overview of project goals and procedures can be found attached.

We look forward to your cooperation and the conversation with you!

Sincerely,
[…]

Joint project PhysicianPlus

- Conversation Guide -

Interlocutors
Function/Position:
An of the clinic since:
In current position since:

Interviewer:
Date/Time:

Special features of the clinic

- What do you experience as a special strength of your clinic?
- Where do you see weak points within your clinic?

- Would you recommend a friend or colleague to work at your clinic?

(0 = very unlikely; 10 = extremely likely)

0	1	2	3	4	5	6	7	8	9	10
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

- Would you recommend further education and training at your clinic to a friend or colleague? (0 = very unlikely; 10 = extremely likely)

0	1	2	3	4	5	6	7	8	9	10
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

- How do you justify your recommendations?

- How do you experience your personal daily work at the clinic? (1 = statement on the left, 10 = statement on the right or a value in between)

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1.	For my work I get enough appreciation and support from...		My work is little appreciated and unnecessarily criticized by…
1.1	…Colleagues.	1 2 3 4 5 6 7 8 9 10	…Colleagues.
1.2	…Superiors.	1 2 3 4 5 6 7 8 9 10	…Superiors.
2.	My superiors know my personal goals and take them into account as far as possible.	1 2 3 4 5 6 7 8 9 10	My personal goals are neither perceived nor taken into account by my superiors.
3.	You can always rely on promises made by the clinic and superiors.	1 2 3 4 5 6 7 8 9 10	Promises cannot be trusted because they are not kept.
4.	When and where I have to work, I can plan for the long term.	1 2 3 4 5 6 7 8 9 10	Changing places and times of work cannot be planned for me.
5.	I am informed in a timely and sufficient manner about plans and decisions that affect my work..	1 2 3 4 5 6 7 8 9 10	I am often not informed in time and sufficiently about plans and decisions that are important to me.
6.	Decisions that affect my work as well as the decision-making process are easy for me to understand.	1 2 3 4 5 6 7 8 9 10	I often can't understand decisions and decision-making processes.
7.	Within the given framework, I can decide for myself how I do my work.	1 2 3 4 5 6 7 8 9 10	I have no room for manoeuvre in decision-making and feel that I am being thwarted by specifications in my work.
8.	The work offers many challenges, but I never feel overwhelmed.	1 2 3 4 5 6 7 8 9 10	I feel overwhelmed by the demands of my work.
9.	In the clinic, I do meaningful work that benefits society.	1 2 3 4 5 6 7 8 9 10	I do pointless work that is of no use to anyone.
10.	In the clinic I find working conditions that are important to me and that I could not find anywhere else.	1 2 3 4 5 6 7 8 9 10	I might as well work in another hospital.
11.	I am paid fairly and appropriately for my work.	1 2 3 4 5 6 7 8 9 10	I don't get paid enough for the work I do.
12.	The clinic offersme optimal opportunities to develop further and to make a career in my profession.	1 2 3 4 5 6 7 8 9 10	I see the clinic as a dead end in which I cannot develop professionally.
13.	In my experience, the workload in the clinic is not too high, and it will remain so..	1 2 3 4 5 6 7 8 9 10	In my experience, the workload is unbearable and it won't get better in the future.

- How likely do you think it is that you will still be working at the clinic in five years' time?
(0 = very unlikely; 10 = extremely likely)

0	1	2	3	4	5	6	7	8	9	10
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

- What are the reasons for your assessment?

Repertory Grids

1. Procedure for recording individual settings

2. The basis is the theory of personal constructs according to George A. Kelly
   - Personal constructs are the way people see their world
   - People usually describe their environment by comparing elements

3. Expiration

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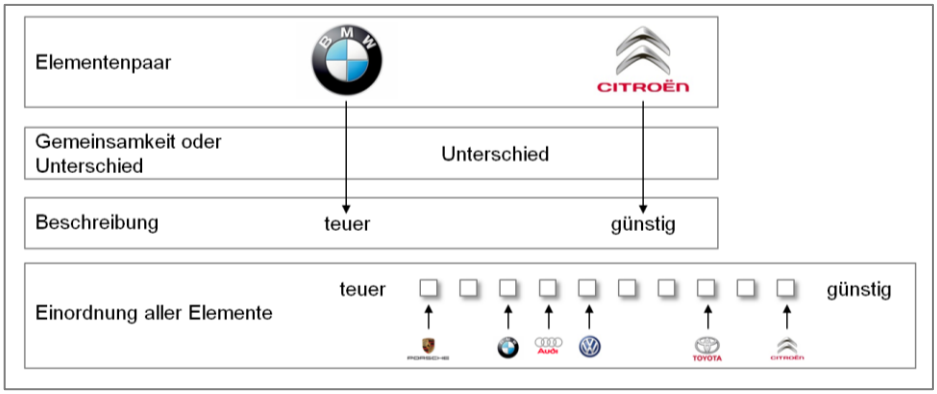
- Comparison of two elements via similarities or differences
- Description of similarities and differences
- Classification of all elements on a scale

4. Example "Car Brands"

1. The elements have more differences than similarities:

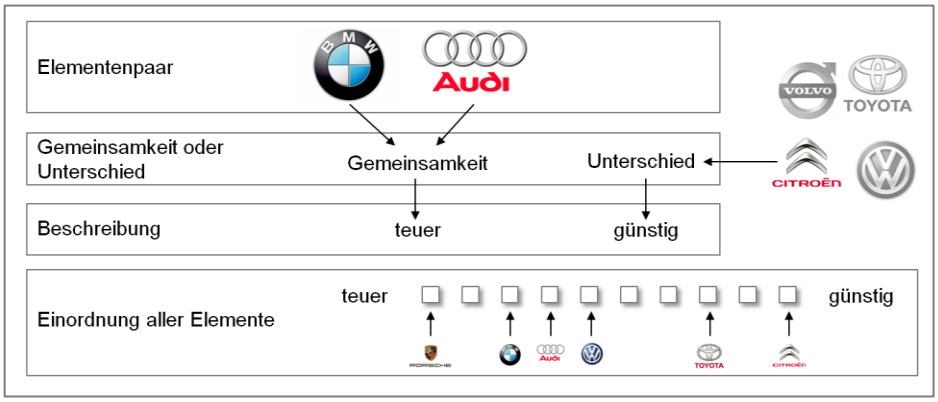


Text in image:

- pair of elements <BMW>, <Citroen>
- Commonality or difference <Difference>
- Description <expensive>,< auspicious >

Classification of all elements <expensive > ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ <auspicious>

2. The elements have more similarities than differences:



Text in image:

- pair of elements <BMW>, <Audi>
- Commonality or difference <Commonality>, <Difference>
- Description <expensive>,< auspicious >

Classification of all elements <expensive > ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ <auspicious>

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- Generating "Repertory Grids" for the elements:
  1. the medical team – the nursing team
  2. the clinic today – the clinic in 5 years
  3. University Hospital Administration – Clinic Administration
  4. the University Hospital today – the University Hospital in 5 years
  5. the University Hospital today – the clinic today
  6. the clinic in 5 years – the University Hospital in 5 years

- Explanations of the elements:
  1. the medical team = team of assistants, specialists and senior physicians
  2. the nursing team = team of management, (area) management and nursing staff
  3. the clinic today = overall picture/working environment today
  4. the clinic in 5 years = realistic overall picture/working environment in 5 years, no dream image
  5. Administration of the University Hospital = Administrative and planning activities (e.g. payroll, OP management, etc.)
  6. Administration of the clinic = administrative and planning activities (e.g., personnel deployment planning, vacation assignment, etc.)
  7. the University Hospital today = overall picture/working environment today
  8. the University Hospital in 5 years = realistic overall picture/working environment in five years, no dream image

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Appendix 2: Full list of all suggestions for improvements generated in the main interview

Suggestion for improvement	Number of persons proposing the improvement
Optimize employee appraisals: regular, structured, binding, more time, more importance, documentation (topic category: personnel management)	27
Making career prospects transparent and offering them, e.g., functional senior physician, senior physician positions (topic category: specialist retention)	23
Longer assignments - do not plug gaps and help out (topic category: specialist commitment)	19
Creating niches/specializations, e.g., outdoor areas, outpatient clinic (topic category: specialist retention)	19
Financial support for further training (topic category: specialist retention)	15
Continue rotation/target agreement discussions also for physicians, not only for residents (topic category: personnel management)	11
Improve tone and appreciation (topic category: specialist retention)	11
Offer language courses - German as a prerequisite (topic category: onboarding)	10
Salary increase (adapted to regional institutions) (topic category: specialist retention)	9
Exemption for further training (topic category: specialist retention)	9
Consider wishes for areas of application and activities (according to intensive WB) (topic category: specialist commitment)	9
Qualify managers and implement what they have learned (topic category: personnel management)	8
Creating a specialist curriculum (topic category: strengths/weaknesses)	8
Promoting a sense of togetherness and exchange, creating at home, e.g., arrangements and rooms for breaks (topic category: strengths/weaknesses)	8
Complete rosters earlier (topic category: specialist retention)	8
Flexibilization of working time/introduction of individual working time models, e.g., part-time, flexible working time) (topic category: specialist retention)	8
Optimize feedback culture, especially regular feedback, day-to-day feedback (topic category: personnel management)	7
Holiday planning more transparent (online calendar, exchange exchange), more binding (topic category: specialist retention)	7
Use of IT to bundle planning - professionalization (topic category: processes)	7
Permanent mentor for colleagues from abroad (topic category: onboarding)	7
Creating a better compatibility with social life (topic category: specialist retention)	5

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Increase commitment, deadlines and feedback must also apply for superiors (topic category: personnel management)	5
Enable short-term vacation planning, e.g., through interactive calendar) (topic category: processes)	4
Create a predictable work situation by announcing your free time at an early stage (topic category: specialist retention)	4
More efficient use of time, e.g., better timing of changeover times between surgeries (topic category: specialist retention)	4
Creating a framework in which genuinely constructive criticism can be expressed (topic category: personnel management)	4
Not always making everything possible, questioning the hospital's service ideas, strengthening standing vis-à-vis surgeons (topic category: processes)	4
Gain experienced personnel (topic category: strengths/weaknesses)	4
Composition Change rotational interviews, e.g., assistant spokesperson (topic category: personnel management)	4
Longer training period for other colleagues (topic category: onboarding)	4
Offer permanent contracts (topic category: specialist retention)	4
Better qualification of personnel - constant qualification (topic category: strengths/weaknesses)	4
Increase available staff (topic category: retention of specialists)	3
Planning not by doctor but experts (topic category: processes)	3
Only discontinue onboarding when it is ensured that standard processes are mastered (topic category: onboarding)	3
Promoting research, even without habilitation/tenure track (topic category: strengths/weaknesses)	3
Increase transparency about rotational interviews (topic category: personnel management)	3
Shorter periods for holiday planning, e.g., semi-annually (topic category: processes)	3
Do not perform elective surgery at night or weekends (topic category: specialist commitment)	3
Improve external rotation (topic category: strengths/weaknesses)	3
Provide long-term contact persons for residents and physicians as a mentor (topic category: specialist retention)	3
Adjust hiring time flexibly to needs - no standard (topic category: onboarding)	3
Introduce ‘company holidays’ (topic category: specialist retention)	3
Transfer coordination processes to teams, e.g., in the case of external training (topic category: personnel management)	2

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Job sharing models (topic category: processes)	2
Retaining personnel, growth from within (strengths/weaknesses)	2
longer-term time/shift planning, e.g., 2 months in advance (topic category: strengths/weaknesses)	2
In particular, lateral entrants must be trained (topic category: onboarding)	2
Introduce performance-based remuneration, pool participation in case lump sums/financial incentives (topic category: retention of specialists)	2
Agreement of concrete goals and expectations at the beginning of the training (topic category: specialist retention)	2
Give more time for planning (topic category: processes)	2
Reduce services and service Load) (topic category: Processes)	2
Possibility to order lunch (topic category: strengths/weaknesses)	2
Reduce working hours during vacation periods (under consultation surgery) (processes)	2
Deploy as many medical staff as possible in fast diagnostics, e.g., radiology (topic category: processes)	2
Offer part-time training (topic category: processes)	2
Involve doctors in strategy/future planning of the clinic (topic category: strengths/weaknesses)	2
Evaluations during rotational interviews are sometimes too good (topic category: personnel management)	2
Offer attractive services (topic category: specialist retention)	2
Introduce intermediate levels to reduce complexity, e.g., not let one person lead all conversations (topic category: strengths/weaknesses)	2
Personnel change at the top (topic category: processes)	2
Introduce the surgical catalogue, when is what operated, definition of the indication for emergencies, limit the arbitrariness of the surgeons (topic category: strengths/weaknesses)	2
Start discussions at a lower hierarchical level (topic category: personnel management)	2
Integration of emergency medical service in duty planning (topic category: specialist retention)	2
Expansion of the range of further training courses (topic category: retention of specialists)	2
Giving more responsibility to junior doctors (topic category: specialist retention)	2
Independent holiday planning per area in the team (topic category: processes)	2
Expansion of kindergarten places (topic category: strengths/weaknesses)	2

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Ensure equivalence of patient care, research and teaching (topic category: strengths/weaknesses)	2
Purification of the planning system/services (topic category: processes)	2
Improve team structures, fast rotation of doctors/nursing (topic category: specialist retention)	1
Reduce volume in the operation theatre (topic category: strengths/weaknesses)	1
Obtain external support (topic category: strengths/weaknesses)	1
Setting expectations for tutors (topic category: onboarding)	1
Advance certification of courses/further education (topic category: strengths/weaknesses)	1
Actively offer further training (topic category: onboarding)	1
Give regular feedback to senior physicians (topic category: personnel management)	1
Offer regular on-site training also for further education assistants/specialists (topic category: personnel management)	1
Relax presence of superiors during holiday periods, use experienced specialists) (topic category: processes)	1
Increase employee orientation, not only patients (topic category: personnel management)	1
Improving knowledge transfer, experience between groups (topic category: processes)	1
Offer training/courses as a reward (topic category: processes)	1
Do not throw FA into the cold water, better prepare for challenges, e.g., surgery together with experienced people (topic category: specialist retention)	1
Free decision as to what happens to overtime (specialist retention)	1
Introduction of final discussions after training for physicians, currently the liability of the residents (topic category: personnel management)	1
Involve more staff in job interviews (topic category: onboarding)	1
Clear definition of the role of administration and clinic, turn on administration instead of doing everything yourself (topic category: personnel management)	1
Role as supervisor possible without habilitation/tenure track (topic category: specialist commitment)	1
Improve communication and information (topic category: strengths/weaknesses)	1
Senior physicians must open up business thinking (topic category: strengths/weaknesses)	1
Introduction of shift work in the operation theatre (topic category: processes)	1
Reduce operation theatres' runtimes (topic category: processes)	1

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Strengthen identification with the clinic (topic category: strengths/weaknesses)	1
Organizational division of the clinic, separation of surgical anesthesia and intensive care (topic category: strengths/weaknesses)	1
Enable individual work design (topic category: specialist retention)	1
Communicate expectations/tasks/performance to new employees (strengths/weaknesses)	1
Sensitize everyone to cultural topics (topic category: onboarding)	1
Teaching the legal basis for foreigners (topic category: onboarding)	1
Introduce bonus-malus system (topic category: strengths/weaknesses)	1
Promote exchange between scientific and clinical fields (topic category: strengths/weaknesses)	1
Encourage doctors to ask questions to superiors (topic category: personnel management)	1
Establishment of formal management rounds (topic category: processes)	1
Increase standardization of rotational interviews, currently heavily dependent on senior physicians (topic category: personnel management)	1
Establish qualification profiles and requirements (topic category: onboarding)	1
Adapting the structure of the senior physician meeting, too large a round and often postponement of decisions (topic category: processes)	1
Hire more qualified nursing staff (topic category: strengths/weaknesses)	1
Introduce core working hours (topic category: specialist retention)	1
Extending external support during planning (topic category: processes)	1
General assembly in hospital desirable (topic category: personnel management)	1
Regular and well-inducted discussion during onboarding (topic category: onboarding)	1
Increased use of simulation (topic category: strengths/weaknesses)	1
Recruitment of regional personnel may be better (topic category: onboarding)	1
Fixed substitution regulations for senior physicians (topic category: processes)	1
Adapt rotations to experience/timing of further training (topic category: onboarding)	1
Promotion of individual strengths/ competence-based use (topic category: strengths/weaknesses)	1
Creating rest rooms for the elderly (topic category: specialist retention)	1
Perceptible equal treatment in further training (topic category: specialist retention)	1
Distribute key functions to several people (topic category: strengths/weaknesses)	1
Fewer tasks outside patient care (topic category: specialist commitment)	1

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Difficult assessment during employee interviews due to frequently changing assignments of specialists (topic category: personnel management)	1
Increase feel-good factor (topic category: strengths/weaknesses)	1
Independent surgical planning (topic category: processes)	1
Set up central service group planning across all services (topic category: processes)	1
Loosen hierarchies (topic category: strengths/weaknesses)	1
Paying allowances for duty and assumption of responsibility (strengths/weaknesses)	1
Setting up lockers (topic category: strengths/weaknesses)	1
Introducing onboarding in general in new areas (topic category: onboarding)	1
Increase referrals and feedback from senior physicians (topic category: onboarding)	1
Implement conscious leadership (topic category: personnel management)	1
Consultation hours with chief physician would make sense (topic category: personnel management)	1
Delegation of medical/nursing tasks (topic category: specialist retention)	1
Stronger specializations in continuing training programs (topic category: strengths/weaknesses)	1
Creating synergies between areas to reduce rotation during further training (topic category: specialist retention)	1
Greater centralization of recruitment and training (topic category: processes)	1
Detailed evaluation of rotation sheets difficult - too short a time (topic category: personnel management)	1
Accept the status quo of lateral entrants in order to develop specific competencies (topic category: personnel management)	1
Include women on the board of employee appraisals (topic category: personnel management)	1
Create a structured onboarding concept (topic category: onboarding)	1
Making rotation sheets visible to junior doctors (topic category: personnel management)	1
Systematic assessment and documentation of competencies (topic category: strengths/weaknesses)	1
Optimal, more efficient use of core working hours - better coordination with other occupational groups to avoid waiting times (topic category: processes)	1
Daily training for specific topics (topic category: onboarding)	1
Reduce sometimes high waiting times, e.g., by optimizing processes transport (topic category: processes)	1

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Enable exchange of leisure time and money, e.g., time value account (topic category: processes)	1
Adapt specialist training, currently too rigid requirements (topic category: specialist commitment)	1
Increase transparency in the allocation of additional qualifications (topic category: processes)	1
Introducing additional areas of responsibility for specialized, supervising physicians (topic category: strengths/weaknesses)	1
Enable home office for certain activities (topic category: strengths/weaknesses)	1
Get input from other clinics and industries (topic category: strengths/weaknesses)	1
Revision of the rotation sheet (topic category: personnel management)	1
Concessions HR Management were not made true, e.g. with regard to time recording (topic category: strengths/weaknesses)	1
Better support during assistance period (topic category: processes)	1
Adapt service model to hall runtimes (topic category: processes)	1
Reducing unequal treatment in the allocation of holidays (topic category: processes)	1
More shared decision-making in task rotation (topic category: personnel management)	1
Making support and appreciation clearer (topic category: personnel management)	1
Introduce real supervision (topic category: strengths/weaknesses)	1
Better involvement in personnel management and development (topic category: personnel management)	1
Creating a failure reserve (topic category: processes)	1
Introducing internships in other clinics, nursing, administration etc. (topic category: Strengths/Weaknesses)	1
Introduction of specialized fellowship as specialized training programs (topic category: specialist retention)	1
Reduction of idle times (topic category: processes)	1
Long-term development goals difficult to demonstrate during rotations (topic category: personnel management)	1
Contractual regulations for binding (topic category: specialist commitment)	1
Growth from within (s topic category: strengths/weaknesses)	1
Establish a professional understanding for doctor’s work within hospital administration (topic category: specialist commitment)	1
Statements total	463

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Appendix 3: Full results of discriminant analyses of frequencies of negative and positive statements to predict NPS groups (sceptical, neutral, promoting) concerning work, training, and intention to stay

Table A3.1: Discriminant analysis predicting NPS work by topics (number of negative and positive statements; absolute differences of function coefficients, Delta, marked according to amount)

	Test of equality of group means			Function coefficients NPS Work			Delta
	Wilks' Lambda	F[2,43]	Sig.	sceptical	neutral	promoting	
Quality of training neg	.978	.488	.617	37.257	40.207	24.077	32.261
Duty scheduling neg	.889	2.676	.080	22.184	16.222	18.461	11.925
Vacation scheduling neg	.916	1.971	.152	56.533	43.771	50.420	25.524
Culture / atmosphere neg	.992	.165	.849	-51.153	-20.666	-41.890	60.974
Personnel capacity neg	.957	.972	.386	-93.410	-67.623	-83.517	51.575
Resources / equipment neg	.773	6.312	.004	-93.904	-41.387	-82.337	105.035
Leadership neg	.958	.935	.401	66.266	21.838	43.815	88.855
Performance orientation neg	.986	.307	.737	123.823	88.156	110.779	71.333
Onboarding neg	.949	1.158	.324	45.720	18.062	30.333	55.316
Working environment neg	.950	1.133	.331	-161.981	-97.451	-176.045	157.190
Cooperation neg	.993	.154	.858	-54.885	-22.876	-44.319	64.019
Technical services neg	.954	1.046	.360	-15.175	-17.438	4.318	43.512
Administration neg	.917	1.943	.156	-36.745	-33.858	-21.509	30.472
Family / Work Life neg	.926	1.708	.193	310.500	160.925	244.900	299.149
Quality of supervision neg	.946	1.236	.301	-32.514	-4.846	-15.583	55.337
Salary neg	.901	2.370	.106	314.544	232.829	251.877	163.429
Career perspectives neg	.986	.294	.746	111.740	56.244	88.663	110.993
Flexible work schedules neg	.970	.672	.516	-149.333	-72.909	-99.217	152.848
Cooperation with nurses neg	.998	.034	.966	97.246	59.595	73.998	75.302
Working hours neg	.988	.251	.780	-216.479	-139.996	-176.958	152.964
Quality of training pos	.967	.728	.489	20.901	20.130	11.799	18.203
Duty scheduling pos	.988	.268	.766	155.384	94.664	115.027	121.440
Vacation scheduling pos	.938	1.420	.253	-164.338	-73.328	-141.490	182.021
Culture / atmosphere pos	.980	.444	.644	-104.370	-81.618	-83.286	45.504
Personnel capacity pos	.936	1.482	.239	-349.195	-131.531	-271.254	435.328

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Resources / equipment pos	.994	.132	.876	31.515	-3.308	34.582	75.779
Leadership pos	.916	1.969	.152	32.442	29.201	34.569	10.736
Performance orientation pos	.977	.503	.608	-331.313	-206.656	-268.133	249.313
Onboarding pos	.889	2.687	.079	87.455	47.461	75.598	79.988
Working environment pos	.837	4.186	.022	101.306	63.762	118.113	108.703
Cooperation pos	.991	.204	.816	-373.217	-253.079	-299.877	240.275
Technical services pos	.993	.161	.852	-39.638	-19.518	-30.623	40.240
Administration pos	.952	1.092	.345	-147.025	-81.050	-113.008	131.950
Family / Work Life pos	.963	.820	.447	-108.013	-46.827	-49.686	122.372
Quality of supervision pos	.996	.076	.927	172.390	113.752	139.751	117.274
Salary pos	.958	.935	.401	-19.028	-83.479	-53.790	128.902
Career perspectives pos	.961	.877	.423	431.053	280.072	378.624	301.962
Flexible work schedules pos	.998	.043	.958	136.970	76.583	110.044	120.773
Cooperation with nurses pos	.982	.397	.675	130.276	75.736	115.312	109.080
Working hours pos	.994	.120	.887	-39.975	-7.752	-36.755	64.446
100% or original cases correctly classified				-174.161	-115.370	-139.324	

Table A3.2: Discriminant analysis predicting NPS training by topics (number of negative and positive statements; absolute differences of function coefficients, Delta, marked according to amount)

	Test of equality of group means			Function coefficients NPS Work			Delta
	Wilks' Lambda	F[2,43]	Sig.	sceptical	neutral	promoting	
Quality of training neg	,937	1,450	,246	80.340	50.278	50.287	60.125
Duty scheduling neg	,987	,277	,759	46.885	25.891	26.340	41.988
Vacation scheduling neg	,942	1,327	,276	73.568	57.124	53.562	40.012
Culture / atmosphere neg	,993	,141	,869	-51.759	-29.702	-29.196	45.125
Personnel capacity neg	,881	2,898	,066	-145.324	-96.222	-93.914	102.818
Resources / equipment neg	,903	2,299	,113	-68.216	-49.683	-47.862	40.710
Leadership neg	,989	,244	,784	33.361	12.500	16.898	41.723
Performance orientation neg	,999	,028	,972	186.976	126.833	121.877	130.198
Onboarding neg	,994	,121	,886	22.757	12.863	13.878	19.788

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Working environment neg	,979	,465	,631	-208.505	-152.126	-146.614	123.783
Cooperation neg	,997	,075	,928	-74.541	-36.891	-38.289	75.301
Technical services neg	,983	,363	,697	-48.791	-24.148	-22.188	53.206
Administration neg	,992	,174	,841	-86.605	-49.706	-48.276	76.657
Family / Work Life neg	,902	2,325	,110	350.874	213.515	209.486	282.776
Quality of supervision neg	,868	3,277	,047	-55.565	-15.697	-17.353	79.735
Salary neg	,868	3,272	,048	468.645	321.753	302.667	331.957
Career perspectives neg	,980	,448	,642	107.956	68.646	67.556	80.800
Flexible work schedules neg	,977	,513	,603	-209.403	-108.402	-106.260	206.287
Cooperation with nurses neg	1,000	,008	,992	120.247	75.137	74.086	92.323
Working hours neg	,997	,074	,929	-288.876	-195.096	-184.067	209.619
Quality of training pos	,980	,439	,648	42.243	27.270	25.399	33.687
Duty scheduling pos	,942	1,323	,277	216.929	132.983	127.097	179.664
Vacation scheduling pos	,962	,856	,432	-96.114	-85.504	-75.894	40.440
Culture / atmosphere pos	,966	,768	,470	-179.561	-117.007	-111.849	135.424
Personnel capacity pos	,970	,671	,517	-380.248	-195.801	-196.952	368.894
Resources / equipment pos	,962	,839	,439	40.693	10.743	14.071	59.900
Leadership pos	,941	1,349	,270	38.410	35.212	33.834	9.153
Performance orientation pos	,965	,784	,463	-477.794	-290.062	-286.588	382.411
Onboarding pos	,941	1,349	,270	120.416	76.362	71.794	97.243
Working environment pos	,920	1,872	,166	107.165	86.641	86.910	41.048
Cooperation pos	,949	1,164	,322	-566.579	-358.365	-346.845	439.469
Technical services pos	,989	,231	,794	-94.079	-38.922	-43.434	110.313
Administration pos	,984	,343	,711	-183.888	-121.080	-109.792	148.193
Family / Work Life pos	,980	,429	,654	-105.673	-43.986	-46.481	123.373

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Quality of supervision pos	,974	,567	,571	198.765	143.718	135.545	126.441
Salary pos	,937	1,445	,247	-141.622	-104.742	-115.998	73.760
Career perspectives pos	,940	1,378	,263	657.578	404.860	404.049	507.057
Flexible work schedules pos	,968	,708	,498	128.314	90.318	86.948	82.732
Cooperation with nurses pos	,983	,364	,697	140.093	100.481	95.755	88.675
Working hours pos	,970	,671	,517	59.492	15.624	18.163	87.736
95.7% or original cases correctly classified				-265.861	-146.466	-131.962	

Table A3.3: Discriminant analysis predicting NPS intention to stay by topics (number of negative and positive statements; absolute differences of function coefficients, Delta, marked according to amount)

	Test of equality of group means			Function coefficients NPS Work			Delta
	Wilks' Lambda	F[2,43]	Sig.	sceptical	neutral	promoting	
Quality of training neg	.987	.292	.748	28.781	40.519	30.124	23.477
Duty scheduling neg	.814	4.899	.012	15.245	16.710	20.233	9.976
Vacation scheduling neg	.959	.912	.409	33.397	45.546	24.900	41.291
Culture / atmosphere neg	.968	.708	.498	-7.562	-16.182	6.960	46.284
Personnel capacity neg	.890	2.664	.081	-55.562	-71.553	-52.002	39.103
Resources / equipment neg	.927	1.698	.195	-36.146	-41.699	-44.992	17.692
Leadership neg	.951	1.110	.339	10.862	-7.049	1.810	35.822
Performance orientation neg	.984	.350	.706	75.504	87.440	71.905	31.071
Onboarding neg	.967	.742	.482	4.122	8.051	-5.936	27.975
Working environment neg	.911	2.088	.136	-103.111	-106.304	-94.841	22.927
Cooperation neg	.979	.464	.632	-23.617	-13.759	-34.775	42.030
Technical services neg	.988	.253	.778	-2.590	-.091	7.473	20.125
Administration neg	.875	3.084	.056	-10.725	-34.100	7.807	83.814
Family / Work Life neg	.995	.111	.895	110.000	142.759	105.078	75.361
Quality of supervision neg	.964	.803	.455	10.823	4.308	20.770	32.924

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Salary neg	.854	3.684	.033	153.915	201.404	78.374	246.061
Career perspectives neg	.969	.695	.505	36.305	41.390	22.813	37.154
Flexible work schedules neg	.975	.546	.583	1.127	-43.830	87.238	262.136
Cooperation with nurses neg	.968	.707	.499	38.640	60.096	37.894	44.404
Working hours neg	.926	1.712	.193	-85.728	-131.581	-38.549	186.063
Quality of training pos	.921	1.856	.169	8.496	13.452	-4.344	35.593
Duty scheduling pos	.966	.758	.475	43.166	61.760	-18.534	160.589
Vacation scheduling pos	.996	.077	.926	-44.396	-54.991	-8.220	93.542
Culture / atmosphere pos	.980	.431	.653	-48.794	-72.527	-12.388	120.277
Personnel capacity pos	.982	.389	.680	-54.364	-111.932	-15.758	192.347
Resources / equipment pos	.946	1.226	.304	4.307	-3.584	12.503	32.173
Leadership pos	.975	.546	.583	30.372	39.326	37.897	17.907
Performance orientation pos	.971	.634	.535	-106.034	-181.076	8.016	378.185
Onboarding pos	.974	.574	.568	35.728	55.989	40.009	40.521
Working environment pos	.870	3.216	.050	79.661	94.694	107.683	56.044
Cooperation pos	.970	.668	.518	-158.617	-218.296	-66.965	302.661
Technical services pos	.896	2.485	.095	-18.857	4.300	-11.582	46.313
Administration pos	.972	.619	.543	-40.626	-70.662	-9.694	121.937
Family / Work Life pos	.904	2.276	.115	-6.979	15.305	25.578	65.112
Quality of supervision pos	.925	1.747	.187	71.206	125.976	54.214	143.525
Salary pos	.965	.770	.469	-123.655	-66.562	-128.074	123.023
Career perspectives pos	.982	.393	.677	207.784	268.358	142.409	251.899
Flexible work schedules pos	.976	.532	.591	49.811	60.608	28.457	64.301
Cooperation with nurses pos	.969	.698	.503	63.858	77.544	66.879	27.371

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Working hours pos	.989	.244	.784	2.062	-3.215	21.010	48.450
100% or original cases correctly classified				-113.550	-130.928	-207.983	

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Appendix 4: PhysicianPlus job satisfaction scale derived from discriminant analyses of negative and positive statements in the main interview predicting NPS concerning work, training, and intention to stay.

How do you experience your personal daily work at the clinic?
(1 = statement on the left, 10 = statement on the right or a value in between)

My work is appreciated and supported by my...	'1' for statement on the left, '10' for the statement on the right or a value in between	My work is hardly appreciated and unnecessarily criticized by my…
…colleagues.	1 2 3 8 4 9 5 10 6 7	…colleagues.
…superiors.	1 2 3 8 4 9 5 10 6 7	…superiors.
My superiors know my personal goals and take them into account as far as possible.	1 2 3 8 4 9 5 10 6 7	My personal goals are neither perceived nor taken into account by my superiors.
You can always rely on promises made by the clinic and superiors.	1 2 3 8 4 9 5 10 6 7	Promises cannot be trusted because they are not kept.
I will be informed in time when and where I have to work. I can make plans for the long term.	1 2 3 8 4 9 5 10 6 7	I won't be informed in time when and where I have to work. I can`t make plans for the long term.
I will be informed sufficiently and early enough about plans and decisions that affect my work.	1 2 3 8 4 9 5 10 6 7	Often, I am not informed sufficiently and early enough about plans and decisions that affect my work.
Decisions that affect my work as well as the decision-making process are easy for me to understand.	1 2 3 8 4 9 5 10 6 7	I often can't understand decisions and decision-making processes at my workplace.
Within the given framework, I can decide for myself how I do my work.	1 2 3 8 4 9 5 10 6 7	I have no room for own decisions and feel that I am being thwarted by the specifications in my work.
The work offers many challenges, but I never feel overwhelmed.	1 2 3 8 4 9 5 10 6 7	I feel overwhelmed by the demands of my work.
In the clinic, I do meaningful work that benefits society.	1 2 3 8 4 9 5 10 6 7	I do pointless work that is of no use to anyone.
In the clinic I find working conditions that are important to me and that I could not find anywhere else.	1 2 3 8 4 9 5 10 6 7	I might as well work in another hospital.
I am paid fairly and appropriately for my work.	1 2 3 8 4 9 5 10 6 7	I don't get enough money for the work I do.

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The clinic offers me optimal opportunities to make progress and to build up a career in my profession.	1 2 3 4 5 6 7 8 9 10	I see the clinic as a dead end where I cannot develop professionally.
In my experience, the workload in the clinic is not too high, and it will remain the same.	1 2 3 4 5 6 7 8 9 10	In my experience, the workload is unbearable, and it won't get better in the future.

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Appendix 5: Means and standard deviations (SD) of items of the PhysicianPlus job satisfaction scale for persons promoting (rating 9-10) none, one, two, or three NPS aspects work, training, and intention to stay.

	promotes none			promotes one (work, training, or intention to stay)			promotes two (work, training, or intention to stay)			promotes three (work, training, or intention to stay)		
Items of job satisfaction scale	Mean	SD	N	Mean	SD	n	Mean	SD	n	Mean	SD	n
appreciation and support by colleages	1.99	0.96	66	1.56	0.65	25	1.75	1.13	13.00	1.80	1.24	8
appreciation and support by superiors	2.25	1.11	66	2.06	0.97	25	1.48	0.68	13.00	1.88	1.18	8
regard of personal goals	2.90	1.31	66	2.06	1.33	25	2.40	1.68	13.00	1.43	0.90	8
reliability promises kept	2.89	1.47	66	2.16	1.33	25	5.95	16.07	13.00	1.61	0.97	8
foresighted planning	3.47	1.80	66	2.71	1.71	25	2.45	1.44	13.00	1.80	1.76	8
sufficient information in time	3.50	1.45	66	2.64	1.32	25	2.47	1.41	13.00	1.58	0.78	8
decisions comprehensible	3.12	1.35	66	2.42	1.43	25	1.75	1.11	13.00	1.31	0.51	8
self directed work	2.43	1.26	66	2.16	1.04	25	2.12	1.31	13.00	1.73	0.93	8
challenge but not overwhelmed	2.96	7.12	66	1.80	0.73	25	2.08	1.33	13.00	1.65	0.77	8
useful purposeful work	1.72	0.95	66	1.32	0.77	25	1.38	1.18	13.00	0.98	0.45	8
good working environment	4.20	1.45	66	3.60	1.59	25	2.82	1.67	13.00	2.40	1.73	8
fair salary	2.69	1.72	66	3.18	1.50	25	2.01	1.59	13.00	2.18	1.84	8
good career perspectives	2.94	1.42	66	2.18	1.09	25	1.22	0.58	13.00	1.28	0.81	8

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working hours manageable	3.63	1.12	66	3.24	1.19	25	3.18	1.21	13.00	2.78	1.47	8

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Appendix 6: Study Guide Rep Grid

Table A6.1: Principal components and factor loadings for the first two components as for work promotors and sceptics

	Eigenvalues work Promoters			Eigenvalues work Sceptics		
	Eigenvalue %	Variance	Cumulative %	Eigenvalue %	Variance	Cumulative %
PC_1	8525.62	63.28	63.28	4877.60	56.38	56.83
PC_2	1525.79	11.33	74.61	1201.63	14.00	70.83

	Factor loadings Promoters		Factor loadings Sceptics	
	PC_1	PC_2	PC_1	PC_2
Physicians	42.92	1.37	38.32	-1.72
Nurses	37.06	21.09	39.36	-9.17
Clinic today	25.97	-3.87	6.60	4.47
Clinic in 5 years	9.12	-26.43	-2.21	20.75
Hospital Admin.	-45.25	13.39	-26.89	15.66
Clinic Admin.	0.84	-3.58	-12.33	8.27
Hospital today	-33.14	8.28	-18.40	12.34
Hospital in 5 years	-37.50	-10.24	-24.46	4.65

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Table A6.2: Principal components and factor loadings for the first two components as for staff members with low vs. high intention-to-stay

	Eigenvalues high intention to stay			Eigenvalues low intention to stay		
	Eigenvalue %	Variance	Cumulative %	Eigenvalue %	Variance	Cumulative %
PC_1	4028.18	62.04	62.04	12967.54	60.28	60.28
PC_2	984.45	15.16	77.21	2755.46	12.81	73.09

	Factor loadings high intention		Factor loadings low intention	
	PC_1	PC_2	PC_1	PC_2
Physicians	30.83	-3.52	57.09	-4.62
Nurses	26.39	-15.00	57.60	-25.01
Clinic today	15.69	4.70	22.22	15.13
Clinic in 5 years	7.19	22.99	-0.96	27.13
Hospital Admin.	-30.63	-9.19	-49.31	-13.34
Clinic Admin.	-1.69	-0.67	-4.74	23.98
Hospital today	-23.86	-7.12	-34.31	-19.39
Hospital in 5 years	-23.93	7.81	-47.59	-3.88