MESTRADO INTEGRADO EM MEDICINA

Gonçalo Manuel Marques Félix

Intuition and common sense: Self-efficacy in interacting with patients in preclinical years

Intuição e senso comum: Autoeficácia em interagir com doentes nos anos pré-clínicos

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Assinatura conforme cartão de identificação:
Gonçalo Manuel Marques Félix

NOME

GONÇALO MANUEL MARQUES FÉLIX

NÚMERO DE ESTUDANTE

201605662

E-MAIL

gon.felix14@gmail.com

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Intuition and common sense: Self-efficacy in interacting with patients in preclinical years

ORIENTADOR

IRENE MARIA PALMARES DIAS CARVALHO

COORIENTADOR (se aplicável)

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DE ACORDO COM A LEGISLAÇÃO EM VIGOR, (INDICAR, CASO TAL SEJA NECESSÁRIO, Nº MÁXIMO DE PÁGINAS, ILUSTRAÇÕES, GRÁFICOS, ETC.) NÃO É PERMITIDA A REPRODUÇÃO DE QUALQUER PARTE DESTE TRABALHO.	☒

Faculdade de Medicina da Universidade do Porto, 15/03/2022

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Dedicatória

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A todos os que marcaram esta caminhada dedico este trabalho.

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AUTHORS:

Gonçalo Manuel Marques Félix

Faculty of Medicine of the University of Porto, Portugal

Irene Maria Palmares Dias Carvalho, Ph.D.

Department of Clinical Neurosciences and Mental Health and CINTESIS

Faculty of Medicine of the University of Porto, Portugal

CORRESPONDING AUTHOR:

Gonçalo Manuel Marques Félix

Address: Lote 16, rua Antero de Quental, Rio de Loba, 3505-570 Viseu

Telephone: +351924233325   **Email:** gon.felix14@gmail.com

ABSTRACT

Context: In the beginning of medical education, students' sense of self-efficacy about interacting with patients is based on their ideas and intuition. Research has paid little attention to students' "lay" sense of self-confidence regarding this interaction. Yet, self-efficacy can have a direct influence on individuals' performance and students' self-confidence about some aspects of the doctor-patient interaction might require special attention in medical education. The goals of this cross-sectional study were to assess this sense of self-efficacy in preclinical years and how it differs after a communication skills (CS) course, also investigating differences regarding individual characteristics.

Methods: A group of 223 students at the end of their 1st year of medical school (G1) and another group of 245 students at the end of their 2nd year (G2) responded to the self-efficacy questionnaire (SE-12). G2 students had attended a CS course during their 2nd year. Analyses were based on group differences and variable associations.

Results: G1 students' mean self-efficacy was 74.56, a value somewhat above the SE-12 scale's midpoint. G2 students' mean self-efficacy was significantly higher (M=87.94; p<0.01). Both groups reported greater self-efficacy regarding the emotional component (*vs*. content/structure) of the clinical interview, although some aspects of the interaction changed positions in students' self-efficacy rankings. Men exhibited significantly greater self-efficacy than women, in both G1 and G2. Previous contacts with physicians due to severe health problems were associated with greater self-efficacy but only in G2 (p=0.014).

Conclusion: In the beginning of medical school, students display average self-confidence levels regarding their ability to interact with patients. A CS course can increase students' sense of self-efficacy even in preclinical years and self-confidence regarding some

aspects, relative to others, can change after the course. Gender and real-life contacts with physicians due to severe medical problems can also play a role in students' sense of self-efficacy.

Key words: Medical students. Self-efficacy. Communication skills. Real-life experiences. Preclinical years.

1. INTRODUCTION

In the beginning of their medical education, undergraduate students are not expected to know how to formulate diagnoses or to prescribe treatments. However, they might anticipate how they will interact with the patient in the medical encounter and, thus, have a sense of self-confidence in their ability to do so. This sense of self-efficacy (inflated, deflated, or accurate as it may be) will influence students' actual performances in the medical encounter.

Albert Bandura defines self-efficacy as a person's own belief in his or her ability to perform a specified task successfully [1]. Greater self-confidence in the ability to carry out an action has been associated with greater likelihood of actual performance of that action [2]. Therefore, self-efficacy is believed to have a direct influence on the individual's performance [1,2]. In medical appointments, physicians need to be able to lead the interaction in an organized fashion that is sensitive to the patients' needs. Research has revealed that physicians' greater sense of self-efficacy is associated with greater ability to recognize patients' needs for information and greater patient satisfaction [3].

Only in their clinical years are students afforded systematic opportunities to observe and participate in medical encounters. During the clinical years, tutors serve as role models with whom students learn, namely, how to collect a medical history and how to prescribe a treatment, among other forms of interaction with patients. In fact, role models, mentors and the accumulation of individual experiences were described as the most powerful of the multiple factors that influence the process of shaping a physician's professional identity [4]. However, until their clinical years, medical students rely only on their own capabilities to conduct an interaction with a patient. Although they might struggle with such tasks as formulating a diagnosis or prescribing a course of action early on in their

education, there is a whole range of other contents and dynamics that take place in the medical encounter, such as relating with the patient, that support those tasks and influence the success of medical actions [5,6,7,8]. Since higher self-confidence levels increase the probability of performing an action [2], the investigation of medical students' self-efficacy regarding these crucial contents and dynamics of a medical encounter can be very valuable for the future of medical education. Medical educators benefit from constant development of the understanding of why some students excel and others struggle during medical training [9]. Knowledge of which contents and dynamics inspire the least self-confidence among students can be informative of which will be the least likely to be undertaken, thus those which will need special attention during medical education.

Communication and interpersonal skills are mandatory competencies for the current and future generations of medical doctors [10,11,12] and clinical communication curricula have become a core part of undergraduate medical education in many countries [13,14,15,16]. Communication skills (CS) programs have improved the theoretical knowledge and practical skills of medical students in different school years [17,18,19,20,21]. Practical skills and theoretical knowledge provide the fundamental resources for students' success in medical education and professional life, but beliefs about personal capabilities to use these resources can cast the difference between success and failure. This is why research on medical students' self-efficacy is growing rapidly and becoming increasingly international [22].

Past research suggests that CS courses can increase self-efficacy in communicating with patients among healthcare professionals [23,24] and among medical students during clinical years [25,26]. However, until now, less attention has been paid to preclinical years, when medical students' self-confidence in interacting with the patient is based on

their own ideas and intuition, or to whether such self-confidence differs after a communication skills course, even before the beginning of clinical experience. It is possible, for example, that initially students find that interacting with a patient in a medical encounter might be difficult and rate their levels of self-confidence as low. Alternatively, students may anticipate that interacting with the patient will be an easy component of the medical encounter and might overrate their own confidence in dealing with him or her. Thus, in these two scenarios, it is possible that a CS course might enhance, or alternatively reduce, undergraduate students' sense of self-confidence, even during the preclinical years.

To tackle these issues during the initial years of medical education, the purposes of this study were to assess (1) students' sense of self-efficacy about interacting with patients in a medical encounter, (2) whether this sense of self-confidence differed after exposure to a CS course, also identifying the direction of the changes, and (3) differences according to individual characteristics, including the role of previous contacts with physicians due to medical problems. Self-efficacy is hypothesized to influence behaviours and environments and, at the same time, to be influenced by them [1]. Gender [27,28,29,30], age [26,30] and grade point average (GPA) [30] have been the most frequently studied influences on self-efficacy.

2. METHODS

2.1 Design

This cross-sectional study took place during the years of 2021-2022 in the undergraduate program of a medical school in Portugal.

2.2 Participants

All undergraduate medical students, from two consecutive school years, who had just finished their first or second medical school year, were invited to participate in the study. A total of 468 students participated. A first group (G1) consisted of 223 students who had just finished their first school year (54 men and 169 women; mean age = 19.18 years). A second group (G2) was composed of 245 students who had just finished their second year of medical school (75 men and 170 women; mean age = 20.15 years). The two groups were equivalent, without statistically significant differences, regarding gender composition, grade point average (GPA) in the first medical school year (13.53 for G1 and 13.41 for G2) and previous personal contacts with physicians due to a health problem, which most students reported having had (94.2% in G1 and 92.2% in G2). The age difference was related with students' participation either at the beginning (G1) or at the end (G2) of the second school year, that is, roughly one year apart. Participants' characteristics are presented in Table 1. Students' written informed consent was required for participation. The study received ethical approval by the Ethics Committee of the Faculty of Medicine of the University of Porto and no funding was received.

2.2 Instrument

Students' self-efficacy about interacting with the patient in the medical encounter was assessed with the Portuguese version of the self-efficacy questionnaire (SE-12) [31]. This instrument contains 12 items that begin with the words, "How certain are you that you are able to successfully …" followed by a specific aspect of the doctor-patient interaction. Each item is responded on a 10-point Likert-type scale ranging from 1 (very uncertain) to 10 (very certain). In this sample, the internal consistency of the questionnaire was high (Cronbach's *alpha* coefficient = 0.94; range: 0.91–0.95) and very similar to the original SE-12's (*alpha* = 0.95) [31].

In a factor analysis applied to the questionnaire's 12 items using varimax rotation, a two-factor structure emerged (Table 2), unlike the one-factor component found in the original version of the SE-12 [31]. The two factors could be clearly interpreted. The first factor referred to the structure and content of the medical interview and included seven items: 1. identify the issues the patient wishes to address during the conversation, 2. make an agenda/plan for the conversation with the patient, 6. structure the conversation with the patient, 9. clarify what the patient knows in order to communicate the right amount of information, 10. check patient's understanding of the information given, 11. make a plan based on shared decisions between the doctor and the patient and 12. close the conversation by assuring that the patient's questions have been answered. The second factor referred to a more patient-centred, emotional dimension of the interaction and included five items: 3. urge the patient to expand on his or her problems/worries, 4. successfully listen attentively to the patient, 5. encourage the patient to express thoughts and feelings, 7. demonstrate appropriate non-verbal behaviour and 8. show empathy.

Students' were additionally asked five questions regarding individual characteristics: age, gender, first-year medical school GPA, history of previous contacts with physicians due to a health condition ("Have you had any contact with physicians in the context of personal or family health problems?"), answered as 0-no or 1-yes, and degree of severity of the most serious of these conditions (responded on a scale from 1-little to 10-very severe).

2.3 Procedure

Self-efficacy was assessed in a group of students at the end of the first school year, before attendance of the CS course (G1), and in other group of students at the end of the second school year, after the CS course (G2). During the second year of medical school, students enrol in a one year-long clinical communication skills course. The first semester is

8

dedicated to basic communication skills (how to begin and end the encounter, patient-centred interview, doctor-centred interview, non-verbal communication, structuring the encounter and building a clinical relationship). The second semester is dedicated to advanced communication skills (dealing with strong emotions and breaking bad news). The course has been described elsewhere [32]. Classes begin with the discussion of the topics, followed by visualisation and analysis of models in video format and role-playing practice with subsequent analysis of the cases and feedback.

2.4. Statistical analysis

Qualitative variables were described using absolute and relative frequencies, whereas quantitative variables were described using means and standard deviations. Differences between groups were based on chi-square and independent-samples *t*-tests. Relationships between variables were inspected with Pearson's correlation coefficient. Significance level was set for $p <0.05$. Cases with missing values were excluded from the respective analyses (specifically, 2 cases missing data regarding age and 4 cases missing data regarding first-year GPA). Data were analysed using the Statistical Package for the Social Sciences (SPSS Version 27).

3. RESULTS

3.1. Self-efficacy about interacting with the patient in a medical encounter

Students at the end of their first year of medical school (G1) exhibited a mean total self-efficacy of 74.56, thus somewhat above the SE-12 scale's midpoint of 66.5. G1 students reported the highest self-efficacy levels regarding the emotional components of the interaction, particularly 4. successfully listening attentively to the patient (7.89) and 8. showing empathy (7.52). In the opposite end, items 2. make an agenda/plan for the conversation with the patient (5.07) and 6. structure the conversation (5.48) were the two

aspects of the structure/content of the encounter about which students showed the least confidence in themselves (Table 3).

Students at the end of their second year of medical school (G2) had attended the CS course and displayed a mean total self-efficacy of 87.94, thus a value that was close to the SE-12 scale's 75th mark of 93.8. They reported the highest self-efficacy levels regarding the same two emotional components as students in G1 did, namely 4. successfully listening attentively to the patient (8.44) and 8. showing empathy (8.07). However, other two emotional components that appeared highly ranked in the self-efficacy list for G1 students appeared in a lower ranking position for G2 students, namely 5. encourage the patient to express thoughts and feelings, and 3. urge the patient to expand on his/her problems/worries. At the same time, two structure/content items that were ranked lower in the self-efficacy list, before the CS course, were ranked higher in the list after the CS course, specifically items 10. check patient's understanding of the information given and 11. make a plan based on shared decisions between you and the patient. In the opposite end of the scale, item 1. identifying the issues the patient wishes to address during the conversation (6.56) emerged as the biggest struggle for the medical students after the CS course, although the same two aspects that G1 students were the least self-confident about (items 2. and 6.) emerged next in the list for G2 students as well (Table 3).

3.2. The effect on self-efficacy of attending the CS course

Mean total self-efficacy was significantly greater for students in G2 (87.94), when compared with G1 (75.56), by 12.38 points on average (p <0.01) (Table 3). Self-efficacy levels were higher in G2 for each SE-12 item as well. Standard deviations were smaller for G2 too, indicating less variation among students after the CS course. As shown in Table 3, the differences between G1 and G2 were highly significant for 11 of the 12 skills studied (p <0.01). The only exception was item 5. encourage the patient to express

thoughts and feelings, which nevertheless registered a significant difference as well (p=0.01). This item was one of the aspects that moved down in students' sense of self-efficacy after the CS course.

3.3. Self-efficacy by participants' characteristics

Table 4 shows students' sense of self-efficacy about interacting with the patient in a medical encounter by individual characteristics. Male students reported higher self-efficacy levels, when compared with their female peers, both in G1 (p=0.023) and in G2 (p=0.014). The relationships of self-efficacy with age, first-year GPA or presence of previous contacts with physicians were all non-significant. However, the severity of the health problem in the context of this previous contact with physicians showed a significant positive correlation with students' level of self-efficacy in G2 (p=0.014), although not in G1. In other words, the higher the severity of the health problem that prompted the previous contact with physicians, the greater the sense of self-confidence of the students, but only if they had received CS training.

4. DISCUSSION

The results of this study showed that, in the beginning of their medical education "unlearned", "lay" students (G1, before attending a CS course) had a sense of self-confidence in their communication abilities regarding the interaction component of leading a medical encounter that lied somewhat above the scale's midpoint. Students felt particularly self-confident about the emotional components of the interaction and less about its structure/content. A previous study reported similar findings as regards self-assessed empathy, albeit for medical students already in their 5th medical school year and comparing with more advanced skills, such as motivational interviewing [25].

After attending the CS course, students have learnt the dynamics and complexities of interacting with the patient in medical encounters. Subsequently, two aspects of the interaction's structure/content moved up in G2 students' self-efficacy list of mean scores, when compared with G1's (items 10 and 11 shown in Table 3). In addition, the two communication skills at the top of G1's self-efficacy list were also the two at the top of G2 students' self-efficacy list (namely, the emotional components 4 and 8 in Table 3). This was consistent with the results of other studies [21] suggesting that educational interventions can be effective in maintaining and enhancing empathy among undergraduate medical students. However, in contrast, self-efficacy for two aspects of the emotional component of the interaction moved down in G2's self-efficacy list, when compared with G1's (items 3 and 5 in Table 3). In addition, one aspect of the interaction's structure/content component also move down, becoming the one for which G2 (but not G1) students' self-confidence was the lowest (item 1. Identifying the issues the patient wishes to address during the conversation).

These findings could suggest that, with attendance of a CS course, the greatest difficulties for medical students shift from knowing how to structure a clinical interview to being able to explore and completely assess patient's needs and worries. The CS course conveys a biopsychosocial, patient-centred approach. This might represent novel complexities, as regards the doctor-patient relation, that could lead students to rethink their self-confidence about being able to perform accordingly. This study's findings suggest that this patient-centred component of the medical encounter is the aspect which can use further attention in medical education. Even after video viewing, role-playing practice and feedback supply for a period of an entire school year, consideration of possible alternative teaching strategies (e.g., even more positive feedback provided) could be useful to increase students' self-confidence in using this learnt approach with the patient. This is particularly

important because increased self-efficacy in an aspect will influence the likelihood of actual performance of that aspect [2].

Despite the relative positions of each self-efficacy aspect in the list of mean scores, and despite the observed differences in these positions between G1 and G2, this study's results showed that the second-year CS course effected a significant increase on students' self-efficacy in the ability to interact with the patient in a clinical interview. The significant improvement of students' perceptions regarding their clinical communication competence occurred for total self-efficacy and for each of its twelve domains. Thus, a CS course that already had been effective in improving the self-confidence of healthcare professionals [23,24] also contributed to strengthen the confidence of medical students in preclinical years in their abilities to conduct a clinical encounter as regards interacting with the patient.

Concerning the relation between self-efficacy and individual characteristics, the fact that female medical students showed statistically significant lower self-efficacy levels than male medical students, both before (G1) and after (G2) the CS course, is in line with past research. Several studies have indicated that female medical students consistently report decreased self-confidence and increased anxiety, particularly over issues related to their competence, even if performing equally to their male peers [27,28,29]. Although no significant differences regarding self-efficacy were observed between students who had previous contacts with physicians and those who had not, greater severity of the condition that led to those contacts was associated with higher levels of self-efficacy, but only in G2. Thus, experiencing first-hand care for a serious condition coupled with attending a CS course that included the communication of bad news, among other interpersonal dynamics, was effective in increasing students' self-confidence about interacting with the patient in ways that the CS course without that personal experience was not. This speaks

to the ecological validity of CS programs. The successful application of these programs to real-life situations has been established with health professionals [23] and now received support with medical students in preclinical years as well, at least when real-life situations represent serious medical conditions. The CS course might not have eradicated gender differences (which remained significant in G1 and in G2), but it seemed effective with students sensitized by previous contacts with physicians due to severe health conditions. In opposition, self-efficacy was unrelated with age as expected, given students' similar ages. It was also unrelated with first-year GPA. Although previous research has reported a relation between medical students' general self-efficacy and academic grades [30], the results in the current study suggest that, as regards interacting with a patient, students' sense of self-efficacy was independent from their academic performance in the first year of medical school.

This study has some limitations. It was based on self-report measures rather than on objective or external ratings. However, the purpose was not to measure an objective level of skill, rather students' own perceptions of competency. Self-reporting has become a regular choice for this purpose in the scientific community [25,33,34]. Second, it is widely recognized that medical students' self-assessment of their competence does not necessarily reflect their actual competence [35]. The assessment of students' actual competence could be added in future studies focusing on the match between these two aspects. Future longitudinal studies could also evaluate students' current self-confidence about specific aspects and the performance of those aspects in their future medical practice. Third, because of this study's cross-sectional nature, the students in G1 and in G2 were different, which could bias the results, although differences between medical students in these two consecutive years were not expected and the two groups were equivalent at baseline regarding the various characteristics considered.

5. CONCLUSION

In the beginning of medical school, students display average self-confidence levels regarding their ability to conduct a medical interaction with the patient. A communication skills course can increase students' level of self-efficacy even before clinical years. Changes in self-confidence as regards some aspects, relative to others, can occur after the course. The CS course did not eradicate gender differences in self-efficacy, but it raised the self-efficacy of students who were sensitized by previous contacts with physicians due to severe health conditions.

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Table 1 – Participants' characteristics ($N = 468$).

Characteristics	Assessment group	
	G1 **($n = 223$)**	**G2** **($n = 245$)**
Gender - *N* (%)		
Men	54 (24.2)	75 (30.6)
Women	169 (75.8)	170 (69.4)
Age - *Mean* (*SD*)	19.18 (2.20)	20.15 (2.45)
First year GPA[a]- *Mean* (*SD*)	13.53 (1.57)	13.41 (1.48)
Previous contact with physicians - *N* (%)		
Yes	210 (94.2)	226 (92.2)
No	13 (5.8)	19 (7.8)
Severity of previous contact with physicians[b]- *Mean* (*SD*)	5.63 (2.53)	5.72 (2.47)

*Note***:** *SD* - Standard deviation.

G1 – Group of students at the end of the 1st school year (before the CS course).

G2 – Group of students at the end of the 2nd school year (after the CS course).

[a] First year grade point average on a 0-to-20-point scale.

[b] Level of severity of the condition in previous contacts with physicians on a 1-to-10-point scale.

Table 2 – Factor analysis and Cronbach's *alphas* for the Portuguese version of the self-efficacy questionnaire SE-12: item loadings in principal component analysis using varimax rotation.

SE-12 items	Component 1	Component 2
How certain are you that you are able to successfully …	**Structure / Content**	**Emotion**
(2) … make an agenda/ plan for the conversation with the patient?	0.868	
(11) … make a plan based on shared decisions between you and the patient?	0.839	
(6) … structure the conversation with the patient?	0.829	
(1) … identify the issues the patient wishes to address during the conversation?	0.797	
(9) … clarify what the patient knows in order to communicate the right amount of information?	0.730	
(10) … check patient's understanding of the information given?	0.730	
(12) … close the conversation by assuring that the patient's questions have been answered?	0.711	
(8) … show empathy (acknowledge the patient's views and feelings)?		0.817
(5) … encourage the patient to express thoughts and feelings?		0.805
(4) … successfully listen attentively to the patient?		0.762
(3) … urge the patient to expand on his or her problems/ worries?		0.653
(7) … demonstrate appropriate non-verbal behaviour?		0.628
Cronbach's *alpha*		
Total = 0.94	0.95	0.91

*Note***:** Factor loadings greater than 0.50 are displayed.

Table 3 – Student's sense of self-efficacy: total and by item.

How certain are you that you are able to successfully…	Self-efficacy[a]		p-value*
	Mean (SD)		
	G1	G2	G1- G2 difference
Emotional Component			
(4) … successfully listen attentively to the patient?	7.89 (1.85)	8.44 (1.53)	<0.01
(8) …show empathy (acknowledge the patient's views and feelings)?	7.52 (1.86)	8.07 (1.63)	<0.01
(5) …encourage the patient to express thoughts and feelings?	6.75 (1.97)	7.33 (1.78)	0.01
(7) …demonstrate appropriate nonverbal behaviour?	6.44 (2.12)	7.49 (1.84)	<0.01
(3) …urge the patient to expand on his/her problems/worries?	6.36 (2.08)	7.11 (1.84)	<0.01
Structure/Content Component			
(12) …close the conversation by assuring, that the patient's questions have been answered?	6.08 (2.17)	7.30 (1.69)	<0.01
(10) …check patient's understanding of the information given?	6.07 (1.97)	7.49 (1.63)	<0.01
(9) …clarify what the patient knows in order to communicate the right amount of information?	5.73 (1.97)	6.91 (1.64)	<0.01
(1) …identify the issues the patient wishes to address during the conversation?	5.61 (1.97)	6.56 (1.75)	<0.01
(11) …make a plan based on shared decisions between you and the patient?	5.55 (2.17)	7.30 (1.69)	<0.01
(6) …structure the conversation with the patient?	5.48 (2.01)	6.91 (1.69)	<0.01
(2) …make an agenda/ plan for the conversation with the patient?	5.07 (2.24)	6.69 (1.94)	<0.01
Total Self-efficacy [b]	74.56 (19.92)	87.94 (14.77)	<0.01

Note: *SD* - Standard deviation.
G1 – Group of students at the end of the 1st school year (before the CS course).
G2 – Group of students at the end of the 2nd school year (after the CS course).
[a] Self-efficacy assessed with the SE-12 on a 1-to-10-point scale.
[b] Total Self-efficacy possible scores between 12 and 120 points.
*Calculated with two independent-samples *t*-test.

Table 4 – Self-efficacy by participants' characteristics ($N = 468$).

		Self-efficacy	
		G1 ($n = 223$)	**G2** ($n = 245$)
Gender - *Mean* (*SD*)			
	Men	79.89 (18.94)	91.17 (12.55)
	Women	72.85 (19.98)	86.52 (15.47)
	p-value[c]	**0.023**	**0.014**
Age - *r*		- 0.024	0.106
	p-value[d]	0.716	0.099
First year GPA[a]**-** *r*		- 0.071	0.025
	p-value[d]	0.293	0.724
Previous contact with physicians - *Mean* (*SD*)			
	Yes	74.29 (19.39)	87.96 (14.87)
	No	78.85 (27.81)	87.74 (13.86)
	p-value[c]	0.425	0.950
Severity of previous contact with physicians[b]**-** *r*		0.005	0.163
	p-value[d]	0.938	**0.014**

Note: *SD* - Standard deviation.

G1 – Group of students at the end of the 1st school year (before the CS course).

G2 – Group of students at the end of the 2nd school year (after the CS course).

[a] First year grade point average on a 0-to-20-point scale.

[b] Level of severity of the condition in previous contacts with physicians on a 1-to-10-point scale.

[c] Calculated with two independent-samples *t*-test.

[d] Calculated with Pearson correlation coefficient.

APÊNDICE 1 - Reporting guidelines

STROBE Statement — Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Página 2: "cross-sectional study".
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Página 2: "A group of 223 students at the end of their 1st year of medical school (G1) and another group of 245 students at the end of their 2nd year (G2) responded to the self-efficacy questionnaire (SE-12)". Página 2: "G1 students' mean self-efficacy was 74.56, a value somewhat above the SE-12 scale's midpoint. G2 students' mean self-efficacy was significantly higher (M=87.94; p<0.01). Both groups reported greater self-efficacy regarding the emotional component (vs. content/structure) of the clinical interview, although some aspects of the interaction changed positions in students' self-efficacy rankings. Men exhibited significantly greater self-efficacy than women, in both G1 and G2. Previous contacts with physicians due to severe health problems were associated with greater self-efficacy but only in G2 (p=0.014). "
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Páginas 5 e 6: "Past research suggests that CS courses can increase self-efficacy in communicating with patients among healthcare professionals [23,24] and among medical students during clinical years [25,26]. However, until now, less attention has been paid to preclinical years, when medical students' self-confidence in interacting with the patient is based on their own ideas and intuition, or to whether such self-confidence differs

			after a communication skills course, even before the beginning of clinical experience."
Objectives	3	State specific objectives, including any prespecified hypotheses	Página 6: "the purposes of this study were to assess (1) students' sense of self-efficacy about interacting with patients in a medical encounter, (2) whether this sense of self-confidence differed after exposure to a CS course, also identifying the direction of the changes, and (3) differences according to individual characteristics, including the role of previous contacts with physicians due to medical problems. " Página 6: "It is possible, for example, that initially students find that interacting with a patient in a medical encounter might be difficult and rate their levels of self-confidence as low. Alternatively, students may anticipate that interacting with the patient will be an easy component of the medical encounter and might overrate their own confidence in dealing with him or her. Thus, in these two scenarios, it is possible that a CS course might enhance, or alternatively reduce, undergraduate students' sense of self-confidence"

Methods

Study design	4	Present key elements of study design early in the paper	Página 7: "All undergraduate medical students, from two consecutive school years, who had just finished their first or second medical school year, were invited to participate in the study. A total of 468 students participated. A first group (G1) consisted of 223 students who had just finished their first school year (54 men and 169 women; mean age = 19.18 years). A second group (G2) was composed of 245 students who had just finished their second year of medical school (75 men and 170 women; mean age = 20.15 years)." Página 7: " Students' self-efficacy about interacting with the patient in the medical encounter was assessed with the

| | | | Portuguese version of the self-efficacy questionnaire (SE-12) ”
Página 8: “Self-efficacy was assessed in a group of students at the end of the first school year, before attendance of the CS course (G1), and in other group of students at the end of the second school year, after the CS course (G2). ” |
|---|---|---|---|
| Setting | 5 | Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection | Página 6: “This cross-sectional study took place during the years of 2021-2022 in the undergraduate program of a medical school in Portugal.” |
| Participants | 6 | (*a*) Give the eligibility criteria, and the sources and methods of selection of participants | Página 7: “All undergraduate medical students, from two consecutive school years, who had just finished their first or second medical school year, were invited to participate in the study.”
Página 7: “Students’ written informed consent was required for participation ” |
| Variables | 7 | Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable | Página 7: “Students’ self-efficacy about interacting with the patient in the medical encounter was assessed with the Portuguese version of the self-efficacy questionnaire (SE-12) [31]. This instrument contains 12 items that begin with the words, “How certain are you that you are able to successfully …” followed by a specific aspect of the doctor-patient interaction. Each item is responded on a 10-point Likert-type scale ranging from 1 (very uncertain) to 10 (very certain). ”
Página 8: “Students’ were additionally asked five questions regarding individual characteristics: age, gender, first-year medical school GPA, history of previous contacts with physicians due to a health condition (“Have you had any contact with physicians in the context of personal or family health problems?”), answered as 0-no or 1-yes, and degree of severity of the most serious of these conditions |

			(responded on a scale from 1-little to 10-very severe). "
Data sources/ measurement	8	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Página 7: "Students' self-efficacy about interacting with the patient in the medical encounter was assessed with the Portuguese version of the self-efficacy questionnaire (SE-12) [31]. This instrument contains 12 items that begin with the words, "How certain are you that you are able to successfully …" followed by a specific aspect of the doctor-patient interaction. Each item is responded on a 10-point Likert-type scale ranging from 1 (very uncertain) to 10 (very certain). " Página 8: "Students' were additionally asked five questions regarding individual characteristics: age, gender, first-year medical school GPA, history of previous contacts with physicians due to a health condition ("Have you had any contact with physicians in the context of personal or family health problems?"), answered as 0-no or 1-yes, and degree of severity of the most serious of these conditions (responded on a scale from 1-little to 10-very severe). "
Bias	9	Describe any efforts to address potential sources of bias	Página 7: "The two groups were equivalent, without statistically significant differences, regarding gender composition, grade point average (GPA) in the first medical school year (13.53 for G1 and 13.41 for G2) and previous personal contacts with physicians due to a health problem, which most students reported having had (94.2% in G1 and 92.2% in G2). The age difference was related with students' participation either at the beginning (G1) or at the end (G2) of the second school year, that is, roughly one year apart."
Study size	10	Explain how the study size was arrived at	Página 7: "All undergraduate medical students, from two consecutive school years, who had just finished their first or

			second medical school year, were invited to participate in the study. A total of 468 students participated. "
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Página 9: "quantitative variables were described using means and standard deviations ". Página 9: "Cases with missing values were excluded from the respective analyses."
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Página 9: "Qualitative variables were described using absolute and relative frequencies, whereas quantitative variables were described using means and standard deviations. Differences between groups were based on chi-square and independent-samples *t*-tests. Relationships between variables were inspected with Pearson's correlation coefficient. Significance level was set for $p < 0.05$."
		(*b*) Describe any methods used to examine subgroups and interactions	Página 9: "Differences between groups were based on chi-square and independent-samples *t*-tests. Relationships between variables were inspected with Pearson's correlation coefficient. "
		(*c*) Explain how missing data were addressed	Página 9: "Cases with missing values were excluded from the respective analyses."
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	Não aplicável, uma vez que no âmbito deste estudo transversal não se aplicou métodos de amostragem.
		(*e*) Describe any sensitivity analyses	Página 7: "In this sample, the internal consistency of the questionnaire was high (Cronbach's *alpha* coefficient = 0.94; range: 0.91–0.95) and very similar to the original SE-12's (*alpha* = 0.95) [31]. " Página 8: "In a factor analysis applied to the questionnaire's 12 items using varimax rotation, a two-factor structure

			emerged (Table 2), unlike the one-factor component found in the original version of the SE-12 [31]. ” Página 22: “Table 2 – Factor analysis and Cronbach's *alphas* for the Portuguese version of the self-efficacy questionnaire SE-12: item loadings in principal component analysis using varimax rotation. ”

Results

Participants	13	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Página 7: “A total of 468 students participated. A first group (G1) consisted of 223 students who had just finished their first school year (54 men and 169 women; mean age = 19.18 years). A second group (G2) was composed of 245 students who had just finished their second year of medical school (75 men and 170 women; mean age = 20.15 years). ”
		(b) Give reasons for non-participation at each stage	Página 7: “Students' written informed consent was required for participation.”
		(c) Consider use of a flow diagram	Não aplicável, uma vez que no âmbito deste estudo transversal não se realizou qualquer diagrama de fluxo.
Descriptive data	14	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Página 21: “Table 1 – Participants' characteristics (N = 468). ”
		(b) Indicate number of participants with missing data for each variable of interest	Página 9: “specifically, 2 cases missing data regarding age and 4 cases missing data regarding first-year GPA”
Outcome data	15	Report numbers of outcome events or summary measures	Página 9: “Students at the end of their first year of medical school (G1) exhibited a mean total self-efficacy of 74.56, thus somewhat above the SE-12 scale's midpoint of 66.5. ” Página 10: “Students at the end of their second year of medical school (G2) had attended the CS course and displayed a mean total self-efficacy of 87.94, thus a

value that was close to the SE-12 scale's 75th mark of 93.8"

Página 10: "Mean total self-efficacy was significantly greater for students in G2 (87.94), when compared with G1 (75.56), by 12.38 points on average (p <0.01) (Table 3). Self-efficacy levels were higher in G2 for each SE-12 item as well. "

Página 23: "Table 3 – Student's sense of self-efficacy: total and by item. "

Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Página 9: "Students at the end of their first year of medical school (G1) exhibited a mean total self-efficacy of 74.56, thus somewhat above the SE-12 scale's midpoint of 66.5. " Página 10: "Students at the end of their second year of medical school (G2) had attended the CS course and displayed a mean total self-efficacy of 87.94, thus a value that was close to the SE-12 scale's 75th mark of 93.8" Página 10: "Mean total self-efficacy was significantly greater for students in G2 (87.94), when compared with G1 (75.56), by 12.38 points on average (p <0.01) (Table 3). Self-efficacy levels were higher in G2 for each SE-12 item as well. " Página 23: "Table 3 – Student's sense of self-efficacy: total and by item. "
		(*b*) Report category boundaries when continuous variables were categorized	Não aplicável, uma vez que no âmbito deste estudo transversal as variáveis contínuas não foram categorizadas.
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Não aplicável, uma vez que no âmbito deste estudo transversal não foram realizadas estimativas de risco relativo.
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Página 11: "Male students reported higher self-efficacy levels, when compared with their female peers, both in G1 (*p*=0.023) and in G2 (*p*=0.014). The relationships of self-efficacy with age, first-year GPA or presence of previous contacts with

| | | | physicians were all non-significant. However, the severity of the health problem in the context of this previous contact with physicians showed a significant positive correlation with students' level of self-efficacy in G2 (p=0.014), although not in G1." |
| | | | Página 24: "Table 4 – Self-efficacy by participants' characteristics (N = 468)." |

Discussion

| Key results | 18 | Summarise key results with reference to study objectives | Página 11: "The results of this study showed that, in the beginning of their medical education "unlearned", "lay" students (G1, before attending a CS course) had a sense of self-confidence in their communication abilities regarding the interaction component of leading a medical encounter that lied somewhat above the scale's midpoint. Students felt particularly self-confident about the emotional components of the interaction and less about its structure/content. "

Página 13: "this study's results showed that the second-year CS course effected a significant increase on students' self-efficacy in the ability to interact with the patient in a clinical interview. "

Página 13: "female medical students showed statistically significant lower self-efficacy levels than male medical students, both before (G1) and after (G2) the CS course"

Página 13: " Although no significant differences regarding self-efficacy were observed between students who had previous contacts with physicians and those who had not, greater severity of the condition that led to those contacts was associated with higher levels of self-efficacy, but only in G2" |
| Limitations | 19 | Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss | Página 14: "This study has some limitations. It was based on self-report measures rather than on objective or external ratings. However, the purpose was not to measure an objective level of |

		both direction and magnitude of any potential bias	skill, rather students' own perceptions of competency. Self-reporting has become a regular choice for this purpose in the scientific community [25,33,34]. Second, it is widely recognized that medical students' self-assessment of their competence does not necessarily reflect their actual competence [35]. The assessment of students' actual competence could be added in future studies focusing on the match between these two aspects. Future longitudinal studies could also evaluate students' current self-confidence about specific aspects and the performance of those aspects in their future medical practice. Third, because of this study's cross-sectional nature, the students in G1 and in G2 were different, which could bias the results, although differences between medical students in these two consecutive years were not expected and the two groups were equivalent at baseline regarding the various characteristics considered. "
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Página 15: "In the beginning of medical school, students display average self-confidence levels regarding their ability to conduct a medical interaction with the patient. A communication skills course can increase students' level of self-efficacy even before clinical years. Changes in self-confidence as regards some aspects, relative to others, can occur after the course. The CS course did not eradicate gender differences in self-efficacy, but it raised the self-efficacy of students who were sensitized by previous contacts with physicians due to severe health conditions. "
Generalisability	21	Discuss the generalisability (external validity) of the study results	Páginas 13 e 14: "This speaks to the ecological validity of CS programs. The successful application of these programs to real-life situations has been established with health professionals [23] and now

			received support with medical students in preclinical years as well, at least when real-life situations represent serious medical conditions. "
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Página 7: "no funding was received."

APÊNDICE 2 -Author Guidelines of the journal *Medical Education*

Abstract: 300 word maximum, structured under appropriate subheadings.

Length guidelines: Generally <3,000 words, but longer papers are accepted.

Format: Usually IMRAD, AMA style references.

Illustrations: Generally 5 or less, but online supplement possible.

Generally less than 3,000 words, but longer papers will be accepted (until 3500 words maximum) if the context warrants the inclusion of more text.

An abstract, structured under subheadings, of no more than 300 words must be included and the paper should contain a maximum of five tables or figures with references included in the AMA style.

The paper will usually be organised using the Introduction, Methods, Results, and Discussion (IMRAD) structure. The introduction should include a strong conceptual framework that indicates how publication of the paper can be expected to fill a gap in knowledge that is important for the field to fill.

The context of the work and your choice of methods must be made clear. Qualitative and quantitative research approaches are equally welcome.

All papers must also clearly articulate how the findings should be interpreted and how they advance understanding of the issue under study.

Front matter

Authors should restrict titles to 15 words or fewer (90 characters including spaces), and the editor reserves the right to edit titles.

Most manuscripts should also include a structured (i.e., subtitled) abstract of up to 300 words.

Main text

We encourage the use of the active voice, short sentences, and clear subheadings throughout the text.

The manuscript should include a wide margin (at least 3 cm) on either side. All pages should be numbered.

Do not use abbreviations without first defining the abbreviation in full. All scientific units should be expressed in SI units. Both numbers and percentages should be given (not percentages alone) when relevant.

Where statistical methods are used in analysis their use should be explained in the setting of the study and an appendix given if the method is particularly unusual or complex.

For all research-oriented manuscripts a consideration of the strengths and weaknesses of the approach used should be included.

End-matter

Where figures, tables or illustrations from other publications have been used, appropriate permissions should be obtained prior to submission.

Referencing should be double spaced using the AMA style.

Additional illustrations/appendices can be published online as supplementary material.

APÊNDICE 3 - Ethical approval by the Ethics Committee of the Faculty of Medicine of the University of Porto

Comissão de Ética da Faculdade de Medicina da Universidade do Porto
Ethics Committee of the Faculty of Medicine of the University of Porto

PARECER

33/CEFMUP/2021

Comissão de Ética da Faculdade de Medicina da Universidade do Porto

Parecer/Rapport: 33/CEFMUP/2021

Título do projeto/ Project title: Impacto da aprendizagem de competências de comunicação na autoconfiança de estudantes de medicina

Investigador/ Researcher: Gonçalo Manuel Marques Félix

Parecer/ Rapport:

☒ Favorável/Accepted

☐ Rejeitado/Declined

☐ Outro

Esclarecimentos enviados são satisfatórios.
A recolha de dados deve iniciar-se em data posterior ao parecer favorável da Comissão de Ética.

Relator: Rita Negrão

Deliberado em reunião plenária da Comissão de Ética de 13 de janeiro de 2022 por unanimidade dos membros presentes.

Solicita-se o favor de após a conclusão do projeto enviar o relatório final com as conclusões do estudo, nos termos do Art.3º n.º 3 alínea f) do Decreto-Lei n.º 80/2018 de 15 de Outubro.

Porto, 13 de janeiro de 2022

_____
O Secretariado Executivo da Comissão de Ética
Profª Doutora Francisca Rego

_____
O Presidente da Comissão de Ética
Prof Doutor Rui Nunes

Alameda Professor Hernâni Monteiro, 4200-319, Porto
Email: comissaoetica@med.up.pt
Telefone: +351 220426840