RESEARCH ARTICLE

How to encourage intrinsic motivation in the clinical teaching environment?: a systematic review from the self-determination theory

Cesar Orsini[1,3]*, Phillip Evans[2], Oscar Jerez[3]

[1]College of Medical, Veterinary and Life Sciences, University of Glasgow, Glasgow, United Kingdom; [2]Medical Education Development Centre, Medical School, Gifu University, Gifu, Japan; [3]Teaching and Learning Centre, School of Economics and Business, University of Chile, Santiago, Chile

Abstract

Purpose: Internalization of students' motivation towards an intrinsic form is associated with increased interest, commitment, learning, and satisfaction with education. Self-Determination theory postulates that intrinsic motivation and autonomous forms of self-regulation are the desired type of motivation; as they have been associated with deep learning, better performance and well-being. It claims three basic psychological needs have to be satisfied in order to achieve intrinsic motivation. These are the needs for autonomy, competence and relatedness. This study aims to provide a review on how these basic psychological needs are encouraged in undergraduate students so they can be transferred to the clinical teaching environment. **Methods:** Electronic searches were performed across four databases (Medline, Embase, PsycINFO, and ERIC), relevant journals, and retrieved bibliography of selected articles. In total, searches produced 4,869 references, from which 16 studies met the inclusion criteria. **Results:** Main themes were coded in three categories: The support of autonomy, competence and relatedness. The research-based evidence appears to be of reasonable quality, and indicates that teachers should work to satisfy students' basic psychological needs to foster internalization of self-regulation. Our findings suggest that teachers should interact with students in a more 'human centred' teaching style, as these actions predict motivational internalization. Several themes emerged from different contexts and further investigation should expand them. **Conclusion:** This review identified actions that clinical teachers could implement in their daily work to support students' self-determination. Autonomy supportive teaching in health professions educations would benefit students and may actually result in more effective health care delivery.

Key Words: Achievement; Learning; Motivation; Personal autonomy; Personal satisfaction

INTRODUCTION

Over the last decade there has been increased research on motivation in health professions education [1,2]. Clinical teaching has been suggested as an important factor influencing students intrinsic motivation and performance [3,4]. A number of studies have found that internalization of students mo-

tivation towards an intrinsic form is associated with increased interest, commitment, effort, learning, and satisfaction with education [5-7]. In contrast, a poor quality of learning occurs when students are not willing to learn [6]. It is suggested that students in higher education, especially in health professions education, have natural tendencies to learn and to know the environment that surrounds them, they have a self-concept of being responsible for their own decisions, and learn things they need to know for real life situations [1,8,9]. However, these behaviours can be supported or diminished by internal or external factors [9]. Self-determination theory [6] supports the idea of students' innate curiosity and desire to learn. This is

achieved by internalizing and integrating psychic components to build an integrated and unified sense of the self [8]. It posits three quality types of motivation: amotivation (i.e. lack of motivation), extrinsic motivation (i.e. driven by external control or demands) and intrinsic motivation (i.e. free engagement in an activity for inherent satisfaction). An internalization process, from external to internal regulation, influences the type of motivation adopted. This relates to how self-determined an individuals' behaviour is and can lead to internalization of habits and motives in order to generate feelings of autonomous self-regulation and value.

Self-determination theory claims three basic psychological needs that have to be satisfied in order to achieve intrinsic motivation and internalization of autonomous self-regulation. These are the needs for autonomy, competence and relatedness [2,8]. The needs for autonomy refers to making decisions by your own will, based on one's own needs and values [9]. The need for competence refers to the desire of feeling capable of performing a determined task and it is related to seek challenges that are optimal to one's abilities [6]. Relatedness is described as the need for belongingness or connectedness with significant others, as well as with a significant community [10]. It means being accepted and valued by people surrounding us. The clinical learning environment can promote these needs and foster intrinsic motivation through an autonomy-supportive teaching style, making students feel autonomous, competent and supported by their teachers and peers. This opposes to the traditional controlling style in which behaviour is usually regulated by punishments and rewards [6], leading to extrinsic motivation. Evidence suggests that if teachers support students' autonomy, competence and relatedness, they will thrive in educational settings [9], they will take responsibility for their learning [1] and also act in a more autonomy supportive way in their interactions with patients [11]. Therefore the aim of this systemic review is to describe and analyse how the teaching environment supports students' needs for autonomy, competence, and relatedness and consequently supports undergraduate students to achieving intrinsic motivation and

engagement in academic activities.

METHODS

The search for relevant literature was performed during November and December 2013. The inclusion and exclusion criteria are outlined in Table 1. Electronic searches were performed across four databases (Medline, Embase, PsycINFO, and ERIC), relevant journals, and retrieved bibliography of selected articles via the Science Citation Index (SCI). All selected articles were exported to a reference manager for further and detailed review.

We designed a three main theme search strategy based on the concepts of '*Clinical Teaching AND Intrinsic Motivation AND Undergraduate Students*'. These concepts were expanded and adapted specifically for each database thesaurus. The core strategy for Medline, which was accessed via Ovid, is presented in Table 2. The results from the database search provided key journals for hand searching. Journals were searched through their electronic websites using their advanced search option. Search criteria included articles available in English and Spanish because of the bilingual characteristics of the authors, and considered a 20-year time frame search in order to assess current tendencies. Two reviewers independently assessed whether the abstracts were eligible for full article review. Any differences of opinion were debated and consensus was reached on which papers to include/exclude. Afterwards the selected abstracts were exported to the reference manager and duplicates were removed. Subsequently, related articles were searched throughout the reference manager's library, and finally, of the selected articles, an ancestry search of their references through the Web of Science® was performed. A summary of the literature search and review process is presented in Fig. 1.

The selected articles that met the inclusion criteria were analysed and read as full text. A word processing file was crated for each article in order to extract information about their methods and outcomes. The 'Critical Appraisal Skills Programme' was used as a guide to critically analyse the articles' methods

Table 1. Setting the scope of the search: inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
1. Studies/reviews/meta-analysis focusing on the encouragement of undergraduate students' intrinsic motivation.	1. Studies not empirical in nature like view- points, editorials, papers expressing opinion and books.
2. Studies/reviews/meta-analysis within Health Professions Education or General Higher Education.	2. Studies on populations other than undergraduate students or teachers in health professions education or General Higher Education.
3. Quantitative research studies with well-formulated definitions, operationalization of concepts and analysis of data.	3. Studies not referring to motivation in higher education.
4. Qualitative research studies with well-defined concepts, reliable methods, well-reasoned conclusions and analysis.	4. Studies focusing on motivation in education for specific issues not regarding teaching.
5. Articles available in English and Spanish Language, published from year 1993.	5. Studies focused on instrument construction/validation.

Table 2. Identifying and expanding essential concepts (Medline Search Strategy)

- Search 1 (words with **OR**): *Clinical Teaching*
  - *Mesh Terms*: exp Teaching/ - Mentors/ - exp faculty/ - clinical clerkship/
  - *Keyword Search (free text)*: tutor$ - clinical adj2 (tutor$ OR teach$) - teach$ – facilitator$ –lecturer$ – Teach$ adj1 development– (chairside or bedside or effective) adj1 teach$ – Instructor$
- Search 2 (words with **OR**): *Intrinsic Motivation*
  - *Mesh Terms*: exp motivation/ - personal autonomy/ - internal-external control/ - professional autonomy/
  - *Keyword Search (free text)*: (intrinsic$ OR extrinsic$ OR controlled OR autonomous) adj2 motivation$ - self adj1 determination - self adj1 regulated adj1 learning – SRL - autonomy – competence – relatedness – (Autonomy or competence or relatedness) adj1 Support – learner adj1 autonomy – motivat$ – Incentive$ – motive$
- Search 3 (words with **OR**): *Undergraduate Students*
  - *Mesh Terms*: students, dental/ - students, medical/ - exp education, dental/ - education, medical, undergraduate/ - Education
  - *Keywords Search (free text)*: (Dental or medical) adj1 student$ - dentist$ - dental - Undergraduate adj1 Student$
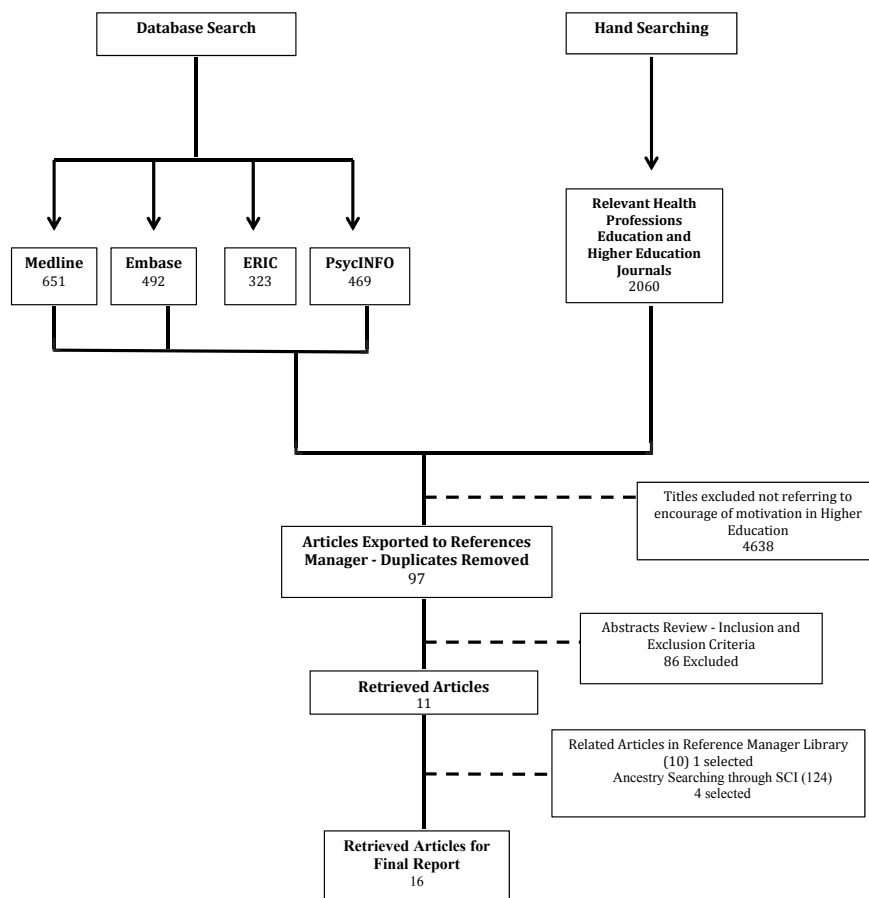- Search 1 AND Search 2 AND Search 3

Fig. 1. Summary of literature search and review process.

[12]. Afterwards, three main themes were used to describe how teachers encourage intrinsic motivation. These themes referred to the three psychological needs mentioned earlier: the needs for autonomy, competence and relatedness. Each relevant idea regarding one of these 'needs' was registered as a topic with a brief description. Subsequently, all the data collected was used to create a table that summarised the information extracted, including the study reference, research topics, type of study, sample, data collection method, data analysis and selected findings and comments. Finally, and attempting to make sense and integrate the extracted data, a thematic analysis was performed. The most relevant themes from each article, referring to the 'three psychological needs' were identified and grouped in a new table. Two reviewers independently

analysed the selected articles following the described steps and posteriorly met, compared their results, and agreed in the final report. The review was organised following the reporting guidelines of the PRISMA statement [13].

RESULTS

The database, manual, and retrieved bibliography search produced 4,869 references to the encouragement of intrinsic motivation in undergraduate students. Of those, 16 met the eligibility criteria and were included in the final review (Fig. 1). Articles were excluded mainly because they were not empirical in nature (i.e. view- points, editorials, papers expressing opinion and books), they involved other populations, were not referring to motivation in higher education, they focused on motivation for specific issues not regarding the encouragement of the three basic psychological needs to foster Intrinsic motivation in higher education, or were focused on instrument construction/validation. Table 3 provides a summary of the key findings from the 16 articles reviewed.

The majority of the studies stated clear objectives or research questions, consistent with the study's development and were found to be relevant for the encouragement of motivation in higher education and particularly to the health professions field. Four studies were centred in overviewing motivation and its applications through the self-determination theory concept [2,8,9,11], meanwhile the rest focused either on supporting autonomy, competence, or relatedness. Although one study was oriented to dental education [3], most studies examined the encouragement of intrinsic motivation in medical education [2,9,11], psychology education [14-17] and general higher education contexts [8,10,18-22]. One study combined medical and nursing education [1]. Most studies were design as quantitative [10,15-22], only two studies reported mixed methods [3,14] and one a qualitative design [1]. Cross-sectional studies were predominant. Two studies employed longitudinal designs [20,22] with two and three data collection points during a one semester period. No control groups were included. One study made a cultural comparison between German and United States students [10]. Participants were all undergraduate students. Modest sample sizes were selected ranging from 117 to 222 participants, with two exceptions. One study collected 1,289 reports from students [10], and a qualitative study recruited 31 students [1]. Student recruitment was through advertisement, email and paper-based invitation. Not surprisingly, self-administered questionnaires were the most popular data collection method, although in several papers more than one was used, these measured different variables. One study used three data collection sources for the same variables (i.e. open and close questions, semi-structured interviews

and focus group), increasing data triangulation [3]. One study used only focus groups [1].

Data analysis was consistent with the studies objectives or research questions. Statistical analysis (i.e. descriptive an inferential), thematic and content analysis were performed. Studies with qualitative components showed rigorous and credible analysis [1,14]. More than one author examined the collected information separately, and then crosschecked listed categories and made adjustments. These studies were also characterised by transparency about methods, one Swedish study asked students to check the final list of categories created and completed a forward and backward translation of results to English, in order to increase dependability and make findings transferable [1]. Most studies did not establish causal relations, instead providing correlations between variables. Three studies reported self-criticism in this aspect [16,18,20] arguing that manipulating these 'needs of satisfaction' variables in real group contexts would be difficult and perhaps unethical to conduct.

How to encourage the three basic psychological needs?

The majority of the studies stressed the importance of autonomy supportive teaching to encourage students' intrinsic motivation. Through the variety of contexts revised, the main approach to promote intrinsic motivation was adopting the principles from the self-determination theory that stress the importance of creating feelings of competence, autonomy and relatedness in students [2,8-11,15-18,20-22]. Table 4 summarises the main themes according to each psychological need. Students' perceived that an autonomy supportive teaching style increased their autonomous self-regulation, competence, interest, well-being [2,9,10,20] and predicted positive outcomes [10,11,14,15,17,18,21].

Strategies for enhancing autonomy

The needs for autonomy refer to experience behaviour as volitional and reflectively self-endorsed. For example, students are autonomous and intrinsically motivated when they freely choose to devote time and energy to their studies [8]. Three studies argued the importance of identifying what students really want [1,2,9]. Contents must be relevant and interesting for students. If teachers take the time to acknowledge students' interest, they can turn boring contents into attractive activities by changing the scenario [2]. This usually happens when learning basic science content. Students may feel uninterested, however, vertical integration incorporating clinically oriented approaches and early patient contact, could make basic knowledge useful and meaningful [1,9]. In one study comparing nursing and medical students' perceptions, both agreed that applying theoretical knowledge into practice motivated them to learn. In the same study, all students expressed that their

Table 3. Summary of studies on the encouragement of intrinsic motivation in undergraduate students

Author(s) (years, country)	Research topics	Type of study	Sample	Data collection method	Data analysis	Selected findings & comments
Ryan & Niemiec (2009, USA) [8]	Overview SDT and applications to educational practice.	Literature review	Purposive sample of articles	Electronic databases and hand search of relevant literature	Thematic analysis	- **Enhancing autonomy** includes providing choice, meaningful rationales for learning activities, acknowledging students' feelings, and minimizing pressure and control. - **Enhancing competence** includes providing effectance-relevant feedback and optimally challenging tasks. - **Enhancing relatedness** includes conveying warmth, caring, and respect to students.
Kusurkar et al. (2011, The Netherlands) [2]	Autonomy-supportive teaching and practical tips for medical teachers.	Literature review	Purposive sample, SDT related Literature	Electronic databases and hand search of relevant literature	Thematic analysis	- **Enhancing autonomy** includes nurturing what students need and want, encouraging active participation having students' internal states guide their behaviour, encouraging students to accept more responsibility for their learning, communicating value in uninteresting activities, giving choices, directing with 'can, may, could' instead of 'must, need, should. - **Enhancing competence** includes providing structured guidance, optimal challenges and positive and constructive feedback. - **Enhancing relatedness** includes giving emotional support and to acknowledge students' expressions of negative effect
Benson, Cohen, & Buskist (2005, USA) [14]	Rapport: student attitudes and proacademic behaviours, and Instructor behaviours contributing to it.	Mixed methods	166 students	Questionnaire-based (close/open questions)	Statistical analysis, (Frequencies, t-test, ANOVA) and content analysis	Rapport-inducing teachers are likely to have students who attend class, pay attention, enjoy subject matter and engage in proacademic behaviours.
Ten Cate et al. (2011, The Netherlands) [9]	Practical applications of SDT in medical education	Literature review	Purposive sample SDT related literature	Electronic databases and hand search of relevant literature	Thematic analysis	- **Enhancing autonomy** includes giving time and opportunity for autonomous work, enquiring what students want, allowing students to choose how to learn and plan moments of assessment. - **Enhancing competence** includes praising quality of performance, providing constructive feedback and trust students with more clinical responsibilities, taking their role seriously. - **Enhancing relatedness** includes empathising, listening to and acknowledging students' perspectives.
Davies et al. (2012, UK) [3]	Student's views and perceptions of clinical teaching	Mixed methods	Three cohorts of 152 final-year students	Questionnaire-based (online/paper-open/closed questions) - Semi-structured interviews - Focus groups	Descriptive statistics and thematic analysis	- A friendly, non-threatening teaching environment is perceived by students to be a good learning environment. - Students appreciate the time and space to take ownership of their learning. - Learning experience is enhanced through reflective practice and feedback.
Bengtsson et al. (2010, Sweden) [1]	What students consider important for their motivation to attain knowledge	Qualitative	31 students	Focus group with semi-structured questions	Content analysis	Dedicated teachers giving performance feedback, discussions in different forms and choices of learning and assessment methods enhance enthusiasm and learning.
Hodgins et al. (1996, Canada) [18]	Reflective autonomy and interpersonal experiences with parents and with peers	Quantitative	153 students	Questionnaire-based	Statistical analysis (coefficient of correlation)	Reflective autonomy was significantly related to more positive and honest naturally occurring interaction and positive relatedness.

Table 3. Continued

Author(s) (years, country)	Research topics	Type of study	Sample	Data collection method	Data analysis	Selected findings & comments
Brewer & Burgess (2005, USA) [19]	Teachers' role in motivating students to come to class.	Quantitative	156 students	Questionnaire-based	Statistical analysis (Descriptive, t-test, MANOVA)	Teachers should maintain a positive attitude toward students, maintaining a flexible class environment and use a variety of alternative teaching methods to capture students' attention and curiosity.
Williams, Saizow & Ryan (1999, USA) [11]	Importance of SDT for medical education	Literature review	Purposive sample, SDT related literature	Electronic databases and hand search of relevant literature	Thematic analysis	**Enhancing autonomy and competence** includes considering students perspective, provide relevant contents, making students responsible for their learning and giving choice. **Enhancing relatedness** includes to dialogue, listen, give advice, and care about students
Black & Deci (2000, USA) [20]	Students' self-regulation and perceptions of their instructors' autonomy support	Quantitative	137 students	Questionnaire-based	Statistical analysis (Descriptive, factor analysis, t-test, coefficient of correlations, Multiple regression, ANOVA)	Teachers should provide support for students' autonomy and active learning to improve their autonomous self-regulation, competence, enjoyment, and decrease anxiety.
Boggiano et al. (1993, USA) [15]	The effect of controlling strategies and restricted choice on students' performance	Quantitative	117 Students	Questionnaire-based	Statistical analysis (Descriptive, ANOVA)	An "expert" teacher using controlling techniques undermines the nonexpert's perceptions of autonomy, sense of responsibility for process and performance.
Beachboard et al. (2011, USA) [21]	Feelings of relatedness and learning outcomes improvement	Quantitative	2,000 records of NSSE survey	Questionnaire-based	Statistical analysis (Descriptive, t-test, linear and block entry regression)	Increased relatedness to peers and faculty and increased higher order thinking assignments are substantial predictors of educational outcomes relevant to literacy, critical thinking and job preparation
Sheldon & Bettencourt (2002, USA) [16]	Relation of need-satisfaction constructs and affect, intrinsic motivation and commitment	Quantitative	134 Students	Questionnaire-based	Statistical analysis (Descriptive, regression and coefficient correlation)	Group inclusion predicted positive outcomes and may be the most important need to satisfy within group contexts
Ciani et al. (2011, USA) [22]	Particular achievement goal profiles of students and SDT	Quantitative	184 students	Questionnaire-based	Statistical analysis (descriptive, correlation and comparative fit index	Teacher autonomy support buffered against the general decline in students' mastery-approach goals over the course of the semester and predicted initial self-determined motivation.
Kaufman & Dodge (2009, USA) [17]	Factors that influence relatedness and value in an academic setting	Quantitative	222 students	Questionnaire-based	Statistical analysis (descriptive and linear regression)	Enhancing relatedness includes providing students with more choice in their curriculum and fostering a sense of mastery goals. Such improvements can be targeted at both the structural or policy level, as well as at the classroom level.
Levesque et al. (2004, USA) [10]	The relevance of the needs for autonomy and competence toward University	Quantitative	1,289 students	Questionnaire-based	Statistical analysis (descriptive, covariance structure analysis)	Positive informational feedback and lower perceived pressure were positively associated with greater perceived autonomy and competence.

motivation was mostly driven by curiosity, being in charge of their studies and contents, and if these contents were connected to their own personal situation [1]. On the other hand, not every activity will be interesting for everyone. When this happens, students can be very discouraged [2]. Teachers give value to uninteresting contents by informing students how these

Table 4. Main themes for supporting intrinsic motivation and satisfying the three basic needs

Supporting autonomy	Supporting competence	Supporting relatedness
Identify what students want	Provide optimal challenges	Respect students
Provide different learning approaches		
Give value to uninteresting tasks	Provide structured guidance	
Promote active participation		Give emotional support
Give choice	Value students work	
Give learning responsibility		Acknowledge students' expressions of negative effect
Provide freedom	Give positive and constructive feedback	
Avoid external reward	Feedback	

subjects are important for their professional future, consequently internalizing an originally externally regulated behaviour [8,9].

Brewer concludes that college teachers should use a variety of alternative teaching methods to capture students' attention and curiosity [19]. In his findings, lectures were ranked by students as the number one "amotivational reason to skip class"; therefore, teachers should avoid relying only on them. When using lectures as a teaching strategy in the clinical setting, teachers should demonstrate vast knowledge of the subject, as students perceived "knowledge of the subject matter" as the number one reason to attend class. Using case studies, role plays, experiments, and group activities made learning easier for medical and nursing students [1]. The use of alternative teaching methods was supported by two studies which argue that turning a passive student into an active learner may hold promise for enhancing students' achievement and psychological development [8,20]. Being an active learner involves having time and space to take ownership of the learning process. In two studies, nursing, medical and dental students expressed the value of clinical freedom [1,3] and complained about too much work and too little time to deepen in their areas of interest.

Traditionally, many teachers and schools have relied on controlling strategies for teaching and curriculum development. Contrary to this, six studies supported giving choice to students, so they could identify and integrate contents [1,2,8,9,15,22]. Boggian et al. found that students under controlling directives conditions performed significantly worse than students in no controlling directives conditions [15]. Students felt comfortable when being in charge of their own behaviour. Teachers can enhance this by giving choices of learning methods, exercises and task, leading to intrinsic motivation [1,2]. An environment that provides choices and freedom for students also needs them to take more responsibilities in their learning process, this has been shown to stimulate students' motivation [2,11]. Davies et al. stressed the importance of facilitating the empowerment of dental students in clinical teaching [3]. Students should determine their learning path and plan their own

moments of assessment when they feel ready [9]. In order to do this, students must know what is expected from them since the beginning of the semester.

Strategies for enhancing competence

The need for competence refers to the desire of feeling effective in whatever actions one pursues and performs. Competence is not meant as an attained skill or ability per se, but rather a perception of confidence and effectance [9]. Two studies argued the importance of providing optimal challenges for students feeling competent and enhancing intrinsic motivation [2,8]. Activities shouldn't be too hard, but neither too easy for students to test and expand their capabilities. Medical students considered that too easy tasks made them feel insecure and that the level of demands should be appropriate for their learning stage [1]. The idea of an autonomy and competent student does not imply an independent and 'free from the government of others' learner. Teachers should provide a structured guidance, delivering the necessary tools for students' success [2,8], but also seriously valuing their work and making them feel an important part of the clinical environment [3,9]. Five studies revealed the importance that positive and constructive feedback has when promoting intrinsic motivation [2,3,8-10]. This feedback should be oriented on the task, not on the person so that it doesn't feel like a threat but as a suggestion on how to improve what went wrong. Dental students and medical students from different cultures, valued positive feedback at the end of sessions, relating it with greater autonomy and competence [3,10].

Strategies for enhancing relatedness

In order to achieve an autonomous self-regulation behaviour, students must feel connected with teachers and peers [9]. Supporting this concept, Beachboard et al. claimed relatedness as a mediating variable for the relationship between students' participation and educational outcomes [21]. Teachers have a fundamental role when establishing rapport with students. Brewer et al. suggests that teacher's personal qualities

were more important in motivating students than were the teaching methods and classroom management practices [19]. The most frequently rapport-inducing teachers qualities stated by students were: encouraging, open-mindedness, creative, interesting, accessible, happy, having a "good" personality, promoting class discussion, approachability, concern for students, and fairness [14]. Four studies stressed the importance of respecting and having a positive attitude towards students, providing a non threatening environment, and feeling cared [1, 3,9,19].

Dental students stated that working together and for the teacher to know them, made them feel 'part of the team' [3]. On the other hand, nursing students felt that sometimes lecturers treated them like teenagers instead of adults, affecting their motivation [1]. Teachers should support an environment were students feel emotionally supported, comfortable and free to express opinions, leading them to be more interested in subjects and to the internalization of tasks [2,8]. Not acknowledging students' expressions of negative effect undermines motivation. Students claimed that when saying something critical, teachers sometimes acted defending themselves instead of listening and discussing [1]. Autonomy supportive teaching also includes being empathic when reasonable students' opinions criticise teachers work [2,9].

DISCUSSION

The research-based evidence for the encouragement of intrinsic motivation in undergraduate students appears to be of reasonable quality, and indicates that clinical teachers should work to satisfy students' basic psychological needs to foster internalization of self-regulation. Several themes emerged from different contexts referring to satisfying those needs and further investigation should expand them. Autonomy supportive teaching in health professions education would benefit students and may actually result in more effective health care delivery [11]. This review identified actions that teachers could implement in their daily clinical teaching work to improve students self-determination. Independent of the context, these actions could be transferred to a broad of educational settings.

Our results suggest that clinical teachers should interact with their students in a more 'human centred' teaching style, as these actions predict motivational internalization. Findings illustrate that research on academic motivation has been focused in general higher education, psychology education and to a lesser extent in medical, dental, and nursing education. Self-determination theory represents one of the most referred theories in psychology, however, its application in health professions education is not so common [9]. Further research applying self-determination theory principles should be undertaken in health professions education, and especially in clinical teaching settings that represents a very important venue for students' development. As motivation represents a universal truth, cultural differences may also influence the implementation of an autonomy supportive teaching style. Although one study established cultural comparison between students from Germany and United States [10], future research in academic motivation should take into account this differences between students in order to generalize findings in other cultures.

Most of the studies were based on quantitative methods, and relying only on students' point of view. Only few studies used mixed or qualitative methods and none of them focused on teachers' perceptions. There is no denying of the valuable data emerged from quantitative studies, but the richness and depth of qualitative and mixed methods constituted the core of the extracted data. For further understanding of teachers' practices, qualitative and mixed methods should be considered, and students' perceptions should be combined with tutors' opinions. Teachers are in charge of supporting students' motivation; therefore, knowing their opinions and apprehensions would add rich information to the data provided by the students. The majority of the studies relied on one method for data collection, primarily questionnaire-based instruments. Future research should consider combining multiple sources of data, therefore increasing data triangulation and credibility of results. On the other hand, two studies were based on six and seven questionnaire-based instruments to collect information and, as it would be expected, response rates were lower than studies that used fewer instruments. Students fatigue to respond and time value should be taken into account.

Intrinsic motivation and autonomous forms of self-regulation are the desired type of motivation in students, as they have been associated with deep learning, better performance and well-being, in comparison with extrinsic motivation and controlled forms of self-regulation (i.e. under external control) [5,6,9]. Teacher behaviours and teaching styles can influence students motivation [8,19], either in classroom or in clinical environments. Students' own curiosity and interests are potent tools by which teachers can promote their desire to learn. In contrast, teachers that rely on external factors (e.g. rewards), risk students internal learning aspirations, compromising the quality of the process [8]. An autonomy-supportive teaching style is characterised by providing options and opportunities for self-directed decisions minimising external pressures [6,23].

The reviewed articles considered the autonomy supportive teaching style to be important for learning, as it aids students' self-motivation and relatedness with significant others [1]. Therefore, many successes and failures in clinical education could be understood through self-determination theory. In

addition, intrinsic or extrinsic motivation are not permanent characteristics, thus, stressing the point about paying attention to the influences of learning environments [6].

Finally, a number of important limitations need to be considered. First, several sources of bibliographic data were used to identify eligible articles. Though important material was found, it was limited to the sources included and important papers could have been ignored. Second, journals searched were predominantly from the United Kingdom and USA, and in English. Even though Spanish articles were included in database search, language and demographic criteria was also counted as limitations. Lastly, most of the reviewed articles were design as cross-sectional studies. Prospective research is needed to examine if the satisfaction of the three psychological needs in fact predicts changes in the internalization of behaviour and the fostering of intrinsic motivation towards academic activities.

It is not difficult to engage in an autonomy-supportive teaching style, it can be learned through practice and self-reflection. By providing an educational environment based on the self-determination theory principles, clinical tutors may be successful in their teaching. Therefore it is important that future research considers what educators and clinical tutors are actually doing to enhance student's motivation and how they can incorporate new teaching and learning strategies.

ORCID: Cesar Orsini: http://orcid.org/0000-0002-5226-3625; Phillip Evans: http://orcid.org/0000-0003-0858-8788; Oscar Jerez: http://orcid.org/0000-0003-0869-5938

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

SUPPLEMENTARY MATERIAL

Audio recording of abstract.

REFERENCES

1. Bengtsson M, Ohlsson B. The nursing and medical students motivation to attain knowledge. Nurse Educ Today. 2010;30:150-156. http://dx.doi.org/10.1016/j.nedt.2009.07.005
2. Kusurkar R, Croiset G, Ten Cate T. Twelve tips to stimulate intrinsic motivation in students through autonomy-supportive classroom teaching derived from self-determination theory. Med Teach. 2011;33:978-982. http://dx.doi.org/10.3109/0142159X.2011.599896
3. Davies B, Leung A, Dunne S. So how do you see our teaching?

Some observations received from past and present students at the Maurice Wohl Dental Centre. Eur J Dent Educ. 2012;16:138-143. http://dx.doi.org/10.1111/j.1600-0579.2012.00733.x
4. Jahangiri L, McAndrew M, Muzaffar A, Mucciolo TW. Characteristics of effective clinical teachers identified by dental students: a qualitative study. Eur J Dent Educ. 2013;17:10-18. http://dx.doi.org/10.1111/eje.12012
5. Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. Am Psychol. 2000;55:68-78.
6. Ryan RM, Deci EL. Intrinsic and extrinsic motivations: classic definitions and new directions. Contemp Educ Psychol. 2000; 25:54-67.
7. Vansteenkiste M, Lens W, Deci EL. Intrinsic versus extrinsic goal contents in self-determination theory: another look at the quality of academic motivation. Educ Psychol. 2006;41:19-31.
8. Niemiec CP, Ryan RM. Autonomy, competence, and relatedness in the classroom: Applying self-determination theory to educational practice. Theory Res Educ. 2009;7:133-144. http://dx.doi.org/10.1177/1477878509104318
9. Ten Cate TJ, Kusurkar RA, Williams GC. How self-determination theory can assist our understanding of the teaching and learning processes in medical education. AMEE guide No. 59. Med Teach. 2011;33:961-973. http://dx.doi.org/10.3109/0142159X.2011.595435.
10. Levesque C, Zuehlke AN, Stanek LR, Ryan RM. Autonomy and competence in German and American university students: a comparative study based on self-determination theory. J Educ Psychol. 2004;96:68-84.
11. Williams GC, Saizow RB, Ryan RM. The importance of self-determination theory for medical education. Acad Med. 1999;74: 992-995.
12. Singh J. Critical appraisal skills programme. J Pharmacol Pharmacother. 2013;4:76-77. http://dx.doi.org/10.4103/0976-500X.107697
13. Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gøtzsche PC, Ioannidis JP, Clarke M, Devereaux PJ, Kleijnen J, Moher D. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. PLoS Medicine. 2009. http://dx.doi.org/10.1371/journal.pmed.1000100
14. Benson TA, Cohen AL, Buskist W. Rapport: its relation to student attitudes and behaviors toward teachers and classes. Teach Psychol. 2005;32:237-239.
15. Boggiano AK, Flink C, Shields A, Seelbach A, Barrett M. Use of techniques promoting students' self-determination: effects on students' analytic problem-solving skills. Motiv Emot. 1993;17:319-336. http://dx.doi.org/10.1007/BF00992323
16. Sheldon KM, Bettencourt BA. Psychological need-satisfaction and subjective well-being within social groups. Br J Soc Psychol.

2002;41:25-38.

17. Kaufman A, Dodge T. Student perceptions and motivation in the classroom: Exploring relatedness and value. Soc Psychol Educ An Int J. 2009;12:101-112. http://dx.doi.org/10.1007/s11218-008-9070-2

18. Hodgins HS, Koestner R, Duncan N. On the compatibility of autonomy and relatedness. Personal Soc Psychol Bull. 1996;22:227-237. http://dx.doi.org/10.1177/0146167296223001

19. Brewer EW, Burgess DN. Professor's role in motivating students to attend class. J Ind Teach Educ. 2005;42:23-47.

20. Black AE, Deci EL. The effects of instructors' autonomy support and students' autonomous motivation on learning organic chemistry: A self-determination theory perspective. Sci Educ. 2000;84:740-756. http://dx.doi.org/10.1002/1098-237X(200011)84:6<740::AID-SCE4>3.0.CO;2-3

21. Beachboard MR, Beachboard JC, Li W, Adkison SR. Cohorts and relatedness: Self-determination theory as an explanation of how learning communities affect educational outcomes. Res High Educ. 2011;52:853-874. http://dx.doi.org/10.1007/s11162-011-9221-8

22. Ciani KD, Sheldon KM, Hilpert JC, Easter MA. Antecedents and trajectories of achievement goals: a self-determination theory perspective. Br J Educ Psychol. 2011;81:223-243. http://dx.doi.org/10.1348/000709910X517399

23. Deci EL, Ryan RM. The "What" and "Why" of goal pursuits: human needs and the self-determination of behavior. Psychol Inq. 2000;11:227-268. http://dx.doi.org/10.1207/S15327965PLI1104_01