REVIEW

Peer assisted learning: a meta-ethnographic synthesis of qualitative studies and recommendations for cardiovascular training, practice, and research

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ABSTRACT

INTRODUCTION: Peer assisted learning (PAL) is a common method to complement more traditional teaching. Several systematic reviews and meta-analyses described the most used ways of implementation and showed that it is effective in fostering learning. A synthesis of qualitative data is missing, to highlight the perceived value by the students and to drive a successful implementation.
EVIDENCE ACQUISITION: The search was performed in Pubmed, Scopus and ERIC databases, with a combination of the search strings. The quality of the retrieved articles was assessed through the Critical Appraisal Skills Checklist. The analysis was performed according to the meta-ethnographic method. Fifteen articles were considered for the analysis, saturation was reached after 12 articles.
EVIDENCE SYNTHESIS: Three main themes emerged from the analysis: PAL is effective when implemented in a safe environment, PAL is a driver of development of students' abilities and identity, and the "dark side" of PAL. Nine sub-themes emerged as components of the themes. The final line of argument highlighted the ambivalence of PAL, as an expression of the ambivalence of the still developing professional identity of students
CONCLUSIONS: This meta-ethnographic synthesis summarizes the elements of success and the threats of PAL, a method that is particularly suitable for the cardiovascular domain. It must be implemented according to some precautions, such as organization and protected time, tutor selection, training and support, a clear integration and endorsement in the framework of the medical curriculum.

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KEY WORDS: Peer group; Learning; Qualitative research; Social identification.

Introduction

Reconciling educational needs with the fast pace of clinical activities and the limited number of available clinical tutors is a very frequent problem of training in the clinical settings. Tutoring as a role and - more in general - the features of an effective learning environment and experience has been largely debated, both for undergraduate students and in residency programs.[1]

The teaching skill of clinical tutors, their educational relation with the learners and the influence of the clinical environment are considered fundamental elements. Nevertheless, the unbalance between the large number of medical students and the low number of clinical faculty members available for tutoring often threatens an effective relationship. To the same extent, the burden of the daily clinical activities often prevents graduate students in the residency programs from deepening their knowledge and reflecting on their actions and decisions.

A possible help to face these problems is the adoption of peer-assisted learning (PAL). PAL has been defined as "People from similar social groupings who are not professional teachers helping each other to learn and learning themselves by teaching."[2] PAL has different formats, including the near-peer assisted learning, in which two groups of students from different years, or undergraduate students and residents, are coupled.[3] There are two roles: the tutor, acting "as a teacher" and the tutee, acting "as a student." PAL activities can rely on formal teaching as an integration to the official courses, management of small group activity, especially when addressed to discuss clinical cases as in case-based learning, shadowing of one or more junior students with a senior student or a resident in the clinical environment.

There is a rather large amount of evidence on the effectiveness of PAL, that is at least as effective as the traditional teaching, both in developing knowledge and practical skills, especially in the clinical stages of training.[4, 5] Some systematic reviews also described in detail the structure of PAL and its different possible activities.[1, 6, 7] Most of research focused a quantitative analysis of the effectiveness of PAL, even in the domain of cardiovascular disciplines. For example, Nourkami-Tutdibi et al.[8] showed the effectiveness of a peer-led course in echocardiography during the CoViD-19 pandemic, Kronschnabl et al.[9] assessed the effectiveness of PAL for cardiovascular physical examination training in third-year medical students.

On the contrary, less attention has been devoted to the qualitative aspects of this teaching and learning approach, especially in the medical domain. Carey et al.[10] used meta-ethnography to synthesize qualitative research in PAL nursing education. Their synthesis resulted in 4 themes: connecting with peers, enabling peers through collaboration, organizational aspects, and learning as a product of PAL. Wareing et al.[11] did an interpretivist exploration of the experience of mental health nursing students of a team mentoring model called Coaching and peer-assisted learning. Both the articles reported the main characteristics of PAL, offering a theoretical framework for a more effective educational design of learning activities based on PAL.

Data from qualitative research are important to understand the theoretical tenets of PAL, its internal dynamics, the nature of learning, the perception of the users both as tutors and as tutees. All these aspects are necessary to make the best possible use of PAL and adapt this approach to different educational and cultural settings, but a synthesis of qualitative studies is missing.

This article synthesizes data from the available qualitative studies on PAL, providing an interpretation of the data and a global meaning for the revised articles. From the point of view of tutors and tutees, the research questions are:

• what are the perceived positive aspects of PAL?

• what are the perceived negative aspects of PAL?

• which elements of the context influence the positive or negative perception?

The goal was to propose to the medical schools and residency programs some hints for a successful local adaptation of the PAL approach, both at an international level and with a special regard for the Italian context. The synthesis was done according to the meta-ethnographic method.

Evidence acquisition

Meta-ethnography was originally introduced by Noblit[12] as a method to synthesize ethnographic studies, a type of qualitative research frequently used by social scientists, in which the researcher lives for some months in a community (an *ethnos*) to record behaviors and systems of thought. The method has been standardized and successfully adapted to synthesize other types of qualita-

tive studies.[13, 14] In order to produce a trustworthy synthesis of data, diverse in nature and meaning, the core concept in meta-ethnography is the "translation" of the metaphors and concepts of the different studies. Noblit[12] used the term translation to mean the comparison between a concept in a study and a possibly related concept in another, as if it was the process of transforming a term in a language into a term in another language. The synthesis of the translations can be reciprocal (the concepts apparently related are similar in their focus) or refutational (the two studies refute each other, because the same concept has a different value and meaning). This analysis is stepped and iterative, moving from the first comparison of two articles, their reciprocal or refutational synthesis, and moving to the comparison with further articles, until saturation is reached. Saturation means that no new concepts are present in any further examined article. Therefore, meta-ethnography does not mandatorily require a systematic bibliographic search and can be performed on a more limited number of articles than a traditional systematic review.[15]

The phases of this meta-ethnographic synthesis were: 1) defining the focus of the synthesis: the synthesis was focused on the relational, environmental, and organizational elements that influenced the perception of the experience of PAL of tutors and tutees. Both the undergraduate and graduate level of education were considered; 2) search strategy and inclusion/exclusion criteria: the search was performed in Pubmed, Scopus, and ERIC database, with a combination of the search strings "peer-assisted," "PAL," "near-peer-assisted," "medical education/undergraduate," "medical education/graduate" and "qualitative research." The inclusion criteria were any type of qualitative research, including mixed method studies, any type of PAL limited to its use in clinical teaching or in clinical environments, both for undergraduate and graduate medical students. Articles only reporting the implementation of PAL or omitting information on the type of qualitative research and a synthesis of the qualitative data gathered were excluded, as well as articles dealing with non-medical students or in which PAL was only used as an integration of formal teaching in the classroom

for preclinical subjects as anatomy; 3) quality appraisal: the quality of the retrieved articles was assessed through the Critical Appraisal Skills Checklist (CASP).[16] This appraisal tool considers three domains for qualitative research: validity (6 items exploring aims and method), results (3 items on ethics, analysis, and clarity), and value (1 item). Each item is graded as "Yes," "Can't tell" or "No" We considered the articles with a number of "Yes" answer ≥5. Table I reports the score of each selected article;[17-31] 4) data extraction: the articles were carefully read twice and the raw data - the sentences of the articles that expressed an idea relevant for the objective of the study - were marked; 5) correlation of concepts: for every article a list of sentences or metaphors was produced. The resulting lists were juxtaposed to look for common concepts. A concept is defined as "a meaningful idea that develops by comparing particular instances. Fundamentally, concepts must explain, not just describe the data."[32] In a meta-ethnography the raw data are called "first order constructs," the concepts resulting from the comparison between the lists of first order concepts are called "second order constructs;" 6) translation of studies: the second order constructs were examined across all the articles, sorted in chronological order. This ordering gave the opportunity to observe possible evolutions in the representation of a concept and made it easier to note the rise of a new concept. The analogies and differences among the studies were noted and expressed as reciprocal or refutational translations; 7) synthesis of the translations: starting from the second order constructs and from the judgment of reciprocal or refutational translation, a limited list of third order interpretations (also called themes) was developed, as a way to express the whole as more than the sum of the parts; 8) a lines of argument synthesis: finally, the synthesis of the third order interpretations was expressed in graphic form as a chart.

The authors performed this process in a cooperative way. FC designed the study, and supervised the process with LG, discussing and solving the controversies. The other authors searched the bibliographic databases, screened the articles, and identified the first and second order con-

Table I.—*List of the analyzed articles, with their main characteristics.*

Authors	CASP V: validity R: results Va: value	Subjects	Number	Data collection	Theory
Alzaabi[17]	V: 4 R: 2 Va: 1	Medical students	36 tutees	Ethnographic observation	Social learning self-regulated learning theory
Bennett 2015[18]	V: 6 R: 3 Va: 1	Medical students	115 tutees	Written feedback Focus groups	Activity theory Communities of practice
Bugaj 2019[19]	V: 6 R: 3 Va: 1	Tutor medical students	10 tutors	Semi-structured interview	Social learning theory
Burgess[20]	V: 5 R: 3 Va: 1	Medical students	23 tutors	Focus groups	Self-determination theory
Khalid[21]	V: 3 R: 2 Va: 1	Medical students	52 tutees; 13 tutors	Open ended questions	No
Martinez[22]	V: 3 R: 2 Va: 1	Internal medicine residents	88 dyads senior residents and interns	Focus groups	No
Menezes[23]	V: 4 R: 3 Va: 1	Medical students	66 tutees; 42 tutors	Open ended questions	Community of Practice
Nishikura[24]	V: 5 R: 2 Va: 1	Tutor residents and medical students	10 tutees; 3 tutors	Semi-structured interview	No
Nomura[25]	V: 4 R: 3 Va: 1	Medical students	116 tutees; 6 tutors	Focus groups	No
Rotzoll[26]	V: 3 R: 2 Va: 1	Incoming Erasmus students	20 tutees	Open ended questions	No
Sahoo[27]	V: 4 R: 2 Va: 1	Medical students	98 tutees; 6 tutors	Open ended questions; focus groups	No
Tai[28]	V: 5 R: 3 Va: 1	Medical students	6 tutees	Handwritten field notes; audio recording of conversation; focus groups	Ethnography
Tamachi[29]	V: 6 R: 2 Va: 1	Medical students	3 tutors; 5 tutors	Semi-structured interview	Interpretative phenomenology
Thampy[30]	V: 4 R: 2 Va: 1	Foundation doctors	64 Foundation doctors	Open-ended questions	Social constructivism
Tsuei[31]	V: 6 R: c Va: 1	Medical students	8 tutees	Semi-structured interview	Social ecological theory

structs. All the authors discussed and approved the translation and the line of arguments.

The article is compliant with the ENTREQ statement for the reporting of synthesis of qualitative research.[15]

Evidence synthesis

Fifteen articles were considered for the analysis, all of them published after year 2000; saturation was reached after 12 articles. Figure 1 shows the

Analysis	Intervention	Outcome of the study	Conclusions
Thematic analysis	Two hours one day for 15 weeks in the Foundation of Clinical Medicine	Perception of students and faculty of PAL	PAL empowers students to a more responsible approach toward their education. It needs to be preceded by supervised faculty-taught sessions
Thematic analysis	Weekly reciprocal PAL session in the clinical setting for case-based discussion	Two competing activity systems: learning from experts/peers	Contextual factors impacting; opportunities for expansive learning
Thematic analysis	Longitudinal interdisciplinary skill lab team	Students' motivations to become tutor	An insight into motivations, as an input for a better training of student tutors
Thematic analysis	Training as teacher	Students' motivation determinants	Understanding of students' motivation to participate in leadership roles
Thematic analysis	Small group session for clinical skills	Tutees satisfaction, confidence and preferences	Tutees prefer being taught by peers, with the tutors also benefitting
Thematic analysis	Two sessions, four times in 2 months on MSK skills	Feedback and acceptability	PAL enhances both learners' and teachers' MSK-related confidence and knowledge
Thematic analysis	Tutorials on relevant clinical contents	Tutees' experience, insight and perspectives	Motivating and resourceful environment for tutees; commitment to continued participation
Thematic analysis	Family and rural medicine (2 weeks)	Impact on learning and perceived difficulties	Participants prejudiced against PAL, but established a comfortable relationship with tutors. A greater participation of senior doctors could strengthen the learning effect
Grounded theory	Small group role play session on clinical skills	Perceived educational benefits	PAL is as effective as faculty led training for teaching communication skill; It enhances reflection of both tutees and tutors
Thematic analysis	Small group sessions	Perception of the experience	PAL facilitated the integration of Erasmus students into their foreign curriculum
Thematic analysis	Small group session on clinical problems in ophthalmology	Perceived benefits; concerns/issues	Trainers had more benefit than learners; Factors influencing the success of PAL
thematic Analysis	Bedside encounters, tutorials, common room discussions	Features of success of PAL	PAL is a learning strategy; the capacity to engage evolve over time; increased social comfort and trust, exposure to feedback, understanding of the standards
Interpr. phenom. analysis	Interactive seminars led by near-peer students	Living experience of relationship within PAL sessions	Multiple factors create an environment in contrast to teaching led by more senior, clinical tutors
Thematic analysis	30 minutes of time-protected PAL teaching weekly	Feedback and acceptability	PAL was well received and positively impacted on their clinical work. PAL tutor demonstrated "cognitive congruence"
Thematic analysis	15-20 h workshop, 10-20 h of consult scenarios. Residents as tutors	Construct of psychological safety (PS)	A sense of PS appears to free learners and enables them to be present and engaging with the learning task: educational safety

flow of selection, Table I lists the articles with their main characteristics. Twelve studies were on undergraduate students, only 3 considered graduate students either as tutors or as tutees.

Table II lists the second order constructs for every selected article, Table III shows an example of the process of translation for one of the emerged third order concepts.[17-31] Almost all the translations were reciprocal, and we had only three articles with refutational translation.
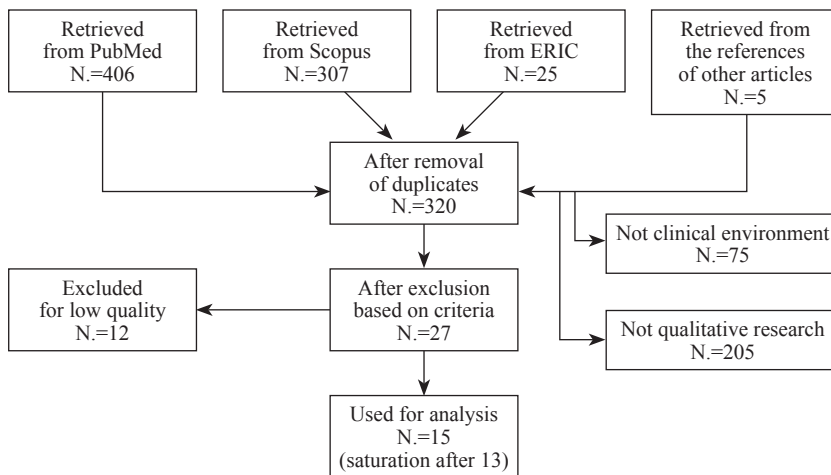
Figure 1.—The PRISMA conformant graph of the process of selection.

TABLE II.—*List of the second order constructs for every selected article.*

Authors	Second order constructs
Alzaabi[17]	Absence of threats; assessment issues; fostering identity; lack of self-regulation
Bennett, 2015[18]	Assessment issues; contextual factors; engagement; lack of self-regulation; mechanisms of learning; sense of threat
Bugaj, 2019[19]	Absence of threats; fostering identity; fostering competence; fostering motivation; fostering reflection; opportunity; self-confidence
Burgess[20]	Engagement; fostering competence; mechanisms of learning; opportunity; self-confidence
Khalid[21]	Absence of threats; mechanisms of learning; opportunity; sense of threat
Martinez[22]	Fostering identity; mechanism of learning; self-confidence; time
Menezes[23]	Absence of threats; assessment issues; mechanisms of learning; positive view of tutoring; sense of community; time
Nishikura[24]	Lack of self-regulation; mechanisms of learning; sense of community; sense of threat
Nomura[25]	Absence of threats; fostering competence; mechanisms of learning; self-confidence; sense of threat
Rotzoll[26]	Fostering competence; sense of community
Sahoo[27]	Contextual factor; fostering identity; lack of self-regulation; mechanisms of learning; positive view of tutoring; self-confidence
Tai[28]	Contextual factor; lack of self-regulation; mechanisms of learning; sense of community
Tamachi[29]	Absence of threats; fostering identity; fostering reflection; self-confidence; sense of community
Thampy[30]	Absence of threats; assessment issues; fostering competence; lack of self-regulation; mechanisms of learning; sense of threat; time

Figure 2 shows an example of the flow from the concepts to the 3rd order interpretations (themes).

Themes and subthemes

Three main themes emerged from the analysis: PAL is effective when implemented in a safe environment, PAL is a driver of development of students' abilities and identity, and the dark side of PAL. Nine sub-themes emerged as components of the themes. The quotes in the following sections are examples of first order constructs.

PAL is effective when implemented in a safe environment

This theme gathers all the elements that make PAL perceived as a positive and effective experience by the students both acting as tutees and tutors. It has been divided into two themes.

AN EGALITARIAN ENVIRONMENT

One of the greatest value tutees assigned to the experience of PAL was the sense of egalitarianism, produced by the nearness between them and the tutors: "Egalitarianism was prominent in students' experience; they felt legitimacy in their role as session participants, which led to feeling free to participate more fully in sessions. They also reported 'closeness' between tutors and students that appeared to flatten the hierarchy implicit in tutor's social position as more senior medical students."[29] The tutors also experienced a "relaxed atmosphere of learning… [and] found

TABLE III.—*An example of the translation of concepts among the articles for the theme "A driver of development of students' abilities and identity."*

Reference	Sub-theme: a driver of development of professional identity	Sub-theme: a driver of clinically oriented learning	Sub-theme: a driver of development of self-regulation
Alzaabi[17]	High level of cohesion and teamwork among the students while undergoing the intervention		
Bennett, 2015[18]	The desired outcome of the Learning with Peer activity emphasized mutual engagement and teamwork		
Bugaj, 2019[19]	The tutors found it particularly rewarding to be able to work closely together with students. Self-confidence and professionalism are needed for teaching peers in a skill lab.		
Burgess[20]	Facilitation allowed students to meet and engage their junior peers in a formal capacity		Students enjoyed the autonomy of having their small group to facilitate.
Khalid[21]	Being a peer tutor has made them consider pursuing teaching in the future	Preclinical students believe peer tutoring is the most effective method for clinical skills teaching	
Martinez[22]		PAL model can enhance both learners' and teachers' MSK-related confidence and knowledge	
Menezes[23]	The desire for a community was noted to be a motivating factor for tutees participating in the program	To gain valuable knowledge from the students in higher year levels… due to the supplementary nature of peer-assisted learning elucidating the established content rather than adding to it. The content covered was more clinically useful, rather than assessment driven.	
Nishikura[24]			The participants [as tutors] recognized that teaching is learning
Nomura[25]			I developed confidence through the experience of teaching junior students. During this teaching experience I reflected on what my attitude was like when I was being taught and the fact that I need to be more active in studying
Rotzoll[26]	I could interact with German students		
Sahoo[27]		The major perceived benefit is increased understanding of subject matters	
Tai[28]	Students also prized their bedside tutorials as places to learn how to be a doctor		Learning through active watching and listening: the value of vicarious learning
Tamachi[29]	The sense of camaraderie led students to experience the formation of deeper, more lasting relationships. Central to the relationship was the "shared journey" of medical school between students and tutors		Tutors also acted as mentors and enabled access to an insider's perspective how to be a clinical medical student.
Thampy[30]		Many commented on the benefits of sharing clinical experiences. Case-based discussions is where I learn from the best	
Tsuei[31]			The sense of psychological safety through interpersonal connections arose because they felt understood and cared for as a person. They described increased awareness of how they were performing relative to the expectations

Each column lists the first order constructs (*i.e.*, the quotes as raw data) which has been translated as reciprocal. Not necessarily all the analyzed articles contained all the concepts that correspond to the themes and sub-themes.
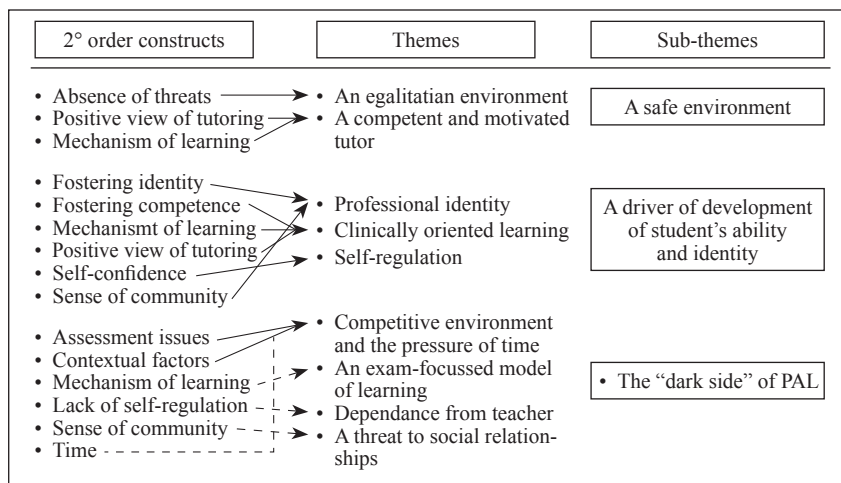
Figure 2.—The flow of synthesis, from the second order constructs to themes. The dotted lines represent the refutational translations.

that students that were taught by their peers — rather than by more experienced teaching staff — were generally less anxious and felt fewer inhibitions in asking questions, talking about difficulties, and making mistakes."[19]

THE IMPORTANCE OF COMPETENT AND MOTIVATED TUTORS

The role of tutors was very relevant in creating a safe environment of learning. In almost all the reported studies, students and residents acting as tutors had a training for their role. Nevertheless, the tutees appreciated not only tutors' teaching skill but also their motivation: "Peer learners articulated that PAL will be beneficial only when a tutor is dedicated and has a good ability to teach."[27] Tutors as well showed the awareness "of the importance of empathizing with their students to gain a better understanding of their situation and needs."[19]

A driver of development of students' abilities and identity

This theme gathers all the concepts dealing with what the students think they can achieve through PAL. It has been divided into three sub-themes.

A DRIVER OF DEVELOPMENT OF PROFESSIONAL IDENTITY

The construct of professional identity is a still debated and complex construct. In the frame of the general concept of identity, intended as an internalized set of role expectations, professional identity formation is the process of developing the sense of feeling like a physician. A proposed theoretical model maintains that socialization is the core of process of identity development[33] and that professional identity relies both on the sense of belonging to a community and on personal features.

In the analyzed articles, this topic often emerged, since PAL gave to the students the opportunity to challenge themselves in a protected environment: "Students also prized their bedside tutorials as places to learn how to be a doctor."[28] PAL allowed also to experience teamwork, that is a fundamental component of professionalism: "The desired outcome of the Learning with Peer activity emphasized mutual engagement and teamwork."[18]

Finally, PAL was a privileged opportunity for tutors to consider a possible academic career: "Being a peer tutor has made them consider pursuing teaching in the future."[21]

A DRIVER OF CLINICALLY ORIENTED LEARNING

The importance of PAL to foster clinically oriented learning was an agreed opinion: "Preclinical students believe peer tutoring is the most effective method for clinical skills teaching."[21] Tutees also felt that tutorials led by peers increased their knowledge: "To gain valuable knowledge from the students in higher year levels… due to the supplementary nature of peer-assisted learning elucidating the established content rather than adding to it."[23] This perception was probably due to the sense of proximity: "Teaching was delivered at an appropriate level … the informal and relaxed atmosphere allowed them to ask

questions … many commented on the benefit of sharing clinical experiences … trainees' preference for case-based discussion were seen across multiple comments."[30]

A DRIVER OF DEVELOPMENT OF SELF-REGULATION

The ability to be self-regulated learners is intended as being behaviorally, meta-cognitively and motivationally proactive in the learning process.[34] This ability is a core competence not only for a successful medical student, but also for a professional, as a driver for the lifelong learning process. A fundamental component of self-regulation is reflection upon own learning process.

The analyzed articles showed many instances of PAL as a driver of self-regulation. In their study on psychological safety, Tsuei et al.[31] (2019) noted that "the students described that they were better able to focus on the present task at hand and more fully explore the learning opportunity when they were feeling a sense of psychological safety." This quote also recalls the fact that a safe learning environment increases self-awareness.

The tutors also benefited of PAL in developing their awareness: "During this teaching experience I reflected on what my attitude was like when I was being taught and the fact that I need to be more active in studying."[25]

The dark side of PAL

This theme gathers all the emerging impeding elements and their consequences, that prevent PAL to be effective and enjoyable by the students. This theme is mainly based on the three articles that were synthesized as more or less refutational translations.[17, 18, 30] Examples of refutational translation were noted also in other articles. The theme has been divided into four sub-themes.

THE THREATS OF A COMPETITIVE ENVIRONMENT AND THE PRESSURE OF TIME

As a counterpart of theme 1, students noted that when the environment is too much competitive, one can be not comfortable in "demonstrating ignorance or a suboptimal performance" in front of their pals.[31] The other side of this same sub-theme is that "some tutees were not keen to criticize peers."[30]

Another concern was about the pressure of time. Students "experienced difficulty in finding time slots that were free both for tutors and for tutees. A regular timetable, with the same time slot, could resolve these difficulties. A system such as this is consistent with the concept of 'protected teaching time'."[23]

AN EXAM-FOCUSED MODEL OF LEARNING

A rather common finding was that students are often focused on a model of learning addressed to pass the exams, rather than to gain knowledge and competence. In their activity system analysis, Bennet et al.[18] identified two competing activity systems, called "Learning from Experts" and "Learning from Peers." While the desired outcome of this last system was mutual engagement, teamwork and collaborative learning, the outcome of the former system was the acquisition of knowledge to pass the exams. This tension was also noted by Alzaabi et al.:[17] "A general lack of enthusiasm was observed among students during their peer learning sessions. A possible explanation could be that this team activity was considered part of their formative assessment rather than summative assessment."

AN INCREASED DEPENDENCE FROM THE TEACHERS' SUPERVISION

The refutation of sub-theme 2.3 on self-regulation comes from the studies of Bennet[18] and Thampy.[30] Bennet found that "In the Learning from experts' activity system, students felt comfortable with their role as novice/learner. Roles of peer teacher, student, and evaluator of the PAL process, were rejected by many, as illustrated by variable engagement with PAL and desire for faculty supervision." The need for supervision was expressed also in this way: "Participants indicated that they believed that having presentations reviewed by a senior doctor prior to teaching provided quality assurance."[30]

A PERCEPTION OF THREAT TO THE SOCIAL RELATIONSHIPS WITH PEERS

A last perceived threat was connected to the reluctancy to judge and criticize peers: "You don't want to burn bridges early by giving some really bad feedback."[18]

Line of argument

When interpreting and discussing the emerged themes and sub-themes, to synthesize them into a line of argument, the dimension of professional identity formation (PIF) emerged as a common background to all the findings of this review. Figure 3 shows how this concept is linked to the themes and subthemes and how they easily fit in the current theoretical background on professional identity.

We think that the ambiguities in the attitude toward PAL that our meta-ethnography shows reflect the ambiguity of the construct of a developing professional identity. In a hermeneutic study on elements and determinants of professional identity, Consorti[35] argued that the construct of identity has two facets: individual professional identity and social professional identity, which are in a mutual relationship. Every adjustment to one's strength has an opposing impact on the other. The relationship is paradoxical because if something decreases a person's sense of belonging as a part of the whole, it will increase their sense of self-confidence and individual identity, and vice-versa. As a result, every new experience has the potential to both strengthen and weaken their sense of identity.

When students experience PAL, they both act on their personal characteristics, as self-regu-lation, and on the societal ones, as the sense of belonging to a community. At the same time, also the expectations from their private social environment (family, friends) are acting, pushing them to prioritize their curricular success. The same ambivalence was also noted by Noerholk et al.,[36] in arguing if PAL should develop a structural individualism or collaborative mindsets.

Discussion and recommendations for cardiovascular training, practice, and research

This meta-ethnographic synthesis summarizes some of the elements of success and the threats of PAL, as they were derived from a meta-synthesis of qualitative studies. Its main added value is to frame the interpretation of PAL in the overall process of professional identity formation of medical students.

PAL is likely to be already present and proved to be effective in many medical curricula and residency programs, as demonstrated by meta-analyses and systematic reviews. In a meta-analysis of 21 randomized trials, Brierly et al.[4] found a significant improvement in academic performance of students who had PAL compared to the control group. Nevertheless, the authors correctly declare the usual limitations of quantitative research in medical education: publication
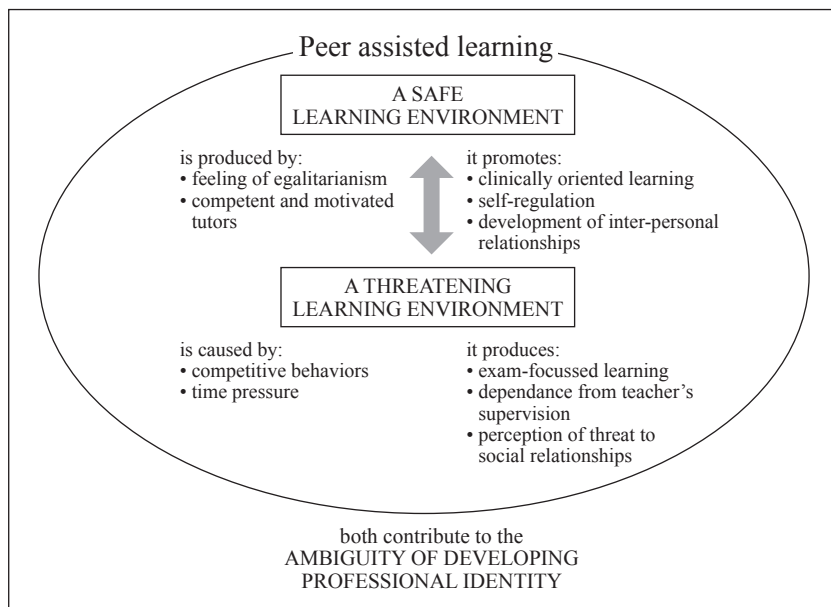

Figure 3.—A graphic representation of the overall model resulting from the final line of argument synthesis, with the two opposite sides of the perception of PAL, both as safe and threatening, and their relationship with the construct of professional identity.

bias, as showed by the funnel plot, high heterogeneity, impossibility to have blindness, and self-selection of participants. Another meta-analysis on 13 comparative studies[5] showed a favorable outcome for PAL, but also these authors declare the high heterogeneity of the studies. Nevertheless, their conclusion is that "the meta-analysis is sufficiently robust to suggest that peer assisted learning is an effective tool for targeted use in the medical curriculum in clinical skill learning."[5] One main source of heterogeneity in quantitative research in medical education is the different cognitive level of outcomes, spanning from the simple "remembering" or "describing" (a bodily structure or function, the indication and dosage of a drug ...), to "interpreting" (the result of a blood gas analysis, a chest x-rays) and over, to "deciding" (doing a diagnosis, choosing a treatment). Moreover, each of these classes of outcomes can be measured in different ways. This is why the integration of quantitative and qualitative research is mandatory in medical education. Qualitative research provides explicit theoretical frameworks and quantitative research can develop meaningful and coherent indicators to measure the outcomes, and hence validate the prediction of a theory.[37]

The findings of this meta-synthesis are coherent with what already knows in the field of PAL. A narrative review[6] identified the same benefits for students as we found (self-confidence, reflective and clinical skills) but also clinical educators can benefit, with enjoyment, the development of teaching skills, and PAL as a source of additional information on students. Burgess *et al.*[7] highlighted the importance of offering structured formative programs for peer tutors and peer teachers. All these elements are relevant because they contribute to produce a safe and not threatening learning environment, as our findings show.

It is very important that to profit of its positive outcomes PAL is implemented according to some precautions. Two main points are the students' willingness to participate and a clear endorsement of the activity from the medical school.[3, 38] A similar suggestion comes from Hofer *et al.*[39] who listed 10 tips for a successful implementation of PAL: the importance of recruitment and qualification of peer tutors and the "fun factor," to create a pleasant learning environment.

PAL can find a wide use in the cardiovascular domain, both at the undergraduate and graduate level. Cardiovascular skills are often the object of stations in an Objective Structured Clinical Examination (OSCE). Blood pressure measurement, the most common severe findings in a ECG track, physical exam of heart and chest or peripheral pulses, lab test interpretation are typical examples of tasks that can be taught and assessed by peers.[40] A structured near-peer mentor-mentee program proved to be very effective in the training of minimally invasive mitral valve surgery at the graduate level.[41] This experience suggests how effective could be formally structuring a residency program in vertical teams of residents, from the first to the last year, not only for the transfer of competencies but also for feedback and peer assessment.[42, 43] At Columbia University Medical Centre, in 2016 the Fellow "House" Peer Mentorship Program started, that matched senior (third-year) and junior (first- and second-year) fellows into a "house" that included 3 fellows — 1 from each class — and 1 faculty member.[44] The program proved to be successful in increasing the perceived satisfaction of 1st year residents to 100% of "fully satisfied."

Conclusions

If we refer to the Italian context, this message is particularly important, because of the rapidly evolving landscape of Italian medical education,[45] and the expected reform of the residency program, for which a relevant methodological support is already available.[46] More awareness of the educational value of PAL is needed, in order not to consider it just a way to decrease the workload of faculty, but a deliberate educational choice to increase students' and residents' final competence. Moreover, research in the educational domain should be expanded and used in the design of undergraduate and residency programs, and as an element to be considered also in career progression. This article proposes a draft theory (Figure 3) on "elements of success and failure of PAL." Based on it, new both qualitative and quantitative research can be designed, to validate the theory, expand or modify it (Supplementary Digital Material 1: Supplementary Text File 1).

Key messages

- Peer assisted learning (PAL) is perceived by learners as a valid method to support traditional teaching, also in the clinical context.
- PAL creates a learning environment that is perceived as "safe" by the students, although it has an ambivalent aspect and a "dark side."
- PAL fosters the development of professional identity, opening the students' perspective also to consider a possible academic position.
- PAL has proved to be effective and fit in the cardiovascular domain as well, and implementation of and research on it should be expanded. This article proposes a draft theory on "elements of success and failure of PAL." Based on it, new both qualitative and quantitative research can be designed, to validate the theory, expand or modify it.

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SUPPLEMENTARY DIGITAL MATERIAL 1

A glossary of the technical educational terms

This short glossary is aimed to help the readers who can be unfamiliar with the technical meaning of some of the terms used in the article. Each definition is referenced, and when not diversely indicated the reference is in the list of references of the article. Nevertheless, the overall style of this glossary is educational, not strictly academic, because many of the defined concepts have a long lasting history of disputes and different definitions.

Competence/competency: a competency is" An observable ability of a health care professional that develops through stages of expertise from novice to master clinician", while competence is the overall construct, composed by a set of competencies. (Frank JR, Snell L, Sherbino J, editors. CanMEDS 2015 Physician Competency Framework. Ottawa: Royal College of Physicians and Surgeons of Canada; 2015.) The development of competencies and, hence, of the overall competence of being a good doctor is the expected "learning outcome" of a medical curriculum or of a residency program. To reach this goal, the competencies must be adequately described, including the methods to assess them. (Amore, 2020) A competency in itself is a "construct", can only be assessed through observable behaviours (actions, answer to questions, writings).

Construct: in psychology and education is "a label for a cluster or domain of covarying behaviours" (https://www.britannica.com/science/construct). A construct only exists in human mind and cannot be directly nor assessed nor measured. Researchers can observe behaviours that, based on a theory, are believed to be expression of the construct. From these behaviours one can infer the "amount" of construct owned by a subject. For example, a multiple-choice test with questions about the anatomy of the heart is a tool to measure the construct of "knowledge of anatomy".
Figure 3 of this article is a draft theory on "elements of success and failure of PAL". Elements like "feeling of egalitarianism", "sense of threat", "self-regulation" are typical constructs.
Based on a theory, new both qualitative and quantitative research can be designed, to validate the theory by using it to make prediction in an experiment, expand or modify it.

Mentor/mentee: a trusted counsellor or guide (Merriam-Webster dictionary). Differently from a tutor, a mentor is mainly a role model, usually a teacher or a health professional with whom a student/resident develops a special relationship of trust and guidance.

Peer assisted learning (PAL): it is the process in which people from similar social groupings who are not professional teachers help each other to learn and learn themselves by teaching. (Topping, 1996) Hence, by PAL we mean a student teaching or tutoring other students. When they are in different years of curriculum, then PAL is indicated as near-PAL (for example a 6th year student teaching/tutoring 4th year student or a senior resident teaching/tutoring a younger resident)

Research (quantitative, qualitative, mixed methods): research can be seen as the process of quest for an answer to a question. Hence, the starting point is "the question". If the research question has a number as a possible answer (frequency, rate, correlation, events over time, …) then it is quantitative research, otherwise if it is about the description and/or theorisation of concepts, opinions, or experiences (how is it composed? how does it work? how is it perceived? how can it be interpreted?) it is qualitative research. (Tavakol, 2014) None of the two gives the "truth" about the world, both of them give a more or less faithful representation of some limited aspects of the world.
Mixed methods research is an approach in which both qualitative and quantitative methods are used, with different levels of integration. (Younas, A., & Durante, A. (2022). Decision tree for identifying pertinent integration procedures and joint displays in mixed methods research. Journal of advanced nursing, 10.1111/jan.15536.)

Saturation: in qualitative research is the point in which the analysis of new experimental data (written text, transcript of interviews, field notes, images, and videos, …) does not add any new concept. Reaching the saturation is equivalent in declaring in quantitative research of having a sample size large enough to give power to a statistical analysis. (Guest, G., Namey, E., & Chen, M. (2020). A simple method to assess and report thematic saturation in qualitative research. PloS one, 15(5), e0232076.)

Self-regulated learning: in educational psychology, self-regulated learning is part of the overall construct of self-regulation. It refers to the competence of use metacognition (thinking about the way I learn) to drive own's learning. It is composed also by strategic action (planning, monitoring, and evaluating my process of learning), and motivation to learn. (Lucieer, 2016)

Skill: in education is usually the term to name the ability to perform a manual/technical procedure, like physical exam, basic life support or communication with patients (history taking, informed consent, breaking bad news)

Tutor/tutee: the term tutor has many different interpretations. In this article we adopt the meaning from Merriam Webster dictionary: "a person charged with the instruction and guidance of another: such as private teacher or teacher in a British university who gives individual instruction to undergraduates". The accent is hence on a personal educational relationship with the tutee. In the context of PAL, usually tutorship is addressed to teaching/learning technical skills or managing case-based discussions.