

# *Intrinsic Motivation of Medical Students from a College with Active Methodology in Brazil: a Cross-Sectional Study*

## *Motivação Intrínseca do Estudante de Medicina de uma Faculdade com Metodologia Ativa no Brasil: Estudo Transversal*

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### RESUMO

Estudo transversal baseado na Teoria da Autodeterminação para identificar a motivação intrínseca no cenário do grupo tutorial e seus fatores associados em 276 estudantes de Medicina de uma faculdade do Nordeste do Brasil entre outubro e dezembro de 2016, tendo sido utilizado o Inventário de Motivação Intrínseca, após sua tradução e adaptação transcultural. Variáveis estudadas: idade, sexo, estado civil, dependentes financeiros, número de tentativas no vestibular para ingresso no curso de Medicina, período em curso, graduação anterior, residência com os pais, escolha do curso por influência ou por pressão dos pais. Realizadas análises uni- e multivariada de Poisson para analisar os fatores associados à motivação intrínseca, foi considerado como nível de significância para fins estatísticos o valor  $p < 0,05$ . O escore médio da motivação foi de 3,8, indicando motivação. Em estudantes do segundo, sexto e décimo períodos do curso de Medicina, permaneceram no modelo final como variável associada à motivação intrínseca aqueles que haviam realizado uma ou duas tentativas no vestibular, quando comparados aos estudantes que tinham realizado três ou mais tentativas (RP=0,88; IC95%(0,79-0,97);  $p = 0,011$ ). Nas análises discriminadas por período, no segundo período, permaneceram no modelo final os estudantes que possuíam graduação anterior ao curso de Medicina, quando comparados aos que não possuíam (RP=0,92; IC95% (0,87-0,97);  $p = 0,005$ ). No sexto período, nenhuma diferença estatisticamente significativa foi encontrada; e no décimo período, a variável de ter realizado uma ou duas tentativas no vestibular (RP=0,65; IC95% (0,47-0,88);  $p = 0,006$ ). Os estudantes se mostraram motivados na atividade do grupo tutorial. O menor número de tentativas no vestibular para ingresso no curso de Medicina e possuir graduação anterior foram variáveis que se mostraram associadas à motivação intrínseca.

### PALAVRAS-CHAVE

- Educação Médica;
- Motivação;
- Estudos Transversais.

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**KEY-WORDS**

- Medical Education;
- Motivation;
- Cross-Sectional Studies.

**ABSTRACT**

*A cross-sectional study based on the Self Determination Theory to identify intrinsic motivation in the tutorial group scenario, and its associated factors in 276 medical students from a college in the Northeast of Brazil between October and December 2016. The Intrinsic Motivation Inventory was utilized following its adaptation and cross-cultural translation. Variables studied: age, gender, marital status, financial dependents, number of attempts at the university entrance exam for the medical course, current semester of study, previous undergraduate training, living with parents, choice of course by parental influence or pressure. Uni and multivariate Poisson analysis were carried out to assess the factors associated with intrinsic motivation;  $p < 0.05$  was considered as the significance level for statistical purposes. Average motivation score was 3.8, which indicates motivation. In 2<sup>nd</sup>, 6<sup>th</sup> and 10<sup>th</sup> semester medicine students, the final model maintained as the variable associated with intrinsic motivation those who attempted the medical school entrance exam once or twice compared to those who had had three or more attempts (PR = 0.88, 95% CI (0.79-0.97),  $p = 0.011$ ). In the analyses assessed by semester, in the second semester, students who had prior undergraduate training before medical school compared to those who had not was the remaining variable (PR = 0.92, 95% IC (0.87-0.97),  $p = 0.005$ ). In the sixth semester, no statistically significant difference was found, and in the tenth semester the variable of those who attempted the medical school entrance exam once or twice remained (PR = 0.65, 95% IC (0.47-0.88),  $p = 0.006$ ). The students seemed to be motivated in the group tutorial activity. The fewer number of medical school entry exam attempts and having previous undergraduate training were variables that showed association with intrinsic motivation.*

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**INTRODUCTION**

With the aim of providing better health care, the Unified Health System (SUS) was established in Brazil, governed by three underlying principles: comprehensiveness, universality and equality. From this perspective, there is an emerging need for changes to both individual and collective care, reflected in the training of the health professional. The shift is toward a generalist, critical, ethical, proactive profile, focused on teamwork and working at the different care levels<sup>1</sup> of the health-disease process. The importance of developing bonds and understanding the psychosocial conditions to which individuals and communities are subject is underlined.

To meet these demands, Medicine courses have incorporated a broadened concept of health, retrieving its political dimension – conditions affecting diet, housing, education, income, environment, work, transport, leisure, freedom, access to land and their possession and access to health care services<sup>2</sup> – and the strengthening of active teaching-learning methodologies, since these integrate cognition, attitudes and abilities, encouraging critical analysis, autonomy, curiosity and individual or collective decision-making. We can highlight, among these methodologies, Problem-Based Learning (PBL), which is a student-focused approach involving constructive,

self-directed, contextual and collaborative learning, where a case is used based on what the student will need for his or her professional life.<sup>3,4</sup>

In the context of PBL, the student's engagement with the initiative and their self-learning results in an individual motivation with direct consequences on their involvement in and the quality of the teaching-learning process.<sup>5,6,7</sup> On the other hand, it is known that the emotive component of learning, translated as the motivation process or the reason for learning, has become an object of psychological and educational study. Its positive effects on academic performance, adaptation and well-being have been established, with theories being developed to explain such findings and determine strategies to stimulate students.<sup>8,9</sup>

One of those theories is called Self-Determination Theory (SDT), an approach that, despite using traditional empirical methods of the Baconian tradition, is based on organismic metatheory. This theory assumes that people are active organisms and tend to develop to cope with the challenges presented in their environment and interact with new experiences, observing a sense of self. The natural tendency to development does not occur automatically, rather it depends on the social context in which the individual finds himself, which may support or obstruct that process.<sup>8</sup>

According to SDT, motivation is directly related to the satisfaction generated by a given action, whether that be achieving a final objective (extrinsic motivation) or performing an activity simply for inherent satisfaction (intrinsic motivation). In the continuum of self-determination, the degree of motivation – which might be non-existent (in a state of lack of intention to act due to not giving value to the activity, not feeling competent to do it or not expecting it will produce the desired result) – varies from highly contrary external regulations on the individual's convictions, with behaviours carried out to satisfy an external demand or compensation, through one's own regulations in accordance with and integrated into the individual's values, to intrinsic motivation. This process should not necessarily progress through each stage, that is, people can internalize a new regulation behaviour at any moment along this continuum.<sup>8</sup>

Still regarding SDT, the field of action in which it engages is the investigation of growth trends inherent to people to innate psychological needs, which form the basis for integration of the personality and self-motivation, as well as the conditions that feed positive processes. The empirical process enables identification of the necessities for competence (objective to develop mastery of a subject matter), relationship (need to establish ties, which may refer to the sense one has about an activity shared with others with similar interests) and autonomy (sense of independence and choice), essential to facilitating the appropriate operation of natural propensities to growth and integration, as well as social and constructive development and the development of personal well-being.<sup>8</sup>

As these three basic needs are interconnected, satisfying one of them can contribute to fulfilling the other two and, therefore, afford greater motivation<sup>10,11,12</sup> and, in terms of health care, contribute toward achieving the fundamental objective for professional training: care with quality.<sup>13,14,15</sup>

Studies which have used SDT have found the following variables as determining factors behind student motivation: older age<sup>16,17</sup>, female sex<sup>8,15,16,18-21</sup>, persistence, self-direction, cooperative attitude, readiness to begin the course, willingness to make sacrifices for studies<sup>13,15,22</sup>, time spent with family<sup>23</sup> and time dedicated to studies during undergraduate training<sup>24</sup>, choice of course through experience with health care or due to family members being medical professionals<sup>25</sup>, receiving and giving feedback in relation to tasks performed<sup>13,18</sup>, and academic environment<sup>21,26,27,28</sup>.

Based on STD<sup>29,30</sup> questionnaires were prepared<sup>28,30,31</sup> which highlighted the Intrinsic Motivation Inventory (IMI)<sup>31</sup>, a multidimensional measurement instrument that evaluates the subjective experience of participants in relation to the performance of a given task.

The IMI is composed of 45 Likert-type items with seven response levels, containing seven subscales/domains: interest/enjoyment, perceived competence, effort/importance, pressure/tension, perceived choice, value/usefulness and integration (relationship). The interest/enjoyment subscale is considered the measure of self-reported intrinsic motivation, assessed in itself. The subscales of perceived competence and perceived choice are positive predictors of intrinsic motivation, and the pressure/tension subscale is a negative predictor. The effort/importance subscale is relevant to motivation, whereas the value/usefulness domain translates the idea that people internalize and become self-regulators in relation to the activities that they consider useful or valuable to themselves; the integration (relationship) subscale, meanwhile, refers to interpersonal interactions, and formation of friendships<sup>31</sup>.

A study conducted in 2015 with Portuguese students indicated the appropriate IMI for assessing the underlying theoretical constructs of STD, enabling the global measure of intrinsic motivation to be ascertained, as well as specific measures for its predictors<sup>32</sup>. However, as it is originally written in English, to be used by another culture and/or language, it requires a translation and transcultural adaptation process that considers the cultural contexts and lifestyle of the target population<sup>33</sup>.

This study therefore aimed to translate and transculturally adapt the IMI so that it could be used to assess the intrinsic motivation among a tutorial group of Medicine students at a university in the Northeast of Brazil which adopts an active methodology, and to verify associated factors.

As a descriptive approach, when evaluating the results of the intrinsic motivation, the study does not require any hypothesis per se. However, considering the analytical interest in verifying whether differences as regards intrinsic motivation, due to various factors, could be found among Medicine students at a university with an active methodology and in the setting of a tutorial group, the hypothesis adopted was that students who are intrinsically motivated present a distinct profile of associated factors.

## METHODOLOGY

### Type and location of the study

Following the translation and transcultural adaptation of the IMI, a cross-sectional study was conducted with Medicine students from the Faculdade Pernambucana de Saúde (FPS), located in the Northeast of Brazil. The data was collected from October to December 2016.

The FPS uses Problem-Based Learning (PBL)<sup>3</sup> as a methodological teaching strategy in the health courses it offers. Its

main field of practice is the Prof. Fernando Figueira Institute of Integral Medicine (IMIP), a regional centre of the Ministry Health for maternal-infant care and of the United Nations (UNICEF) for Integrated Management of Childhood Diseases (IMCI), health, nutrition and HIV/Aids. Throughout the course, whether at FPS or in its field of practice (IMIP), students discuss and review problem cases, assisted by the tutor. This moment, called group tutorial or tutoring, takes place in two meetings per week, based on the following steps: firstly, identification of unfamiliar terms in the text, definition of the case problem, brainstorming, review of previous steps and definition of the learning goals; followed by, directed study conducted between meetings; and, finally, closing of the case in a roundtable discussion<sup>3</sup>.

### Study participants

The study involved the participation of first year (second semester), third year (sixth semester) and fifth year (tenth semester) Medicine students, representing the start, middle and end of the FPS Medicine course.

### Translation and transcultural adaptation of the Intrinsic Motivation Inventory (IMI)

With the consent of its author, the IMI was translated and transculturally adapted in order to evaluate the students' intrinsic motivation; the stages of this process were executed in accordance with pre-established standards<sup>34</sup>.

The translation involved the participation of two English-speaking Brazilian professionals, one of whom is from the field of health training, and the other a sworn translator. The back-translation was also performed by a sworn translator, whose mother tongue is English. Following the joint revision performed face-to-face, a consensual version was obtained which was translated back into English. The importance of the conceptual translation was highlighted as opposed to the literal version.

For the transcultural adaptation, meanwhile, a panel of experts composed of professionals who participated in the translation stage and a Ph.D. in languages was instilled with the purpose of revising and analysing the instrument and any cultural discrepancies (validation of the content).

After this stage, semantic validation was performed by means of applying the translated instrument to six third-year Medicine students from FPS to discuss its formulation and understanding. The students were encouraged not only to complete the questionnaire, but also report any comprehension issues and make suggestions for changes to be made to the text. The transcultural equivalence was tested until all the

items were understood by the students. Only modifications that were approved by group consensus were implemented. At the end, the scale still had the same original composition of 45 items and seven subscales/domains.

To verify the reliability of the final translated version, the IMI was applied to 38 fourth-year Medical students. Analysis of the internal consistency of the answers to the instrument employed Cronbach' alpha and assumed a value equal to or greater than 0.70 as acceptable<sup>35</sup>.

### Application of the IMI and of the questionnaire with sociodemographic and academic variables of the students

The first-, third- and fifth-year students, prior to beginning the tutorial groups, were invited to participate in the study through the reading of a Free and Informed Consent Form (FICF). Subsequently, questionnaires were delivered with sociodemographic, educational and IMI data. Data of the first- and third-year students was collected at FPS, and of the fifth-year students from the internship field, at IMIP.

Once the students had left the rooms, the questionnaires were gathered and any that were unanswered were placed at the disposal of the students in three further occasions. After this period, those who failed to respond were considered "study loss".

The sociodemographic and academic variables of the students corresponded to gender, age, marital status, financial dependents, number of attempts at the entrance exam for the Medicine course, current semester of course, undergraduate training prior to Medicine course, living in the same city/state of parents/guardians with financial responsibility, choice of Medicine course due to needing health care, choice of Medicine due to influence (student's perception in relation to parents' influence, but with right to choice) or due to parental pressure (student's perception in relation to parental pressure to choose the course).

### Analysis of the IMI

For the IMI, analysis of the mirrored answered were initially analysed, considering the existence of reverse scoring in 16 questions, according to the following domains: interest/enjoyment (questions 3 and 4), perceived competence (question 13), effort/importance (questions 15 and 18), pressure/tension (questions 19 and 21), perception of choice (questions 25, 26, 27, 28 and 30) and integration (relationship) (questions 38, 39, 42 and 43). Subsequently, each subscale/domain was defined by the arithmetic mean average of the set of its composite items. The seven possible responses (1 to 7) considered varied from 1 = not true, 4 = somewhat true to 7 = very true,

to define the score grading. Thus, the following cut-off points were created and used:  $\leq 3.0$  (not true/not motivated),  $> 3.0$  and  $< 6.0$  (somewhat true/motivated) and  $\geq 6.0$  (very true/very motivated). As an outcome, for the purposes of statistical analysis, intrinsic motivation categorised as yes ( $> 3.0$ ) and no ( $\leq 3.0$ ) was considered.

### Data analysis

The data were inputted into an Excel spreadsheet with dual entry and validated in Epi-Info 3.5.3; analyses were conducted with the program Stata 12.1. The continuous variables studied were presented by the mean average and standard deviation (SD). Categorical data were described by means of frequency distribution tables.

Considering the factors that influenced the student's intrinsic motivation<sup>15-21,24,25</sup>, the variables gender, age, marital status, financial dependents, attempts at the entry exam, current semester of course, prior undergraduate training, living with parents, choice of course by need for health care, by parental influence or pressure, were studied to analyse possible factors associated to intrinsic motivation. A reference category was considered to be with an outcome that presented a greater frequency (intrinsic motivation with a mean score  $> 3$ ). From that point on, a Poisson univariate analysis was initially conducted, and the variables that presented p values of  $< 0.20$  qualified to enter the Poisson multivariate analysis. In this stage of the analysis, for statistical purposes, the final model consisted of variables with a p value  $< 0.05$ . The p value was analysed by Wald test.

### Ethical aspects

The study complied with the ethical criteria of CNS Resolution 466/2012. The study was approved by the IMIP Human Research Ethics Committee, CAAE number 57741216.8.0000.5201.

## RESULTADOS

Of the 371 Medicine students, 276 participated (74.4%). Distribution according to the second, sixth and tenth academic semesters corresponded to 113/151 (74.8%), 90/157 (57.3%) and 63/73 (86.3%) students, respectively.

The mean overall score for intrinsic motivation, considering all the items of the IMI, was 3.8 (SV = 0.5). The scores by domain and according to current semester of study are found in Table 1. The subscales of pressure/tension and perceived choice were the only ones that presented scores of  $\leq 3.0$ . The subscale of value/usefulness, considering all semesters, presented a score equal to 6.0.

**TABLE 1**  
Mean scores for intrinsic motivation of Medicine students. Recife (PE), 2016

Domains	Mean intrinsic motivation scores*			
	2 <sup>nd</sup> Semester Mean $\pm$ SD	6 <sup>th</sup> Semester Mean $\pm$ SD	10 <sup>th</sup> Semester Mean $\pm$ SD	General Mean $\pm$ SD
Interest/enjoyment	4.0 $\pm$ 1.0	4.1 $\pm$ 0.8	3.5 $\pm$ 0.9	3.9 $\pm$ 0.9
Perceived competence	4.0 $\pm$ 1.0	3.9 $\pm$ 1.0	3.7 $\pm$ 1.0	3.9 $\pm$ 1.0
Effort/importance	3.6 $\pm$ 0.8	3.7 $\pm$ 0.7	3.5 $\pm$ 0.8	3.6 $\pm$ 0.8
Pressure/tension	2.9 $\pm$ 0.8	2.9 $\pm$ 0.7	3.0 $\pm$ 0.7	2.9 $\pm$ 0.7
Perceived choice	2.6 $\pm$ 0.7	2.4 $\pm$ 0.8	2.3 $\pm$ 0.8	2.5 $\pm$ 0.8
Value/usefulness	6.1 $\pm$ 1.2	6.1 $\pm$ 1.2	5.9 $\pm$ 1.3	6.0 $\pm$ 1.2
Integration (relationship)	3.4 $\pm$ 0.5	3.4 $\pm$ 0.6	3.2 $\pm$ 0.7	3.3 $\pm$ 0.6

\*  $\leq 3.0$  (not motivated),  $> 3.0$  and  $< 6.0$  (motivated) and  $\geq 6.0$  (very motivated).

As regards sociodemographic and academic characteristics and aspects related to encouragement to choose the Medicine course, most of the 276 students were female (72.8%), under 20 years old (64.5%), single (95.7%) and with no financial dependents (80.4%). Almost 90.0% of the students had no prior undergraduate training (89.9%), and the highest proportion (68.8%) corresponded to those who were admitted to the Medicine course after one or two attempts at the entrance exam. Residing in the same city as the parents was reported by 79.7% of the students. The choice of Medicine course through necessity of health care was reported by 16.3%, and resulting from parental influence by 33.0%. Sixteen students (5.8%) reported being subjected to pressure from their parents to choose the Medicine course.

Table 2 presents the results of the adjusted univariate and multivariate Poisson regression models for the condition of intrinsic motivation of the Medicine student in the group tutorial setting, according to sociodemographic, academic and family variables (gender, age, marital status, existence of financial dependents, attempts at the entry exam for the Medicine course, current semester of study, student with prior undergraduate training, residence in the same city as the parents, choice of Medicine through necessity of health care, choice of Medicine through parental influence or pressure).

Of the set of 11 variables, three presented p values  $< 0.20$  in the univariate analyses (age, number of attempts at the entry exam and choice of Medicine due to health care need), thus qualifying to be included in the multivariate analysis. At this stage of the analysis, remaining in the final model and associated to intrinsic motivation was the category of students who had attempted the entry exam once or twice ( $p = 0.011$ ), when compared to those who had attempted it three or more times.

**TABLE 2**  
**Results of the adjusted univariate and multivariate Poisson regression models for the condition of intrinsic motivation of Medicine students in the group tutorial setting. Recife (PE), 2016**

Variables	N = 276	Motivated N (%)	Gross PR* (CI95%)	p value**	Adjusted PR* (CI95%)	p value**
<b>Gender</b>				0.923	-	-
Male (n = 75)		68 (90.7)	0.99 (0.91-1.08)		-	
Female (n = 201)		183 (91.0)	1		-	
<b>Age</b>				0.047		0.074
< 20 years (n = 178)		167 (93.8)	1		1	
≥ 20 years (n = 98)		84 (85.7)	0.91 (0.83-0.99)		0.92 (0.85 – 1.01)	
<b>Marital Status</b>				0.486		-
Single (n = 264)		241 (91.3)	1		-	
Married (n = 12)		10 (83.3)	0.91 (0.71-1.18)		-	
<b>Financial dependents</b>				0.955		-
Yes (n = 54)		49 (90.7)	0.99 (0.91-1.09)		-	
No (n = 222)		202 (91.0)	1		-	
<b>Attempts at Medicine course entry exam</b>				0.009		0.011
1 or 2 (n = 190)		180 (94.7)	1		1	
3 or more (n = 86)		71 (82.6)	0.87 (0.79-0.96)		0.88 (0.79-0.97)	
<b>Current semester</b>				0.372		-
Second (n = 113)		105 (92.9)	1		-	
Sixth (n = 90)		83 (92.2)	0.99 (0.92-1.07)		-	
Tenth (n = 73)		63 (86.3)	0.93 (0.84-1.03)		-	
<b>Student with prior undergraduate training</b>				0.409		-
Yes (n = 28)		24 (85.7)	0.94 (0.80-1.09)		-	
No (n = 248)		227 (91.5)	1		-	
<b>Lives in same city as parents</b>				0.376		-
Yes (n = 220)		202 (91.8)	1		-	
No (n = 56)		49 (87.5)	0.95 (0.86-1.06)		-	
<b>Chose Medicine due to need for health care</b>				0.189		0.212
Yes (n = 45)		38 (84.4)	0.91 (0.80-1.04)		0.92 (0.81-1.05)	
No (n = 231)		213 (92.2)	1		1	
<b>Influence of parents in choice of course</b>				0.257		-
Yes (n = 91)		80 (87.9)	0.95 (0.87-1.04)		-	
No (n = 185)		171 (92.4)	1		-	
<b>Pressure from parents to choose course***</b>				0.329		-
Yes (n = 16)		13 (81.2)	0.89 (0.70-1.13)		-	
No (n = 259)		237 (91.5)	1		-	

\* Prevalence Rate; \*\* Wald Test; \*\*\* The sample varied due to lack of information.

In accordance with the results of the adjusted models of uni and multivariate Poisson regression by semester (second, sixth and tenth), in the second semester, from the group of ten variables, marital status was not included in the multivariate analysis possibly due to the low frequency of the married student category, leaving two variables that displayed values  $p < 0.20$  in the univariate analyses (number of attempts at the entry exam and prior undergraduate training) and the final model maintained students who had undergraduate training

prior to the Medicine course (PR = 0.92; CI95% (0.87-0.97);  $p = 0.005$ ) (Table 3).

In the sixth semester, no statistically significant difference was found, and in the tenth semester, of the group of ten variables, four presented values of  $p < 0.20$  (gender, age, marital status, number of entry exam attempts and living in the same city as parents), with the final model maintaining the variable of having attempted the entry exam once or twice (PR = 0.65; CI95% (0.47-0.88);  $p = 0.006$ ) (Table 4).

**TABLE 3**  
**Results of the adjusted univariate and multivariate Poisson regression models for the condition of intrinsic motivation of second semester Medicine students in the group tutorial setting, Recife (PE), 2016**

Variables	N = 113	Motivated N (%)	Gross PR* (CI95%)	p value**	Adjusted PR* (CI95%)	p value**
<b>Gender</b>				0.431		-
Male (n = 27)		24 (88.9)	0.94 (0.82-1.09)		-	
Female (n = 86)		81 (94.2)	1		-	
<b>Age</b>				0.387		-
< 20 years (n = 100)		94 (94.0)	1		-	
≥ 20 years (n = 13)		11 (84.6)	0.90 (0.71-1.14)		-	
<b>Marital Status</b>				0.005		
Single (n = 111)		103 (92.8)	0.93 (0.88-0.98)			
Married (n = 2)		2 (100.0)	1			
<b>Financial dependents</b>				0.343		-
Yes (n = 27)		26 (96.3)	1		-	
No (n = 86)		79 (91.9)	0.95 (0.86-1.05)		-	
<b>Attempts at Medicine course entry exam</b>				0.115		0.119
1 or 2 (n = 78)		75 (96.1)	1		1	
3 or more (n = 35)		30 (85.7)	0.89 (0.77-1.03)		0.89 (0.77-1.03)	
<b>Prior undergraduate training</b>				0.005		0.005
Yes (n = 10)		10 (100.0)	1		1	
No (n = 103)		95 (92.2)	0.92 (0.87-0.97)		0.92 (0.87-0.97)	
<b>Lives in same city as parents</b>				0.650		-
Yes (n = 93)		86 (92.5)	0.97 (0.87-1.09)		-	
No (n = 20)		19 (95.0)	1		-	
<b>Chose Medicine due to need for health care</b>				0.823		-
Yes (n = 17)		16 (94.1)	1		-	
No (n = 96)		89 (92.7)	0.98 (0.86-1.12)		-	
<b>Influence of parents in choice of course</b>				0.282		-
Yes (n = 34)		30 (88.2)	0.93 (0.81-1.06)		-	
No (n = 79)		75 (94.9)	1		-	
<b>Pressure from parents to choose course</b>				0.310		-
Yes (n = 10)		8 (80.0)	0.85 (0.62-1.16)		-	
No (n = 103)		97 (94.2)	1		-	

\* Prevalence Rate; \*\* Wald Teste.

When the reliability of the answers to the IMI were evaluated by internal consistency analysis, the Cronbach Alpha of the IMI was found to be 0.9177. When evaluated by domain, the interest/enjoyment domain corresponded to 0.8843, perceived competence to 0.8792, effort/importance to 0.7537, pressure/tension to 0.6869, perceived choice to 0.6342, value/usefulness to 0.9486 and relations to 0.8137.

## DISCUSSION

The basic presuppositions of PBL, which integrate cognition, attitudes and abilities in student-centred learning processes, facilitate the acquisition of a proactive and critical profile, similar to

how work in small groups promotes interaction between their members<sup>3,36</sup>. In principle, they encompass the three basic pillars of SDT (autonomy, competence and establishment of ties)<sup>11,14,37</sup>, which was found in this study, where the assessed students proved to be intrinsically motivated (average score > 3).

This findings are corroborated by studies on the effects of the instructional elements of PBL on various factors that affect student motivation. Jones *et al.*<sup>6</sup>, following the application of the MUSIC model of academic motivation (Empowerment, Usefulness, Success, Interest and Care), found that all the components were consistent predictors in the motivation of students who used PBL.

**TABLE 4**  
**Results of the adjusted univariate and multivariate Poisson regression models for the condition of intrinsic motivation of tenth semester Medicine students in the group tutorial setting. Recife (PE), 2016**

Variables	N = 73	Motivated N (%)	Gross PR* (CI95%)	p value**	Adjusted PR* (CI95%)	p value**
<b>Gender</b>				0.121		0.446
Male (n = 30)		28 (93.3)	1		1	
Female (n = 43)		35 (81.4)	0.87 (0.73-1.04)		0.94 (0.82-1.09)	
<b>Age</b>				0.217		-
< 20 years (n = 16)		15 (93.7)	1		-	
≥ 20 years (n = 57)		48 (84.2)	0.90 (0.76-1.06)		-	
<b>Marital Status</b>				0.002		0.569
Single (n = 70)		60 (85.7)	0.86 (0.78-0.94)		0.97 (0.90-1.06)	
Married (n = 3)		3 (100.0)	1		1	
<b>Financial dependents</b>				0.230		-
Yes (n = 9)		6 (66.7)	0.75 (0.47-1.20)		-	
No (n = 64)		57 (89.1)	1		-	
<b>Attempts at Medicine course entry exam</b>				0.005		0.006
1 or 2 (n = 50)		49 (98.0)	1		1	
3 or more (n = 23)		14 (60.9)	0.62 (0.44-0.86)		0.65 (0.47-0.88)	
<b>Prior undergraduate training</b>				0.458		-
Yes (n = 8)		6 (75.0)	0.85 (0.56-1.30)		-	
No (n = 65)		57 (87.7)	1		-	
<b>Lives in same city as parents</b>				0.084		0.110
Yes (n = 59)		54 (91.5)	1		1	
No (n = 14)		9 (64.1)	0.70 (0.47-1.05)		0.77 (0.56-1.06)	
<b>Chose Medicine due to need for health care</b>				0.625		-
Yes (n = 17)		14 (82.3)	0.94 (0.74-1.20)		-	
No (n = 56)		49 (87.5)	1		-	
<b>Influence of parents in choice of course</b>				0.545		-
Yes (n = 28)		25 (89.3)	1		-	
No (n = 45)		38 (84.4)	0.94 (0.79-1.13)		-	
<b>Pressure from parents to choose course</b>				0.841		-
Yes (n = 6)		5 (83.3)	0.96 (0.66-1.40)		-	
No (n = 67)		58 (86.6)	1		-	

\* Prevalence Rate; \*\* Wald Teste.

In the domains of competence and perceived choice, conceived as positive predictors of intrinsic motivation<sup>31</sup>, the former was observed within the cut-off point stipulated in our study (> 3.0) in all semesters, showing that, in the setting studied, the students saw themselves as competent. However, this was not the case in the domain of perceived choice, probably due to the evaluation, although performed in the group tutorial setting, involving collaborative work in small groups, not having given another activity option. Therefore, the students may not have perceived the choice of other forms, such as the definition of their own learning objectives, the free choice of literature researched, independent or self-directed study,

which may suggest a shortcoming in the application or explanation of the PBL concepts in the tutorials.

One study which tested the educational utility of teaching in the students' preferred method as a way of supporting autonomy and conceptual learning at universities found that the participants who received their preferred teaching method perceived the instructor more as a supporter in this basic need and displayed greater satisfaction with autonomy, engagement and conceptual learning<sup>9</sup>.

In the domain pressure/tension, considered a negative predictor, the mean of all the scores was 3.0 or less. It is presumed that the students, especially the shy ones, can feel pres-



sured. In the group tutorial, students are evaluated by their individual participation in the identification of unfamiliar terms in the text, the definition of the case problem, the brainstorm, the definition of the learning goals, the directed study and, finally, in closing the case through a roundtable discussion<sup>3</sup>. In other words, a student who “does not possess” good communication skills, even if he or she is dedicated to individual study, may feel pressured.

The domain of effort/importance was considered relevant to motivation, presuming that the mental energy channelled to follow the seven steps should generate significant results for the student’s learning. As regards the subscale of value/usefulness, it was demonstrated that the students regulate themselves in relation to the activity, as they experience it as useful or valuable to themselves, which should be reflected through their good practices in basic and clinical care, although this has not been analysed in this study.

The domain of integration (relationship), an important basic need in active methodologies, since the work is done in small groups<sup>3,5,6</sup>, in this study proved to be favourable to intrinsic motivation, both in the overall analysis and per semester<sup>30</sup>. In a study with second-year Engineering students, redesigned to promote intrinsic motivation in learning by means of autonomy, 17 students were interviewed after the redesign with questions about how the experiences in the semester affected their motivation. In the analysis of the description of the three basic needs (autonomy, competence and relationship), the one that demonstrated the strongest indication of supporting motivation, surprisingly, was relationship<sup>6</sup>.

When analysing the factors associated to intrinsic motivation, both overall and by semester, the number of attempts at the entry exam to be admitted to the Medicine course, in the category of once or twice, was considered a predisposing factor for intrinsic motivation of the students. This was observed in the overall analysis and in the tenth semester. It may be suggested that these students feel more secure in themselves and more confident. In turn, of the students from the second semester, those who had undergraduate training prior to the Medicine course were considered the most motivated, which may be related to the experience and qualification they had acquired. Both factors favour autonomy, competence and relationship, the three basic needs for intrinsic motivation<sup>8</sup>.

It is important to highlight that students with a lower number of attempts at the entry exam would probably be younger, and those who had prior undergraduate training would be older. That is to say, age may explain these findings. However, no statistically significant association was found with age in any of our analyses. It should be underlined that

in the group of students in general, without discriminating between semesters, the students’ age lost statistical significance following adjustment by the variable number of entry exam attempts, which composed the final model.

One study shows that older students are less impersonal and perceive themselves as more competent<sup>16</sup>. Another found an association between older age and intrinsic motivation, as well as thinking about the future in this category of age while a student, as a source of motivation<sup>17</sup>.

In the evaluation of intrinsic motivation in relation to the gender of the students, this study failed to find any association, unlike other research<sup>8,15,16,18-21</sup>, which, although using different methodologies, found greater motivation among females. It is known that female students tend to perceive their teacher as providing more support than male students do, and this perception measured by gender may differentiate motivation and emotional experience<sup>21</sup>. It is speculated that our results derive from the learning methodology adopted at the school studied, by exposing students, regardless of gender, to the factors related to the development of motivation.

Educational strategies should favour equality between genders. When educational strategies do not reinforce these differences, there is a greater chance of both having enjoyment and interest in performing the most varied activities, without stigmatizing, for example, some activities as more suited to female students and others to male students<sup>20</sup>.

Choice of the Medicine course due to parental influence, in this study, was reported by more than 30% of the students. However, no significant association was found with intrinsic motivation, as is also the case with the choice of course due to health care need and through parental pressure.

A study conducted in 2015 in New Zealand, which studied the motives that led high school students to apply for places on medicine courses identified as the main reasons: interest in science and the desire to help people (autonomous motivation). However, parental pressure was also mentioned (controlled motivation). Experiences with health care and patients positively influenced autonomous motivation and served as a way of checking the reality of their expectations. Having medical professionals in one’s family network also encouraged interest among students, facilitating access to health care<sup>23</sup>. Also regarding parental influence in the choice of course, parents generally encourage their children to make their own choices, but do not fail to convey to their children their own expectations of them. Therefore, there may be a greater influence in the choice of profession than perceived by their children.

This study presented some limitations. Firstly, the lack of coverage of all students by semester, more specifically in

the sixth semester (57.3%), which may have contributed to no association being found between the variables studied and the intrinsic motivation of the students. Secondly, only one PBL methodology setting was evaluated, the group tutorial, which corresponds to one of the activities conducted, despite not referring to only one cognitive activity, and going far beyond the development of abilities that are part of the student evaluation, such as interpersonal relationship and communication. Hence, the current findings cannot be generalised to other activities, such as laboratory work. Thirdly, it has not been possible to evaluate the role of feedback in student motivation<sup>13,18,38</sup> by virtue of this tool not being implemented in the FPS group tutorial activities during the data collection period. Fourthly, the nature of the type of study chosen, cross-sectional research, which does not allow causal inferences to be made, which may be resolved by longitudinal studies capable of examining the direction of the effects. And finally, the limitation of not having broadened the study to consider the tutor's characteristics to analyse their role in student motivation<sup>5,7,17</sup>.

Considering such limitations, with the exception of some dimensions already justified by the context under evaluation, the Medicine students involved in the study found themselves to be intrinsically motivated during the group tutorial activity using PBL methodology. The factors associated to intrinsic motivation in our study, such as prior undergraduate training to the Medicine course and the number of entry exam attempts for being admitted to the medical school, have implications for the development of programs that identify students who are not included in these categories and for the development of interventions, such as support for teacher autonomy so that they are able to develop instructional objectives<sup>39</sup> based on intrinsic practices, such as: "Take the student perspective"; "Make psychological needs vital during teaching activities"; "Use the basis of an inviting language"; "Provide explanatory reasons for what you ask for"; "Show patience" and "Recognise and accept expressions with negative effect"<sup>40</sup>.

## CONCLUSIONS

This study demonstrated, considering Self-Determination Theory, that Medicine students were intrinsically motivated to perform activities in the group tutorial, which motivation is associated to factors like less attempts at the Medicine course entry exam and undergoing other undergraduate training prior to the current course. It may be suggested that these students, according to SDT, are more self-regulated and less dependent on external influence to achieve their goals and,

therefore, feel more secure in themselves and more confident. Both factors favour autonomy, competence and relationship, the three basic needs for intrinsic motivation.

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#### AUTHORS' CONTRIBUTIONS

Pedro Tadeu Álvares Costa Caminha de Azevedo, Maria de Fátima Costa Caminha e Ana Rodrigues Falbo: making, study design, analysis and interpretation of data and writing of the article.

Camyla Rolim Souto de Andrade, Carolina Gonçalves de Godoy e Raissa Lyra Sales Monteiro: making, design of the study and writing of the article.

#### CONFLICT OF INTEREST

No conflict of interests to declare.

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