

Impact of Implementing Psychological Ownership in Undergraduate Dental Clinical Training: A Retrospective Study

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ABSTRACT

Purpose: The idea of psychological ownership (PO) has been utilized in a variety of contexts, but the significance and lessons learned from using PO in dental clinical education have not been investigated. A detailed long-term study of PO in dental clinical education will allow us to understand the effectiveness of this practice. The purpose of this paper is to compare undergraduate (UG) student's clinical performance before and after the PO system was implemented.

Materials and methods: A retrospective study was conducted with around 70–80 students in an academic year from June 2012 to June 2019. Through ownership quality, four-handed dentistry, observation and assistance, supply of must-haves, and measurable outcomes, the clinical performance of students in pre- and post-PO systems was compared.

Results: The quantum of overall clinical procedures performed by the UG students was 8,214 and 13,753 in pre-PO and post-PO, respectively. Chi-squared tests performed unveil that there exists a statistically significant difference in the quantum of clinical procedures performed by UG after the implementation of PO.

Conclusion: The results of our study clearly state that there was a significant increase in the quantum of clinical procedures performed by UG students after the implementation of the PO system.

Keywords: Dental education, Measurable outcomes, Ownership, Undergraduate training.

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INTRODUCTION

The term "psychological ownership" (PO) is a distinctive attitudinal state observed in an individual toward a variety of targets or concepts. PO concept has been employed in an array of fields, and it yields positive behavior in an individual.¹ It is an integral part of an individual's relationship with the organization or the place.² The Individuals with robust likeliness toward PO are expected to experience leadership qualities such as authority, accountability, and responsibility, which in turn propel them to spend time cultivating the above mentioned qualities further.³ PO is a multidimensional concept that enhances positive behaviors such as self-esteem, increases prosocial behavior, and creates self-identity.^{4,5} It also boosts one's cognitive sense of defining and presenting themselves in their profession,^{6,7} whilst the negative behaviors are failing to perform their duty and territoriality.⁷

Avey et al.⁸ proposed seven components of which possession and belongingness are considered to be important criteria in PO.⁹ The value of an object or concept varies, depending on their ownership thinking that they own it, which builds a positive and emotional attachment toward an object.^{10–12} Van Dyne and Pierce in 2004 developed a standard seven-item scale to measure possessiveness for a specific concept or target.¹³ Several authors have modified this standard scale with different variables to measure PO.^{8,14} Belongingness or the sense of attachment to a particular place provides sustainable business, loyalty, and cognitive caliber.^{15–17} Further, it also facilitates proactive participation, effective communication, and self-expressive skills.¹⁷ PO would positively strengthen one's virtues and deliver a measurable impact on the performance to experience a successful

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career.^{18,19} The variables such as usefulness, ease of use, responsibility, communication, and attitude toward the system are to be considered while practicing PO.²⁰ Unlike the application of PO in the restaurant industry,²¹ the application of PO has played an outstanding role among the health care professionals, such as physicians' acceptance of clinical information systems,²⁰ advanced practice nursing working environment,²² practicing PO in a dental school setting, as explained by Muthu et al.²³ In health care, enabling PO is considered a vital component while handling serious health ailments.²⁴

There is still a disinclination to perceive PO, and a better understanding of this concept shall efface the negative notion of acceptance of the systems.²⁵ Although the importance of PO shall be gleaned from existing literature, the insights into the outcomes of practicing PO are yet to be unraveled. A long-term detailed effect of PO is required to address unclear practical difficulties in implementing PO in any profession. Hence, the objective of this paper is to evaluate the clinical performance of the undergraduate (UG) students before and after the implementation of the PO system.

MATERIALS AND METHODS

Ethical Approval

This study was approved by the Institutional Ethics Committee of Sri Ramachandra Institute of Higher Education and Research (SRIHER), Chennai, Tamil Nadu, India (Ref No: IEC-NI/22/Jan/81/19).

Study Setting and Study Participants

This retrospective study comprised of UG students (third-year, final-year, and interns) from the Department of Pediatric and Preventive Dentistry, SRIHER (around 70–80 students per academic year) from June 2012 to June 2019. The students followed a scheduled clinical rotation in groups to all departments (Oral Medicine and Radiology, Public Health Dentistry, Pediatric and Preventive Dentistry, Oral and Maxillofacial Surgery, Periodontics, Conservative Dentistry and Endodontics, Prosthodontics, Orthodontics, and Oral Pathology) of dental school for a particular period of time as per the requirements of the dental curriculum (Flowchart 1).

In the UG (BDS) program, the third- and fourth-year students attended three clinical postings (UG clinical operatory) each year. Third-year students were posted for a period of 8 days from 9 am to 1 pm for each posting. Fourth-year students were posted for 7 days from 10 am to 4 pm on all days for each of the postings thrice. The fifth-year students (interns) were posted for 30 days in the department and were at liberty to choose their electives for 15 days (Flowchart 1).

Clinical Posting System before Psychological Ownership (2012–2015) at Pediatric and Preventive Dentistry (Pre-Psychological Ownership)

Students start their clinical postings in the third-year of their 5-year BDS program. The students were oriented in relation to the UG clinic in general, and each year, they were facilitated by different faculties in charge. In the course of their clinical stay at the department, routine discussions were held on various pediatric dental topics. Each academic year (third-year, fourth-year, and fifth-year), students were allotted a particular number of dental chairs with no preference for individual dental chair allotment. Separate paramedical staff on rotation were posted to dispense dental materials from a common material dispensing center only on request for various dental procedures carried out by students.

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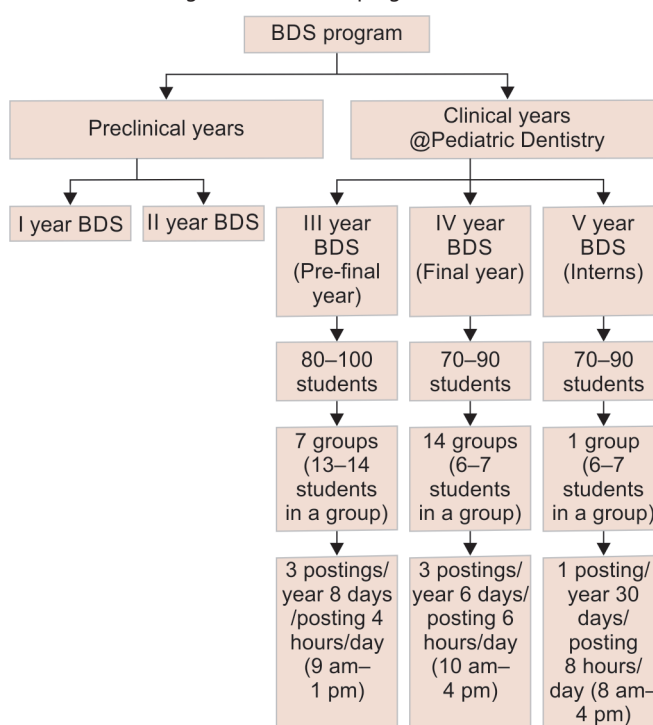
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Students were encouraged to perform clinical procedures like oral prophylaxis, glass ionomer cement (GIC) restoration, composite restoration, and extraction. The UG students did not have the opportunity to observe or assist their seniors or their batch mates and it was not made mandatory for them to do preventive procedures like sealants, preventive resin restoration (PRR), topical fluorides, and advanced procedures like crown placement, pulp therapy, and appliances. The magnitude of treatment procedures performed was successfully captured in one common treatment register. The completed treatment was countersigned by the respective faculty in charge. They were instructed to furnish the same details of the treatment performed in their UG record. Appointments for further

Flowchart 1: Undergraduate (UG) BDS program in SRIHER, Chennai, India



treatment were scheduled, and students were posted during that particular period to perform the necessary procedures.

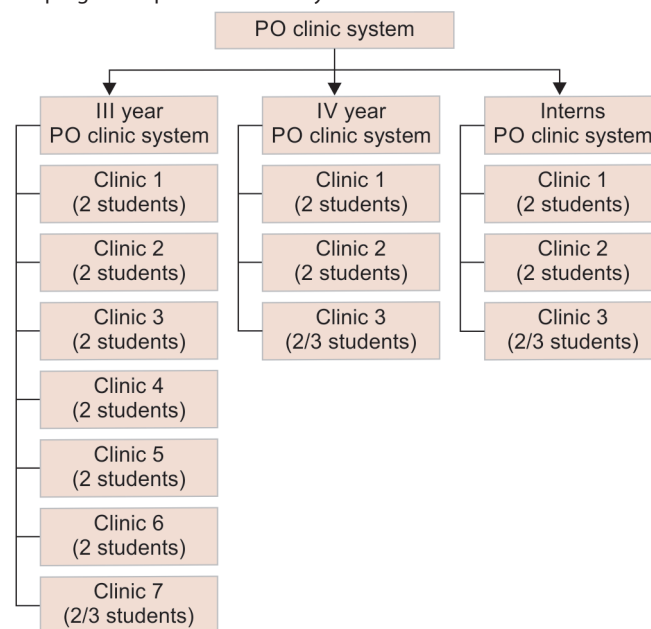
Psychological Ownership Clinical System (2016–2019) at Pediatric and Preventive Dentistry (Post-Psychological Ownership)

Psychological ownership (PO) system was introduced and implemented in the Department of Pediatric and Preventive Dentistry from January 2016. Students were sensitized to the PO system on the first day of their clinical posting through a preorientation lecture by the faculty in charge. The faculty in charge explained in detail the functioning of the system and guided the students to launch their clinic (dental chair and cupboard). The students (clinic owners) were allotted the workplace (clinic) according to the name list as provided by the University (Flowcharts 2 and 3). Two students shared a clinic, but if a team had an odd number of students, the last team comprised three students. Clinic I had the first two students (1 and 2), clinic II had the next two students (3 and 4), and clinic III had the last three students (5–7) for a batch of seven students (Flowchart 2). The students were given the freedom to design their clinic (based on their own ideas or different themes), choose their clinic name, and place the clinic board in their respective workspaces. Themes like “Jungle Safari, Christmas Season, Disney World, Dora Bujji,” etc., dominated the UG clinical operator. The name of the clinic, doctors’ name (students/clinic owners), and the day and time of their availability will be displayed on the board. Students were encouraged to perform all procedures with four-handed dentistry either with the partner or with the students posted in the UG department (if their clinic partner was unavailable for that day). Faculty were assigned for that particular year, and they remained in charge until the completion of the UG program (internship). The dental materials required for the clinic were issued on the first day of the clinical posting and checked on the last day by paramedical staff (Table 1).

Discussions and activities were conducted during the clinical posting hours. Students were given the opportunity to observe various clinical scenarios and assist their seniors and peers. A roster with a regular posting schedule for observation and assistance at the postgraduate (PG) clinical operator, UG clinical operator, and general anesthesia operator was followed. Procedures were allotted to the students in a systematic order (Flowchart 2). Procedures like oral prophylaxis, topical fluoride, GIC restoration, composite/PRR, and extraction were routinely performed by the students. Students who were interested in carrying out procedures like sealant placements, stainless steel crowns (SSC), strip crowns,

space maintainers, habit-breaking appliances, and pulp therapy were encouraged to execute the procedures under supervision. The completed procedures were documented in the treatment register that was countersigned by the faculty in charge. Students were reminded to make appointments to carry out any further necessary treatment and to check their own patients in their subsequent bookings, which are reflected in the appointment register.

Flowchart 2: Year-wise description of the number of clinics during the UG program of pediatric dentistry



Flowchart 3: Steps involved in setting up clinics in the PO system

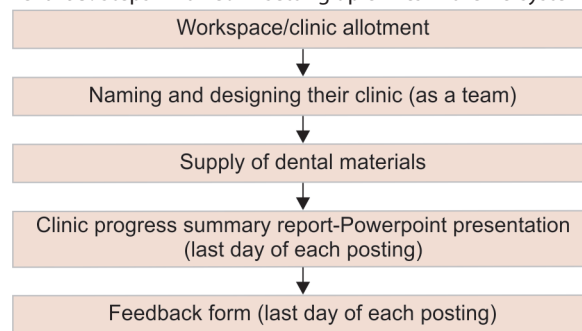


Table 1: Year-wise comparison of clinical procedures performed by UG students in pre- and post-PO system

		Pre-PO system					Post-PO system				
		2012	2013	2014	2015	Total	2016	2017	2018	2019	Total
Preventive therapy	Oral prophylaxis	845	1,074	925	632	3,476	946	978	773	1125	3,822
	Topical fluoride	0	91	27	78	196	355	250	331	410	1,346
	Sealants	17	49	62	11	139	78	462	502	775	1,817
Restorative procedures	GIC	917	888	699	389	2,893	497	566	1067	634	2,764
	Composite/PRR	81	92	92	45	310	83	372	366	702	1,523
	SSC	0	0	0	0	0	0	10	108	187	305
	Strip crown	0	0	0	0	0	0	3	13	26	42
Surgical	Extraction	250	394	324	219	1,187	269	356	797	639	2,061
Endodontics	Pulp therapy	0	0	1	0	1	0	1	14	40	55
Orthodontics	Interceptive orthodontics	0	0	0	0	0	0	0	5	13	18

Bold values are used to emphasize on the total clinical procedures performed by UG students in pre- and post-PO system

The students were trained to enter the details in the posting summary template that was provided to them in a powerpoint format to measure their progress. The students presented the posting summary report that captured all the clinical procedures performed, total income generated (amount generated through treating various clinical procedures), and discussion/activities attended in that particular posting on the last working day or on the penultimate day of the posting in the presence of the faculty in-charge.

Data Collection

The treatment registers from January 2012 to December 2015 (4 years of pre-implementation of PO) and from January 2016 to December 2019 (4 years of post-implementation of PO) were manually checked by two investigators. The number of various clinical procedures performed (data) per year was recorded in a preformed data entry sheet. The third investigator counterchecked the data to avoid misinterpretation of the results. Unavailable data, incomplete data, and data that were not clear were excluded from the study.

Statistical Analysis

The recorded data were analyzed, and the results were tabulated (each clinical procedure performed and overall treatment rendered) in whole numbers and percentages. A Chi-squared test was performed to compare the pre and post-implementation of the PO systems.

RESULTS

A retrospective data collection of the number of various clinical procedures carried out by UG students between pre-PO (2012–2015) and post-PO (2016–2019) was assessed. The quantum of overall clinical procedures performed by the UG students was 8,214 and 13,753 in pre-PO and post-PO, respectively (Table 1). Chi-squared tests were performed, unveiling that there exists a statistically significant difference (*p*-value of 0.001) in the quantum of clinical procedures performed by UG after the implementation of PO (Table 2).

Among all the clinical procedures, the total number of preventive procedures like oral prophylaxis, topical fluoride application, and sealants had significantly increased in the post-PO system. When more complex clinical procedures like endodontic and orthodontic treatments performed by UG students were analyzed, pulp therapy procedures and appliances showed a strong significant increase after 2016. Also, restorative procedures other than GIC procedures exhibited a greater increase in the post-implementation of PO. Further, comparing the aggregate of restorative procedures like crowns, it was evident that neither stainless steel nor strip crowns were placed until 2015. A twofold increase in the number of extractions performed was observed.

DISCUSSION

This study was conducted to evaluate the clinical performance of UG students before and after the implementation of the PO system. The results of this retrospective study revealed that there was a significant rise in the number of clinical procedures performed by UG students. Schmitz, concluded that introducing newer management practices among working teams increases productivity.²⁶ In our study, ownership quality, four-handed dentistry, observation and assistance, supply of must-haves, and measurable outcomes are a few factors that could have played an important role in the increase in number of cases (Table 3).

Table 2: Chi-squared test comparing the clinical procedures of pre- and post-implementation of the PO

Clinical procedures	Pre		Post		p-value
	N	%	N	%	
Oral prophylaxis	3,476	25.3	3,822	27.8	0.001*
Topical fluoride	196	1.4	1,346	9.8	
Sealants	139	1.0	1,817	13.2	
GIC	2,893	21.0	2,764	20.1	
Composite/PRR	310	2.3	1,523	11.1	
SSCs	0	0	305	2.2	
Strip crowns	0	0	42	0.3	
Extraction	1,187	8.6	2,062	15.0	
Pulp therapy	1	0.0	55	0.4	
Interceptive orthodontics	0	0	18	0.1	

* Statistically significant ≤ 0.05

Table 3: Factors that could have potentially contributed to the increase in the number of clinical procedures in the UG clinic

Concepts	Factors
Ownership quality	<ul style="list-style-type: none"> • Concept of "mine." • Building relationship. • Enhance team function. • Better communication. • Commitment and job satisfaction.
Four-handed dentistry	<ul style="list-style-type: none"> • Efficient clinical practice. • Improved teamwork. • Increased productivity. • Reduced time. • Opportunity for the assistant to learn.
Observation and assistance	<ul style="list-style-type: none"> • Valuable insights. • Improved critical thinking and problem-solving. • Opportunity to learn. • Enhance academic and clinical engagement. • Improved professional practice.
Supply of "must-haves"	<ul style="list-style-type: none"> • Saves time. • Efficient working atmosphere. • Increased productivity. • Improved responsibility.
Review	<ul style="list-style-type: none"> • Instils professionalism. • Commitment and job satisfaction.
Measurable outcomes (clinical posting summary/ portfolio)	<ul style="list-style-type: none"> • Preparedness in practice management. • Sharing experiences. • Healthy competition. • Reflection on teamwork.

Ownership

Pierce et al. studied in detail the relationship between ownership and productivity and explained self-esteem-based motivational effects.²⁷ Few other studies have also suggested that the concept of ownership created responsibility and productivity through the cognitive sense of assuming the objects are "mine."^{4,5} This "mine" concept was rooted firmly among our study participants (UG students) and strongly reflected as they staged and maintained their own clinics proficiently. Hamid et al. suggested that the ability to perform and be responsible increases productivity.²⁸ Students' preparedness for

their clinics with predetermined tasks like attending discussions and completing a certain number of procedures for that day was seen as their responsibility to adapt and perform skillfully under different clinical scenarios.

Four-handed dentistry

Finkbeiner BL disclosed that the art of practicing four-handed dentistry warrants teamwork and productivity.²⁹ The same was experienced in our study as the clinical procedures were completed in a shorter duration as there were assistants to aid in various tasks (handling the suction, adjusting the light, reaching out for the instruments and materials). Good coordination through verbal and nonverbal gestures motivates teamwork and facilitates better accessibility, reduces the operator's stress and needless movement during the procedure.^{29,30} The increase in the number of clinical procedures in our study could be explained as this above-described maneuver seen in four-handed dentistry, may have created a desirable and promising environment to perform more procedures at ease.

Observation and Assistance

Horst et al. suggested that attentive watching through observation and assistance played a tremendous role in procedural learning.³¹ Observation and assistance provided valuable insights, critical thinking, and problem-solving as expressed by various authors.³²⁻³⁴ This was reflected in our study as students gained adequate academic knowledge and clinical skills through observing and assisting PG students, interns, and peers/their clinic partners. In addition, this could have favored them to be well-oriented to various complex clinical procedures (pulp therapy, placement of SSC and strip crowns, habit-breaking appliances, space maintainers, full mouth rehabilitation) that were not routinely practiced in the UG operatory, armamentarium needed for the procedure, clinical steps and also the procedural errors. The mechanism of observation and assistance could have been instrumental in steering the number of clinical procedures, as students were confident to mimic the same procedure in the UG operatory with minimal flaws.

Supply of "Must-haves"

Improved working conditions and ability to perform have been cited as a few important reasons for increased productivity.^{28,35} Most of the dental schools in India practice the traditional system of obtaining dental materials from a common dispensing table when needed for the clinical procedure. The time taken to procure the dental materials was greatly reduced as the required dental materials and disposables were available in their own clinical space (dental chair and cupboard). This improved working environment would have facilitated the students to perform proficiently and contributed to the increase in the number of treatment procedures.

Review

Collier R elucidated that adherence to ethical practices, potent interaction with patients and other team people, accountability, and commitment were a few notable principles of professionalism.³⁶ According to the above statement, the concept of reviewing patients in the ensuing postings was yet another good practice strategy that was observed as professionalism under the PO system among the study participants. The recall not only allowed the students to evaluate their own clinical skills but also promoted a sense of better acquaintance with the patients and their caregivers, which was strongly reflected in the spike in the number of clinical procedures.

Measurable Outcomes

Stup R reported that tracking or continuous monitoring of the work done would improve performance and productivity.³⁷ Our study measured students' overall volume of work through a clinical posting summary that served as an evidence-based approach (portfolio). Avey et al. have explained regarding "preparedness in practice," and the same was observed with our students when they measured their clinical outcomes.⁸ A review by Holmes and Schmitz, concluded in their study that competition among peers leads to productivity.³⁸ In our study, the number of procedures captured during the postings would have enhanced their working skills through the sharing of knowledge by peers and the faculties during the presentation. Further, the concept of healthy competition was also reflected in their posting summary, and measuring this motivated the team to perform better.

Reward systems or incentives/wages are considered as an essential factor that motivates performance and productivity.³⁸⁻⁴⁰ The income generated from each clinic might have been a motivating factor and have inspired the students to perform better. The above-said factors could be the reason for the students to follow more procedures in the ensuing postings.

Strengths and Limitations of the Study

This is the first-ever longitudinal study with the application of the novel concept of "psychological ownership" in dentistry among UG students. The responsibility of owning up to the challenges faced in the clinical setup increased the students' skill and productivity, which was observed as the strength of the study. The limitations could be that the clinical procedures performed by the students were compared and not the number of patients. Also, a different set of students were involved in the pre-PO and post-PO periods, which could be considered as the second limitation of the study.

CONCLUSION

The results of our study clearly state that there was a significant increase in the quantum of clinical procedures performed by UG students after the implementation of the PO system. After the adoption of PO, complex clinical operations like the insertion of crowns, appliances, and pulp therapy were managed easily in the UG operatory.

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