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**The Relative Importance of Patient and Physician Characteristics on Physicians’ Likelihood to Provide Self-Management Support to Patients**

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# Abstract

## Background

Person-Centered Care (PCC) strives to treat patients as individuals and as equal partners in decision-making. However, PCC faces the barrier of physicians not supporting their patients' self-management and remaining to adhere to a paternalistic decision-making approach. Physicians sometimes adhere to a paternalistic decision-making style because they underestimate the extent to which patients can take responsibility for their health. This study aimed to investigate the relative importance of two patient characteristics (a patient's education level and social support) and one physician characteristic (work experience) on physicians' likelihood to provide self-management support to patients.

## Methods

The study consisted of a quantitative research design using secondary data from a factorial survey from 2017, administered by University Medical Center Utrecht (UMCU). The study sample consisted of 47 General Practitioners (GPs) and 13 GPs in training. A multinomial logistic regression was used to create a model of the relationship between the predictor variables (education level, social support, and work experience) and physicians' likelihood of providing self-management support to patients.

## Results

This study shows that a high education level (vs. low education level) is the only patient characteristic in this study that has a significant effect on physicians' likelihood of providing self-management support to patients, Neutral ( $p = .025$ ), and Likely ( $p = .021$ ). While patients' social support and physician work experience do not significantly affect this likelihood.

## Conclusion

This study shows that physicians are more likely to provide self-management support to patients with a high education level vs. low education level. The patient's characteristic of social support and the physician's characteristic of work experience had no significant effect.

## Implications

Suggested future interventions include training for physicians (in training) to familiarize themselves with PCC and become aware of their implicit bias, and decision-making styles concerning patients' education level. Furthermore, a PCC moment during a consult could be scheduled which allows the patient the opportunity to inform the physician on their circumstances to ensure adherence to PCC.

## Background

Perceptions of medical decision-making and the role of the patients and family therein have changed (Rodriguez-Osorio & Dominguez-Cherit, 2008). The old paternalistic system, where the doctor had complete control over the treatment of the patient, has shifted to a system in which a patient is more likely to question the doctor's opinion (Coulter & Oldham, 2016). Patients today want to be acknowledged as distinct individuals, whose knowledge, values, preferences, family, and social circumstances are considered. These circumstances are of great importance in medical decision-making (Coulter & Oldham, 2016). Medical decision-making is the process by which a diagnosis or treatment plan is formulated based on the available test information and patient preferences (Whang, 2013).

Person-centered Care (PCC) applies to the contemporary opinion on managing medical decisions. PCC strives to treat patients as individuals and as equal partners in decision-making (Coulter & Oldham, 2016). To be able to partner with physicians in decision-making, patients need to be able to self-manage their health (Rodriguez-Osorio & Dominguez-Cherit, 2008). Self-management is the active participation of patients in their treatments. It is defined as the day-to-day management of health conditions by patients and includes medical, behavioral, and emotional management in problem-solving, decision-making, resource utilization, and partnership with healthcare providers (Grady & Gough, 2014). For instance, patients can make lifestyle changes in diet or exercise to manage their health condition (Grady & Gough, 2014). However, PCC faces the barrier that some physicians do not support their patient's self-management and remain to adhere to a paternalistic decision-making approach (Mapes, DePergola, & McGee, 2019). The extent to which physicians are likely to support their patient's self-management is dependent on whether they believe the patient is able to manage their own health (Bos-Touwen, et al., 2017).

Physicians sometimes adhere to a paternalistic decision-making style because they underestimate the extent to which patients can take responsibility for their health (Coulter & Oldham, 2016). Paternalistic physicians create a dependency which can undermine patients' confidence to protect their health, prevent illness, get involved in decision-making, and manage their own care (Coulter & Oldham, 2016). Furthermore, because patients often greatly respect physicians, it can be difficult for them to express their feelings and personal thoughts during decision-making (Alharbi, et al., 2014). Both the lack of confidence and difficulty for patients to express their feelings can lead to patients receiving poorer treatment, inaccurate diagnosing, and inequalities in the quality of care that is received (Haghighi, 2021). The underestimating attitude of physicians regarding the ability of patients to take responsibility for their care is dependent on physician characteristics and perceptions of patient characteristics (Bos-Touwen, et al., 2017). Examples of characteristics are the work experience of the physician, or the education level and social support of the patient (Eijk, Nijhuis, Faber, & Bloem, 2013; Reblin & Uchino, 2009; Ryn & Burke, 2000). Education level and social

support influence physicians' attitudes because physicians expect patients to be unable to comprehend medical information and meet institutional expectations in decision-making (Entwistle, Carter, Cribb, & McCaffery, 2010; Gage-Bouchard, 2018) Also, the work experience of physicians can influence the extent to which they adhere to PCC in practice (Eijk, Nijhuis, Faber, & Bloem, 2013).

Physicians can provide self-management support to their patients by referring them to resources to self-improve their health. For instance, by referring patients to education or skills training (e.g., language training to improve health literacy), or making referrals to community-based resources (e.g., quit smoking programs or exercise programs) (Agency for Healthcare Research and Quality, 2020).

Previous research has not yet studied how patient and physician characteristics influence physicians' likelihood to provide self-management support. Therefore, the scientific relevance of this study is to contribute to the current lack of knowledge by gaining insight into the role patient and physician characteristics play in shaping physicians' support of patient self-management. And to understand how physicians' support aligns with the PCC approach of treating patients as equal individuals in shared decision-making. The social relevance of this study is to find opportunities and future intervention suggestions that support patients in their self-management.

Based on what has been discussed above, this study aims to investigate the relative importance of two patient characteristics (patients' education level and social support) and one physician characteristic (work experience) on physicians' likelihood to provide self-management support to patients.

## **Existing research**

In PCC, medical decision-making is a joint process between physician and patient that is defined as shared decision-making. Shared decision-making goes beyond formulating treatment and entails collaborative care planning and implementation (Thomas, Bass, & Siminoff, 2021). Decision-making can be influenced due to the physician's implicit bias toward patient characteristics since treatment decisions are based on the physician's expectations of the patient (Chapman, Kaatz, & Carnes, 2013). In this study, PCC is defined as treating patients as individuals and as equal partners in decision-making. It is personalized, coordinated, and enabling in its care approach, involving multidisciplinary personal needs, and tackling these accordingly (Louw, Marcus, & Hugo, 2017). This form of care means recognizing patients' capabilities and self-management as a way to improve their health, not seeing them simply as victims of diseases or passive recipients of care (Coulter & Oldham, 2016).

However, PCC faces several barriers concerning the physician's attitude and the patient population (Moore, et al., 2016). Moore et al. (2016) state that PCC is limited in practice because physicians adhere to traditional (paternalistic) practices and structures, and patient characteristics.

Furthermore, PCC is challenged by the physician's professional practice, culture, beliefs, and stereotypes of patients (Mapes, DePergola, & McGee, 2019). As a result, even though PCC strives for shared decision-making, physicians continue to have paternalistic decision-making approaches.

Work experience is a physician characteristics that can play a role in the adherence to PCC and physicians' support of self-management (Liang, Reiss, & Isaacs, 2023). Work experience can influence the extent to which physicians adhere to the PCC and tackle the personal needs of the patients. For example, a lack of experience can render physicians unable to address the complex needs of a patient (Eijk, Nijhuis, Faber, & Bloem, 2013).

Furthermore, differences in patient characteristics may explain the differences in physician attitudes and support of self-management (Arpey, Gaglioti, & Rosenbaum, 2017). A study by Ryn and Burke (2000) shows that physicians are less affiliative with patients with lower education levels and judge these patients as more likely to be at risk for inadequate social support (Ryn & Burke, 2000). Expectations based on the education level of the patient stem from the physician's perception that lower-educated individuals experience lower health literacy (Jansen, et al., 2018), expecting that they are less capable of self-management (Entwistle, Carter, Cribb, & McCaffery, 2010). Furthermore, another patient characteristic that influences the health outcomes of patients is their social support (Reblin & Uchino, 2009). Social support is of great importance in PCC, since it is considered by physicians during decision-making (Coulter & Oldham, 2016). Social support refers to functions performed by people close to the individual, including emotional, informative, and instrumental support. Having social support is causally related to improving health and well-being since it acts as a stress buffer (Thoits, 2011). Moreover, people with no social support often experience worse health, as it is linked to social isolation and loneliness (Melchiorre, et al., 2013). Physicians expect that people with no social support and a less favorable social environment have reduced self-management ability (Pincus, Esther, DeWalt, & Callahan, 1998). Physicians have this expectation because having social support shapes people's ability to meet institutional expectations for patients' involvement in decision-making. Having no social support makes meeting these expectations more difficult since managing stress, navigating the health care system, and decision-making need to be done without support from others (Gage-Bouchard, 2018).

These expectations of physicians concerning patient characteristics can lead to inappropriate care and health inequalities (Coulter & Oldham, 2016). Health inequalities are differences in disease and mortality between population groups (Riley, 2020). As a result of these health inequalities, people with less fortunate characteristics experience poorer health outcomes (Singer & Ryff, 2001).

Currently, there is a gap in the literature concerning the influence of patient and physician characteristics on the likelihood of physicians to support patient self-management, and to what extent physician work experience and patient characteristics (education level and social support) play a role in this. This study aims to address this gap in the literature and add to the body of knowledge by contributing to an interdisciplinary field of study. Therefore, this study is valuable for both social and

medical sciences as it offers a holistic perspective on patient self-management, its relation to PCC, health inequalities, and shared decision-making.

## **Theoretical framework**

To understand how differences in patient characteristics result in health inequalities the Fundamental Cause Theory (FCT) is relevant. FCT explains how social differences between groups result in health inequalities (Riley, 2020). The FCT posits that resources such as education level, and social support determine people's access to high-quality care (Riley, 2020). These resources can be seen as (fundamental) causes that shape individuals' health behavior and create opportunities to engage in health-enhancing behavior. Furthermore, FCT offers a way to understand why differences in patient characteristics result in health inequalities and to what extent the physician characteristic of work experience plays a role in this (Phelan & Link, 2013).

Furthermore, Scholl et al (2014) developed a framework consisting of the dimensions of PCC categorized into principles, enablers, and activities. This framework demonstrates the multi-layeredness of PCC, highlighting that physicians tend to focus on only several principles, enablers, or activities, rather than having a holistic perspective (Scholl, Zill, Härter, & Dirmaier, 2014). This framework is of relevance to the study as it accounts for physicians' behavior in a PCC setting. Within the dimensions of PCC, this study focusses on the principle of the Biopsychosocial perspective. This principle aims to understand the patient from a broader perspective by considering the biological, psychological, and social contexts of the patient. It entails that the physician also feels responsible for non-medical aspects of problems and is involved in the full range of difficulties that the patient brings up (Scholl, Zill, Härter, & Dirmaier, 2014). By understanding how education level and social support fit into the Biopsychosocial perspective of PCC this study is able to identify their function as barriers or facilitators in PCC, and whether they influence physicians' likelihood to support patient self-management.

## **Research questions**

As argued in previous sections, it is still unclear how patient and physician characteristics influence physicians' likelihood to support patient self-management and how this support aligns with PCC in shared decision-making. While investigating this topic, the FCT will function as a perspective to understand why patient characteristics result in inequalities in self-management support and what role the physician characteristic of work experience plays in this. Furthermore, the Biopsychosocial perspective on the dimensions of PCC help to identify whether education and social support are barriers or facilitators in PCC, and whether they influence physician likelihood to support patient self-management. This study answers the following research question:

*What is the relative importance of patient characteristics (a patient's education level and social support) and the physician's characteristic of work experience on the physician's likelihood to provide self-management support to patients?*

To answer the main question, the following sub-questions are researched:

1. To what extent is the physician's likelihood to support the patient's self-management in terms of medical decision-making affected by the patient's education level?
2. To what extent is the physician's likelihood to support the patient's self-management in terms of medical decision-making affected by the patient's social support?
3. To what extent does physicians' work experience affect their likelihood to support the patient's self-management in terms of medical decision-making?

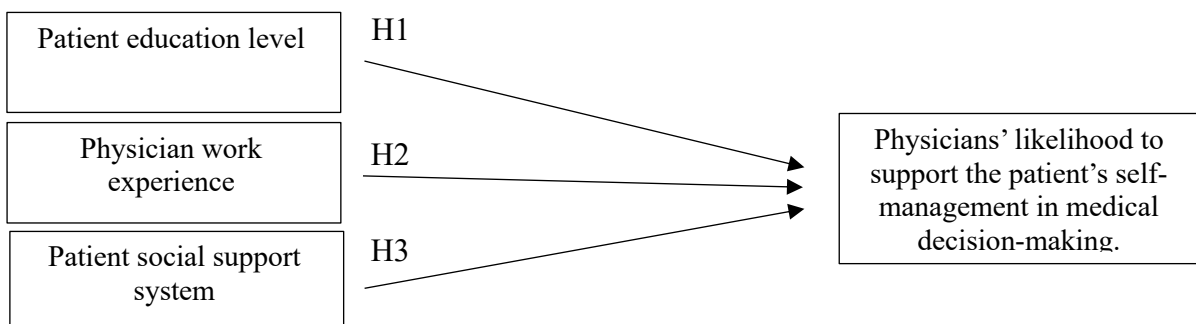
Based on the existing research and the theoretical framework, the following hypotheses are formulated:

H1. A patient with a higher education level will experience more self-management support from the physician in terms of medical decision-making vs. patients with lower education levels.

H2. A patient with social support will experience more self-management support from the physician in terms of medical decision-making vs. patients with no social support.

H3. Physicians with more experience are more likely to support the patient's self-management in terms of medical decision-making vs. physicians with less experience.

**Figure 1:** *Conceptual model*



## Methods

### Study design

Quantitative research was best suited for this study, since the study aimed to research the relationship between patient and physician characteristics and self-management support, testing the research questions and hypothesis that are mentioned in the research question section. This study is a secondary data analysis based on a factorial survey from 2017, administered by University Medical Center Utrecht (UMCU). The UMCU study aimed to identify the relative importance of patient factors in health professionals' decision-making regarding self-management support (Bos-Touwen, et al., 2017). A factorial survey is an experimental design consisting of vignettes that have to be judged by respondents (Dülmer, 2015). Within the UMCU study, respondents were asked to evaluate clinical vignettes (case descriptions) consisting of a written case history of a fictitious patient (see Box 1.) (Bos-Touwen, et al., 2017). The vignettes and questions were written by one of the primary research team members and subsequently discussed within the research team to ensure they were as realistic as possible (Bos-Touwen, et al., 2017). The vignettes of the factorial survey consisted of 15 patient factors divided into subcategories, e.g., education level split up into low, medium, or high levels. Every respondent was allocated a random set of 12 vignettes. All respondents assessed each vignette, and indicated after reading each vignette whether they would support patient self-management, and whether they expected this support to be successful on a 5-point Likert scale (Bos-Touwen, et al., 2017). A study design consisting of clinical vignettes best suited this research since vignettes are a valid tool to measure the quality of care in clinical practice among physicians (Peabody, et al., 2004).

#### Box 1. *Example of a clinical vignette used in the survey.*

Patient X is **80 years old**, has a **high education level**, and comes to see you for a **COPD checkup**. The patient currently experiences **severe COPD-related symptoms**. You **experience a good patient-provider relationship**. The patient has **sufficient knowledge of the disease** and has a **realistic illness perception**. The patient **has no social support at home**. The patient is **motivated for self-management** and has **sufficient self-efficacy for self-management**. The patient **has an anxiety or depressive disorder**.

*Note.* Adapted from *Questionnaire*, by Bos-Touwen., 2017.

### Study sample

A total of 161 healthcare professionals participated in the UMCU study. The study participants were recruited through regional primary healthcare organizations, the General Practice Specialty Training institutes in the Netherlands, and the national practice nurse network. Participants



from these organizations were previously recruited for another study and agreed to participate in the vignette study. Once healthcare professionals consented to participate, they were asked for their email addresses and were sent the vignettes through an online questionnaire (Bos-Touwen, et al., 2017). For this study, the study sample was narrowed to Physicians and final-year Physicians in training, resulting in a study population of 47 Physicians and 13 Physicians in training that completed a total of 720 vignettes. This contraction in the study population was made because this study focused on Physicians, not nurses. Including General Practitioners (GPs) in training was valuable since it gave insight into the work experience of the physician.

## **Data operationalization**

Dependent variable: *Likelihood of providing self-management support (Prov\_SM)*

The dependent variable *Prov\_SM* measured the likelihood of healthcare professionals to provide self-management support for their patients. This variable was measured at the end of every vignette with the question: ‘*How likely is it that you will support this patient in self-management?*’ This variable was operationalized on a 5-point Likert scale. 1 Being *very unlikely* to provide support and 5 being *very likely* (Bos-Touwen, et al., 2017). In this study, the dependent variable was collapsed into 3 categories, reducing the number of cells with frequency 0 from 51.2% to 30.2 %. The original dependent variable therefore was transformed from a 5-point Likert scale to 1) Unlikely, 2) Neutral, and 3) Likely to support self-management.

Independent variables of patient characteristics: 1) *Education* and 2) *Social Support*

The patient characteristics of education and social support were included in the case descriptions of each clinical vignette. Within each vignette, a patient was described including their education level and social support (see Box 1). Based on these descriptions, the participants answered the question that is mentioned above on the likelihood to support the patient in self-management.

*Education* was operationalized in the case descriptions on an ordinal scale consisting of 1) high education level, 2) medium education level, and 3) low education level. *Social support* was operationalized nominally: 1) having social support at home, and 2) having no social support at home.

Independent variable of the physician characteristic: 1) *Physician work experience*

The physician characteristic of work experience was included in the study to gain insight into the baseline characteristics of the study participants. *Physician work experience* was operationalized nominally: 1) Physicians, and 2) Physicians in training.

## Confounding variables

To enhance the validity of the study, two confounding variables were controlled for (Bovbjerg, 2020). The chosen confounders of the study are physician age and gender. Physician characteristics tend to differentiate one generation from the next. For instance, physicians from the Baby Boomer generation (1946-1964) are often the oldest, most experienced generation in practice and are characterized as having a strong work ethic, valuing a strong chain of command, and may be judgmental of differing views (Lim & Epperly, 2013). While Millennial (1981-1999) physicians value work-life balance, are feedback and team-oriented, and want to make an impact quickly (Lim & Epperly, 2013). Gender is relevant, since patients identify more communal traits among female physicians compared to male physicians, therefore suggesting that female physicians possibly adhere more to PCC (Chen, et al., 2021).

Confounder 1: *Age\_GP*

*Age* was operationalized continuously, the youngest GP (trainee) being 27, and the oldest being 64.

Confounder 2: *Gender\_GP*

Gender was operationalized nominally: 1) Male, and 2) Female.

## Data analysis

Descriptive analyses were conducted in IBM SPSS Statistics, version 28 to gain general knowledge of the variables. Next, H1, H2, and H3 were all tested through a multinomial logistic regression. This model best suited the study since the dependent variable had more than two categories. Multinomial logistic regression is an analysis for predicting categorical outcomes from categorical and continuous predictors, which can predict outcomes with several categories (Field, 2018). This is useful since the dependent variable was originally measured on a 5-point Likert scale (later collapsed into 3 categories), and the independent variables varied between nominal, ordinal, and continuous scales. This analysis investigated the relationship of independent variables (patient) *Education*, (patient) *Social Support*, (physician) *Profession*, and the confounders (physician) *Age\_CP* and *Gender* to the dependent variable *Prov\_SM*. Before executing the analysis, the data was filtered on GPs and GPs in training only. Next, it was tested on missing values and outliers through frequency tables and tested for incomplete information. Furthermore, most assumptions were met, except the independence of observations was violated since every respondent answered 12 vignettes. See Appendix B for the syntax.

## Results

### Descriptive statistics

Descriptive statistics (Table 1) show that the average age of the physicians was 47.05. In total, 720 vignettes were assessed of which 32.9% of vignettes were assessed as Unlikely by physicians (in training) to provide self-management support (Table 1). 24.4% Of vignettes were assessed by the physicians as Neutral and 42.6% as Likely to provide self-management support.

**Table 1**

<i>Descriptive statistics patient and physician characteristics</i>			
		N	Marginal Percentage
Likelihood of providing self-management support with 3 categories	Unlikely	237	32.9%
	Neutral	176	24.4%
	Likely	307	42.6%
Physician in Training	.00	156	21.7%
	1.00	564	78.3%
Physician Education	High education level	240	33.3%
	Medium education level	240	33.3%
	Low education level	240	33.3%
Social Support	Having social support at home	359	49.9%
	No social support at home	361	50.1%
Physician Gender	Male	360	50%
	Female	360	50%
Total Vignettes		720	100%
		Mean statistic	Std. Error
Age Care Provider		47.05	0.431

Table 3 is divided into two halves, using Unlikely as the reference category. The top half of the table compares the *Neutral likelihood of providing self-management support* to the *unlikelihood of providing self-management support*. The bottom half of the table compares the *likelihood of providing self-management support* to the *unlikelihood of providing self-management support*.

**Table 3**

*The relative importance of patient and physician characteristics*

Likelihood of providing support with 3 categories		Sig.	OR	95% Confidence Interval for OR	
				Lower Bound	Upper Bound
Neutral	Intercept	.828			
	Physician in training	.859	.930	.420	2.059
	Physician <sup>c</sup>	.	.	.	.
	High Education level	.025	1.732	1.071	2.801
	Medium Education level	.598	1.139	.702	1.848
	Low Education level <sup>d</sup>	.	.	.	.
	Social_support	.369	1.198	.807	1.778
	No Social_support	.	.	.	.
	Age Care Provider	.179	.978	.947	1.010
	Gender	.586	1.141	.710	1.833
Likely	Intercept	.680			
	Physician in training	.731	.880	.425	1.822
	Physician <sup>c</sup>	.	.	.	.
	High Education level	.021	1.646	1.079	2.512
	Medium Education level	.173	1.330	.882	2.005
	Low Education level <sup>d</sup>	.	.	.	.
	Social_support	.131	1.302	.925	1.832
	No Social_support <sup>e</sup>	.	.	.	.
	Age Care Provider	.799	1.004	.976	1.032
	Gender	.715	1.079	.716	1.628

a. This parameter is set to zero because it is redundant.

b. The reference category is unlikelihood.

c. The reference category is Physician.

d. The reference category is Low Education Level.

e. The reference category is No Social Support

## The relative importance of patient and physician characteristics

As shown in Table 3, high patient education level has a significant effect on whether a physician is Neutral ( $p = .025$ ), and Likely ( $p = .021$ ) vs. Unlikely to provide self-management support. Medium education level has no significant effect on whether a physician is Neutral ( $p = .598$ ), and Likely ( $p = .173$ ) vs. Unlikely to provide self-management support. This suggests that physicians are more likely to provide self-management support to high-educated patients vs. low educated patients. The odds ratio (OR) tells us that there is a significant difference between high vs. low education level and whether physicians are Neutral (OR = 1.732, CI [1.071 – 2.801]), and Likely (OR = 1.646, CI [1.079 – 2.512]) vs. Unlikely to provide self-management support. In other words, when a patient's education level is high, physicians are more likely to provide self-management support. Other OR show no significant effect (Medium Education level Neutral OR = 1.139 CI, [0.702 – 1.848]. Likely OR = 1.330 CI, [0.882 – 2.005]).

Overall, these results confirm H1 since high education level vs. low education level does significantly affect the likelihood of physicians providing self-management support, this is also reflected in the OR. However, medium education level vs. low education level does not show a significant effect, indicating that they do not affect the likelihood of physicians to provide self-management support or not.

The patient characteristic of the social support does not significantly affect whether physicians are Neutral ( $p = .369$ ), and Likely ( $p = .131$ ) vs. Unlikely to provide self-management support. Neither is this reflected in the OR, Neutral OR = 1.198, CI [0.807 – 1.778], Likely OR = 1.302, CI [0.925 – 1.832].

The physician characteristic of work experience does not significantly affect whether physicians are Neutral ( $p = .859$ ) and Likely ( $p = .731$ ) vs. Unlikely to provide self-management support. Neither is this reflected in the OR, Neutral OR = 0.930, CI [0.420 – 2.059], Likely OR = 0.880, CI [0.425 – 1.822].

None of the confounding variables had a significant effect on the physicians' likelihood of providing self-management support. Physician age Neutral,  $p = .179$ , OR = 0.978, CI [0.947 – 1.010], Likely,  $p = .799$ , OR = 1.004, CI [0.976 – 1.032]. Gender Neutral,  $p = .586$ , OR = 1.141, CI [0.710 – 1.833]. Likely,  $p = .715$ , OR = 1.079, CI [.716 – 1.628].

## **Discussion**

### **Main findings**

This study found that patients' education level was significantly related to physicians' likelihood to provide self-management support. When a patient's education level is high, physicians are more likely to provide self-management support. Therefore, the hypothesis (H1) that patients with a higher education level would experience more self-management support is therefore validated. However, medium education level vs. low education level does not show a significant effect, indicating that they do not affect the likelihood of physicians providing self-management support. The patient's characteristic of social support and the physician's characteristic of work experience had no significant effect. The hypothesis that patients with social support would experience more self-management support and that physicians with more work experience would be more likely to support self-management was therefore falsified.

### **Similarities and differences to existing research**

Earlier research highlighted the shift to a PCC system where patients are acknowledged as distinct individuals that enable people to partner with their physician in shared medical decision-making (Coulter & Oldham, 2016). In this study, patients' social support, patients' low and medium education levels, and physician work experience showed no significant influence on physicians' likelihood to provide self-management support. These characteristics therefore do not influence physicians' (un)likelihood to provide self-management support and suggest that they do not influence the physician's adherence to PCC. However, earlier research on patient education level, patient social support, and work experience of physicians suggest that they do influence the extent physicians adhere to PCC (Entwistle, Carter, Cribb, & McCaffery, 2010; Gage-Bouchard, 2018). Additional research is necessary to validate the study's findings and to understand the extent patient and physician characteristics play a role in adhering to PCC.

Earlier research suggested that a patient's education level influences physicians' likelihood to provide self-management (Reblin & Uchino, 2009). The results of this study show a significant effect between high education level vs. low education level and the likelihood of physicians providing self-management support. Suggesting that physicians are more likely to support self-management amongst higher educated patients. However, medium education level vs. low education level does not significantly affect this. Thus, the findings of this study only partly align with earlier research. Suggesting that the type of education level (low, medium, or high) of the patient influences the likelihood of the physician to provide self-management support. An alternative explanation could be that there is an implicit bias among physicians concerning the type (high, medium, low) of education level that influences the extent of self-management support. Further research is necessary to understand the extent of physician's bias of their patients and the effect on their adherence to PCC.

Earlier research also suggested that physicians adhere to a paternalistic decision-making style, due to physician characteristics that cause implicit biases around patient characteristics (Lucy Moore, 2016; Mapes, DePergola & McGee, 2019). This would limit the self-management patients have in their medical decisions and is in conflict with the PCC approach. However, this study suggests that there is no significant effect of physician work experience on their likelihood to provide self-management support and therefore is not in conflict with PCC. An alternative explanation could be that physicians continue to adhere to a paternalistic decision-making style because they are not familiar enough with PCC and its practice. Therefore, it is recommended to already familiarize physicians in training with PCC in their medical studies or provide training to physicians concerning PCC and its practice. Future research is necessary to investigate what other patient and physician characteristics play a role in the lack of familiarization of physicians (in training) with PCC.

The Fundamental Cause Theory explains how social differences between groups result in health inequalities, due to inequalities in resources (Riley, 2020). This study indicates that high education level (vs. low) was the only patient characteristic that had a significant effect on the physician's likelihood to provide self-management support. The differences in self-management support among different patient education levels illustrate how social differences influence people's health behavior and resources to engage in health-enhancing behavior. Other patient and physician characteristics are found to be insignificant, therefore indicating that within this research model, they do not play a role in health inequalities. However, further research is necessary to go more into detail on the cause of health inequalities and what patient and physician characteristics influence this.

The Biopsychosocial perspective of the PCC framework by Scholl et al (2014) suggests that in PCC physicians aim to understand patients from a broader perspective, considering the biological, psychological, and social contexts of the patients. The study results are mostly in line with this perspective since social support does not significantly affect physicians' likelihood to provide self-management support, neither does medium education level vs. low education level nor the physician's work experience. The study results indicate that physicians in this context are not influenced by these characteristics and are approaching their patients from a broader perspective. However, it is important to keep the context of the study in mind when drawing this conclusion, considering that the characteristics are measured using vignettes of fictitious patients. Further research is necessary to validate the study results and research how physicians adhere to PCC in practice.

### **Strengths and limitations**

The study had a number of strengths and limitations worth considering. The inclusion of both patient and physician characteristics in the study design expanded earlier research and helped to investigate the relative importance of these characteristics on the likelihood to provide self-management support. The use of a factorial study consisting of vignettes allowed the investigation of the relationship between patient and physician characteristics on self-management support. The

inclusion of confounders enhanced the study's validity of the results. The sample size was sufficient to answer the research questions, enhancing the generalization of the results. The patient and physician characteristics chosen in the study were rather explicit, whereas more nuances can be expected in clinical practice. Currently, only conclusions can be drawn regarding the relative importance of the selected patient and physician characteristics. Therefore, it would be interesting to expand the selection of patient and physician characteristics in future studies, and for example include physician stress levels and (lack of) time for the patient (Evén, Spaak, M, Franzén-Dahlin, & Stenfors, 2019). Also, this analysis was performed only using data of GPs and GPs in training, limiting the generalization amongst other physicians. Furthermore, due to the use of secondary data, there was no opportunity to expand the data and research how physicians assessed their likelihood to provide self-management support. Future qualitative research is needed to go into depth on why physicians are (un)likely to provide self-management support, this could be done by interviewing physicians on their motives in providing self-management support. These insights could offer a better understanding of why patient self-management is sometimes limited and provide information that can help develop initiatives to increase patient self-management support. Another limitation of the study was the violation of the independence of observations assumption. This violation may affect the reliability and interpretation of the statistical results.

## **Conclusion**

This study shows that patients' education level was significantly related to physicians' likelihood to provide self-management support to patients. Physicians are more likely to provide self-management support to patients with a high education level vs. low level. The patient's characteristic of social support and the physician's characteristic of work experience had no significant effect. Future research is advised to further elucidate the role of other patient characteristics, such as socioeconomic status, (health) literacy, etc. This would provide a more comprehensive understanding of patient characteristics that influence physicians in their likelihood to provide self-management support. Furthermore, future interventions could include training for physicians to familiarize themselves with PCC and become aware of their implicit bias, and decision-making styles concerning patient characteristics. Also, more attention could be paid to PCC in medical training, to familiarize physicians in training with the concept. Finally, a suggestion could be to schedule a PCC moment during physician-patients consults in which patients can inform their physician on their characteristics and circumstances. In order for the physician to be able to provide additional support and resources when necessary, and successfully adhere to PCC.



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## Appendix

### Appendix A: Assumptions

First, the assumption of independence of observations was violated since every respondent answered 12 vignettes. However, the analysis was still performed since alternative analysis techniques were not mastered by the other. Second, multicollinearity was tested through linear regression by transforming *Education* into the dummy variable *Education\_Dummy*. Third, the categories of the outcome variables are mutually exclusive since they are based on vignette factors. Fourth, the linear relationship between continuous variables and the logit transformation of the outcome variables shows no significance. This indicates that the assumption of linearity of the logit has been met. Fifth, independence of errors was present, since SPSS Statistics produced a chi-square goodness-of-fit statistic that checked if overdispersion was present. The ratio of this statistic to its degrees of freedom was between one and two, therefore overdispersion was not present. There was no indication of overdispersion, this could be because the Pearson statistic is sensitive to low expected frequencies.

## Appendix B: Syntax

```
USE ALL.
COMPUTE filter_$=(Profession3 < 3).
VARIABLE LABELS filter_$ 'Profession3 < 3 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.

FREQUENCIES VARIABLES= Age_CP Education Social_support Profession3
Gender Prov_SM filter_$
  /ORDER=ANALYSIS.

FREQUENCIES VARIABLES= Age_CP Education Social_support Profession3
Gender Prov_SM filter_$
  /FORMAT=NOTABLE
  /HISTOGRAM
  /ORDER=ANALYSIS.

DESCRIPTIVES VARIABLES=Gender Age_CP Profession Social_support
Education Prov_SM Three
  /STATISTICS=MEAN STDDEV VARIANCE RANGE MIN MAX SEMEAN.

RECODE Education (1=1) (2=0) (3=0) INTO Education_dummy_1.
VARIABLE LABELS Education_dummy_1 'Education Dummy 1'.
EXECUTE.
RECODE Education (1=0) (2=1) (3=0) INTO Education_dummy_2.
VARIABLE LABELS Education_dummy_2 'Education Dummy 2'.
EXECUTE.

RECODE Profession3 (1=1) INTO Profession.
VARIABLE LABELS Profession 'Profession (0=in training, 2=gp)'.
EXECUTE.

REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA COLLIN TOL
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT Prov_SM
  /METHOD=ENTER Education_dummy_1 Education_dummy_2 Social_support
Profession Age_CP.

CROSSTABS
  /TABLES=Gender Profession3 Education Social_support BY Prov_SM
  /FORMAT=AVALUE TABLES
  /CELLS=COUNT
  /COUNT ROUND CELL.

COMPUTE LnAge_GP=LN(Age_CP).
VARIABLE LABELS LnAge_GP 'Ln(Age_GP)'.
EXECUTE.

COMPUTE LnAge_GP=LN(Age_CP).
```

```

VARIABLE LABELS LnAge_GP 'Ln(Age_GP)'.
EXECUTE.
NOMREG Prov_SM (BASE=FIRST ORDER=ASCENDING) WITH Age_CP LnAge_GP
  /CRITERIA CIN(95) DELTA(0) MXITER(100) MXSTEP(5) CHKSEP(20)
LCONVERGE(0) PCONVERGE(0.000001)
  SINGULAR(0.00000001)
  /MODEL=Age_CP Age_CP*LnAge_GP
  /STEPWISE=PIN(.05) POUT(0.1) MINEFFECT(0) RULE(SINGLE)
ENTRYMETHOD(LR) REMOVALMETHOD(LR)
  /INTERCEPT=INCLUDE
  /PRINT=PARAMETER SUMMARY LRT CPS STEP MFI.

NOMREG Prov_SM_Three (BASE=FIRST ORDER=ASCENDING) BY Profession
Education Social_support WITH Age_CP Gender
  /CRITERIA CIN(95) DELTA(0) MXITER(100) MXSTEP(5) CHKSEP(20)
LCONVERGE(0) PCONVERGE(0.000001)
  SINGULAR(0.00000001)
  /MODEL=Profession Education Social_support Age_CP Gender
  /STEPWISE=PIN(.05) POUT(0.1) MINEFFECT(0) RULE(SINGLE)
ENTRYMETHOD(LR) REMOVALMETHOD(LR)
  /INTERCEPT=INCLUDE
  /PRINT=CELLPROB FIT PARAMETER SUMMARY LRT CPS STEP MFI IC
  /SAVE ESTPROB PREDCAT PCPROB ACPROB.

```

## **Appendix C Ethical aspects**

### *Ethical aspects of the dataset*

By filling in the survey, the healthcare professionals agreed to anonymously participate in the research. In the introduction of the survey, the participants were informed about the study, self-management was operationalized, and emphasized that there was no right or wrong in the answers the healthcare professionals gave. By not responding to the survey the healthcare professionals could withdraw from participation.

The dataset was publicly available on the data platform Datadryad.org. (Accession number DOI: [10.5061/dryad.9g5m2](https://doi.org/10.5061/dryad.9g5m2))

### *Ethical aspects of the researcher*

To analysis was executed ethically by adhering to the research methods as well as to report the results accurately and honestly. This includes avoiding bias and misrepresentation in reporting the results.

## Appendix D FERB Ethical Approval

<p><b>P.O. Box 80140, 3508 TC Utrecht</b></p> <p>The Board of the Faculty of Social and Behavioural Sciences Utrecht University P.O. Box 80.140 3508 TC Utrecht</p>	<p><b>Faculty of Social and Behavioural Sciences</b></p> <p>Faculty Support Office Ethics Committee</p> <p><b>Visiting Address</b></p> <p>Padualaan 14 3584 CH Utrecht</p>
<p><b>Our Description</b>                    23-0153</p> <p><b>Telephone</b>                            030 253 46 33</p> <p><b>E-mail</b>                                    FETC-fsw@uu.nl</p> <p><b>Date</b>                                        20 January 2023</p> <p><b>Subject</b>                                  Ethical approval</p>	

### ETHICAL APPROVAL

Study: Person-centered care and medical decision-making: the moderating role of socioeconomic factors on physicians in providing self-management support to their patients

Principal investigator: M.R.E. Drummen

Supervisor: Carlijn Kamphuis

The study is approved by the Ethical Review Board of the Faculty of Social and Behavioural Sciences of Utrecht University. The approval is based on the documents sent by the researchers as requested in the form of the Ethics committee and filed under number 23-0153. The approval is valid through 12 June 2023. The approval of the Ethical Review Board concerns ethical aspects, as well as data management and privacy issues (including the GDPR). It should be noticed that any changes in the research design oblige a renewed review by the Ethical Review Board.

Yours sincerely,

Peter van der Heijden, Ph.D.

Chair

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