



# Managing orthodontic needs through mobile apps

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**Abstract:** To conduct a review of current mobile orthodontic apps available on Apple and Google Play stores in order to understand the integration of mobile app technology in orthodontic needs. The mobile orthodontic apps were searched on respective app stores of Apple and Google Play on two devices namely Apple iPad 2 and Samsung Galaxy S7 Edge Smartphone up to 11/01/2018. English language apps directly related to orthodontics were included whereas general, dental, non-health, individual orthodontic practice, conference apps and non-English apps were excluded. Forty-nine apps met our review criteria. Nine apps on Apple, 22 apps on Google play stores and 18 apps in both stores. The apps are divided into clinician, clinician/patient and practise centred apps. The review highlights the need for developing educative tools that support the use of orthodontic apps which might have an impact on patient's health, compliance, financial and regulatory barriers. Professional groups, universities or developers in medical fields with access to updated information can create apps suiting the wider requirements of orthodontic care and management. The apps reviewed are effective and provide information and support to the patient yet lack certain features of interaction and fail to highlight the importance of orthodontic treatment.

**Keywords:** Orthodontic education; orthodontic care; orthodontic mobile apps and orthodontic reminder

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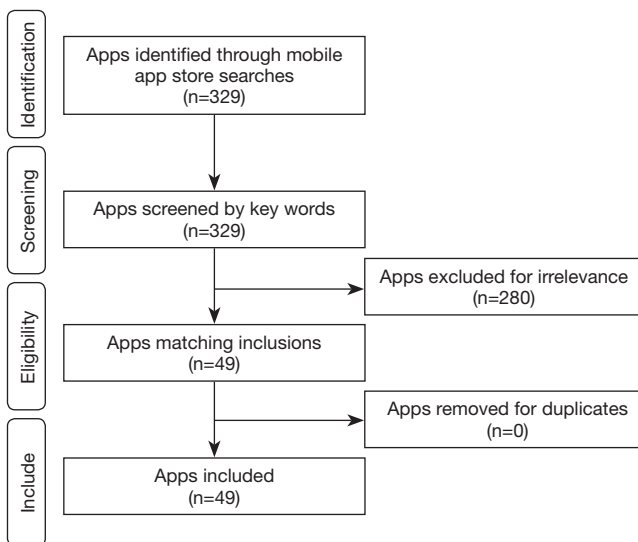
## Introduction

Orthodontic health and management of patients are based on individual characteristics and personal attributes. The learning, teaching and treating patients with orthodontic problems is ever changing with the inclusion of Smartphone technology and mobile apps (1). The mobile apps have an ever-increasing grasp on people's health-related applications owing to the wider availability, awareness and technological advances in accessing information from anywhere and anytime (2).

Statista website reports that the Smartphone usage has reached a humungous 2.32 billion in 2017 to reach a predicted 2.81 billion users by 2020 globally and the number of downloads has increased from a rate of 57.33 billion in 2012 to 253.91 billion in 2017 (3). With

the introduction of mobile health apps, access to gaining knowledge in seeking health care is easy and efficient. This demand and spread of mobile technology results in the availability of a huge number of apps with varying amount of information. Therefore, the available apps have to be reviewed to highlight the importance of these apps for people seeking orthodontic information.

The mobile orthodontic apps provide a reasonable source of information to clinicians, students and patients. Mobile orthodontic apps can help achieve treatment in a compliant and timely manner using the reminder service and photo upload option. According to an estimate (4,5) the use of mobile orthodontic apps will see an increase as more developers, clinicians and health carers will start utilizing the platform for their practices to educate and train patients.



**Figure 1** Flow diagram showing inclusion/exclusion of mobile apps.

The app features can motivate the patient to undergo treatment and assess and track progress during different treatment stages contributing to the overall orthodontic health, care, education and management.

The current estimates by research2guidance place the number of mobile health apps at 325,000 on major app stores (6). Considering the availability of so many health apps, it is prudent to review the mobile orthodontic apps available and further the existing knowledge of apps available to include current additions. Based on reviews (7) on available apps we focus our search in this article to include in specific the mobile orthodontic apps available for both the orthodontist and the patient.

## Material and methods

### Search methods

The apps were searched on respective app stores of Apple (8) and Google Play (9) on two devices namely Apple iPad 2 running IOS v 9.3.5 and Samsung Galaxy S7 Edge Smartphone running Android v 6.0.1 (Marshmallow) up to 11/01/2018. To avoid bias in searches, the app stores were accessed from the two devices mentioned above along with accessing the same store websites of Apple iTunes and Google Play from a laptop computer. This made it possible to check the availability from two individual sources from different platforms.

The following keywords such as, ‘orthodontic education’, ‘orthodontic care’ and ‘orthodontic reminder’ were included.

The PICO method has been incorporated into the foundation for quality searching (8). This strategy helps in developing an effective search of the problem, intervention, comparison and outcome of the descriptive review.

### Data collection

The apps revealed by the searches were subjected to an inclusion and exclusion criteria for appropriate reviewing.

### Inclusion

Apps directly related to orthodontics were included.

### Exclusion

General, dental, non-health, individual orthodontic practice, conference apps and non-English apps were excluded (9).

Apps are classified based on the category they fall under medical, education, lifestyle, health and fitness, news and magazines, books and references, productivity and business.

Each of the 49 apps was reviewed for their content, specificity and functionality in relation to orthodontics. The content of an app aims to provide what information is included in the app, the specificity of an app aims to provide how relevant is it to orthodontics and finally, the functionality of the app aims to provide what role the app plays as part of orthodontic health, care, education and management.

## Results

The app market searches revealed many apps related to individual orthodontic practices, photo booths for braces, games and non-orthodontic apps. Of these, using the inclusion and exclusion criteria the apps were scrutinised for the specificity of its content to meet our review. The number of apps meeting our review criteria summed up to be 49 which are represented in the flow diagram in *Figure 1*.

The 49 apps reviewed provide an insight into the content, specificity and functionality of each app. The list of apps with names, app store, category, ratings, costs, developer names and downloads can be found in *Tables 1-3*

below with the numbers of downloads and ratings reflecting the date 11/01/2018.

The app categories in *Figure 2* show the distribution of apps under 5 categories with 69% (n=34) falling under medical, 20% (n=10) under health and fitness, 8% (n=4) under education and lifestyle and books and references occupying 2% (n=1) each.

Our review divides the apps into 3 subcategories to identify the area of usage with 53% (n=26) apps falling under clinician centred, 41% (n=20) under clinician/patient centred and a small 6% (n=3) under practice centred apps. These subcategories show a tendency of apps leaning more towards clinicians with many apps providing tools for orthodontic evaluation and treatment planning as represented in *Figure 3*.

Free apps contribute to 81% (n=40) of the total apps reviewed with 17% (n=8) being paid and 2% (n=1) having an in-app purchase option. The app costs affect the number of downloads with free app downloads being 1,000 to 1,0000+ and paid apps have 100 or less than 100 downloads as represented in *Figure 4*. Google Play contributes to the most with 45% (n=22) of the share followed by 18% (n=9) from Apple and the remaining 37% (n=18) of apps available in both stores as seen in *Figure 5*.

## Discussion

The current availability of mobile orthodontic apps creates a huge resource of information for the general population, students and clinicians. The problem with the use of these mobile apps is the inability of content verification. Previous studies highlight the drawbacks of apps in terms of the authenticity, reliability and validity of content which are difficult to be regulated or assessed (10). The information sought by the users might be unrelated to their problem creating misunderstanding and misjudgement. The patient seeking treatment might either exaggerate or understate their problems putting them at risk.

This gap in understanding requires a descriptive review of the current mobile apps. The apps form a free resource for seeking health information. Of the total 49 apps we have reviewed, the clinician centred apps contribute to 53% of the total apps which are specific to an orthodontist who facilitates the different treatments, methods and calculations used in the diagnosis and treatment planning along with educating the clinician on the current knowledge in orthodontics. These apps will find use only at the hands of either an orthodontist, general dentist with special interest

in orthodontics or orthodontic students. The clinician centred apps provide a sound resource and tools for the clinician but not a single app can provide all the tools in one interface. The clinician has to download and use several apps which can be reduced to a single app if the above features are available in one download. Clinician/patient centred apps contribute to 41% of the total apps. These are useful to both the clinician and the patient in terms of the information they provide. The clinician can utilise these apps to educate, train and motivate the patients during the various stages of treatment whereas the patient can use these to keep track of the progress and follow the regimes of oral hygiene and elastic wear. The apps can help seek an appointment and also let the patients upload pictures and share information with their clinician.

The clinician/patient centred apps provide several functions to both the clinician and the patient in keeping track of progress, image uploads, appointment and reminder services, location-based services and information. These apps can further reach several thousands of people if the information is content specific with illustrations, 3D animations, child-friendly with wider geographical distribution. The practice centred apps contribute to 6% of the total apps which are aimed specifically at the running of orthodontic clinics. These apps provide a basic management service. The benefits of having health apps have changed the perspective of engaging oneself in healthy habits and seeking advice based on ones' assessment. They provide a huge resource to a potential patient or any person interested in accessing specific health-related information. The mobile health apps can have a huge contribution to the future of healthcare by giving the controlling power of seeking medical care back to the patient by empowering the patients with ample information and choices which can be monitored by the individual for individual care. The dental apps are more focused on dental education and orthodontic apps on the compliance of treatment, oral hygiene maintenance and reminder services (11).

The apps reviewed are effective and provide support to the patient yet are lacking certain features of interaction. The ease of seeking quality information is limited. The apps provide a basic understanding of treatment but fail to highlight the importance of orthodontic treatment at large. The apps should also have an attractive edge to captivate the user from the first instant and take the experience further with interactive hints, image uploads, real-time data

**Table 1** The list of names, app store, category, ratings, costs, developer names and downloads (Google play store) under clinician centred apps

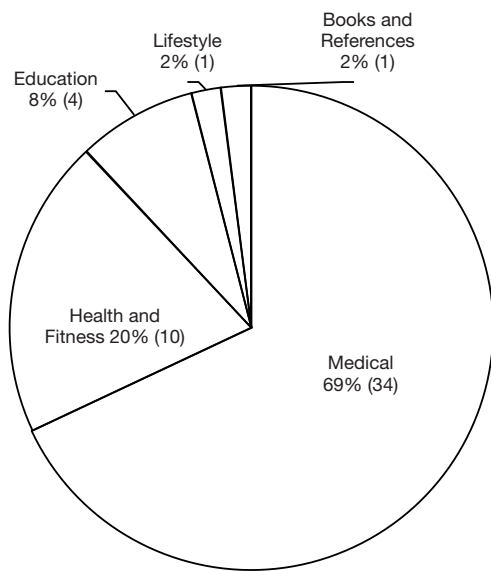
Number	Apps (clinician centred apps)	Apple/Google play store	Apple/Google play category	Apple/Google play ratings	Apple/Google play costs	App developer	Google play downloads
1	American Association of Orthodontics/AAO Mobile	+/+	Medical	12+/3+	Free	American Association of Orthodontics	1,000 to 5,000
2	American Journal of Orthodontics & Dentofacial Orthopedics/AJODO	+/+	Medical	12+/3+	Free	Elsevier Inc	1,000 to 5,000
3	CephNinja/CephNinja	+/+	Medical	17+/3+	Free	Naveen Madan	1,000 to 5,000
4	CVM Stage Guide	-/+	-/Medical	-/3+	-/Free	NXS	1,000 to 5,000
5	Face Centered Diagnosis	-/+	-/Medical	-/Unrated	-/Free	Fsc India	500 to 1,000
6	iModelAnalysis	-/+	-/Medical	-/Unrated	-/Free	NXS	10,000 to 50,000
7	iOrtodoncia	+/-	Medical/-	4+/-	Free	Raul Flores	-
8	iRok	+/+	Health and fitness	17+/3+	Free	Bo Li	50 to 100
9	MBT Chart Helper	-/+	-/Medical	-/3+	-/Free	NXS	1,000 to 5,000
10	ModelAnalysis	-/+	-/Medical	-/3+	-/Free	Droido Knights	1,000 to 5,000
11	Myobrace Activities	+/+	Medical/-	4+/3+	Free/-	Daniel Smith/ Myofunctional Research Co	1,000 to 5,000
12	OneCeph	-/+	-/Medical	-/3+	-/Free	NXS	5,000 to 10,000
13	OrthoPulse	+/+	Medical	4+/3+	Free/-	Biolux Research Ltd	1,000 to 5,000
14	Orthotown	+/+	Medical/-	17+/12+	Free/-	Dentaltown. com LLC	500 to 1,000
15	SmarTooth	+/-	Medical/-	4+/-	Free/-	Augusta University	-
16	Dentora	-/+	-/Education	-/3+	-/Free	IHApps	5,000 to 10,000
17	Mini Implant guide	+/+	Education	17+/3+	Free/-	O1 Systems Inc	1,000 to 5,000
18	Orthodontic Service Centre	-/+	-/Health and fitness	-/Unrated	-/Free	Dimitar Bonev	100 to 500
19	The Intl Assoc for Orthodontics	+/-	Health and fitness/-	4+/-	Free/-	BlueToad, Inc	-
20	Clinical Orthodontics	+/+	-/Medical	-/3+	Free/Free	Elamed	1,000 to 5,000
21	Progress in Orthodontics	+/+	Medical/books and references	4+/Unrated	Free/Free	Springer	1,000 to 5,000
22	Brace Off!	+/-	Medical/-	4+/-	\$1.99	Paul Martin	-
23	Cephalometric Analysis	-/+	-/Medical	-/3+	-\$28.71	Bogdan Scanteie	10 to 50
24	Mechanotherapy in Orthodontics Vol.1	+/-	Medical/-	12+/-	\$189.99	Ctor Press LLC	-
25	Planmeca mRomexis	-/+	-/Medical	-/3+	-\$45.18	Planmeca Oy	50 to 100
26	Tongue Thrust Checklist	-/+	-/Medical	-/Unrated	-\$9.70	Superior Therapy Resources	1 to 5

**Table 2** The list of names, app store, category, ratings, costs, developer names and downloads (Google play store) under clinician/patient-centred apps

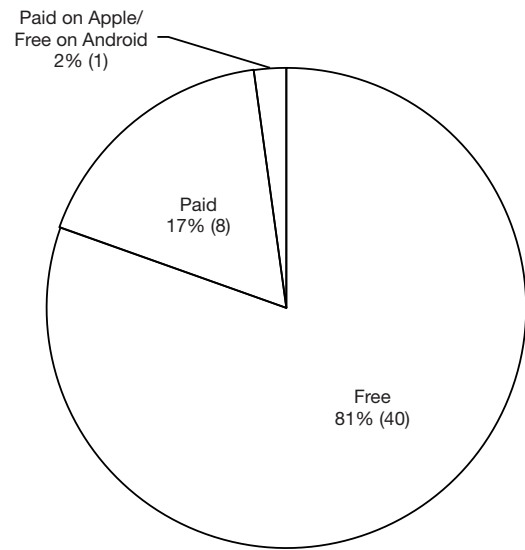
Number	Apps (clinician/patient-centred apps)	Apple/Google play store	Apple/Google play category	Apple/Google play ratings	Apple/Google play costs	App developer	Google play downloads
27	Carriere Ortho 3D	+/+	-/Medical	4+/Unrated	Free	Fundacio Barcelona Media	10,000 to 50,000
28	OrthoTempo	-/+	-/Medical	-/Unrated	-/Free	Point Net	500 to 1,000
29	OrthoComm Aligner Management	+/+	Medical	4+/3+	Free/-	Frontier Inc. Japan	100 to 500
30	Orthoconnex	-/+	-/Medical	-/3+	-/Free	Mark Hamanishi	10 to 50
31	Orthodontic	-/+	-/Medical	-/3+	-/Free	King Star Studion	1,000 to 5,000
32	OrthoGuide	+/-	Medical/-	12+/-	Free/-	Dan Cassey	100 to 500
33	Smile Radar Doc	-/+	-/Medical	-/3+	-/Free	Sawbros	50 to 100
34	StraightenMe	-/+	-/Medical	-/Unrated	-/Free	DMR-apps LLC	1,000 to 5,000
35	Sur 'Face'	-/+	-/Medical	-/3+	-/Free	Yeshwanth Pulijala	500 to 1,000
36	SmileSesame	+/+	Medical/health and fitness	4+/3+	Free/-	Great Smiles LLC	1,000 to 5,000
37	Mombrush Pro Care Orthodontic	-/+	-/Education	-/Unrated	-/Free	-	500 to 1,000
38	My braces clinic	+/-	Health and fitness/-	4+/-	Free/-	MyBraces Clinic Pte Ltd	-
39	OrthoMarbles	-/+	-/Health and fitness	-/3+	-/Free	Bluethunder	50 to 100
40	Remindalign	+/+	Health and fitness/-	12+/3+	Free/-	hhpage Inc	100 to 500
41	The Orthodontist Clinic	-/+	-/Health and fitness	-/3+	-/Free	Kivi technologies Pvt. Ltd	100 to 500
42	Dental Monitoring	-/+	-/Health and fitness	-/3+	-/Free	Dental Monitoring	1,000 to 5,000
43	Smile-tastic!	+/+	Medical	4+/3+	\$2.99/Free	Kendra J Remington	10 to 50
44	Tongue Thrust Therapy	-/+	-/Education	-/3+	-\$51.81	Alissa Holloway	1 to 5
45	RubberBand Reminder	+/+	Health and fitness/-	4+/3+	\$0.99/\$1.50	IAM THINKING	100 to 500
46	Braces Accelerator	+/+	Lifestyle	4+/3+	\$0.99	IAM THINKING	50 to 100

**Table 3** The list of names, app store, category, ratings, costs, developer names and downloads (Google play store) under practice centred apps

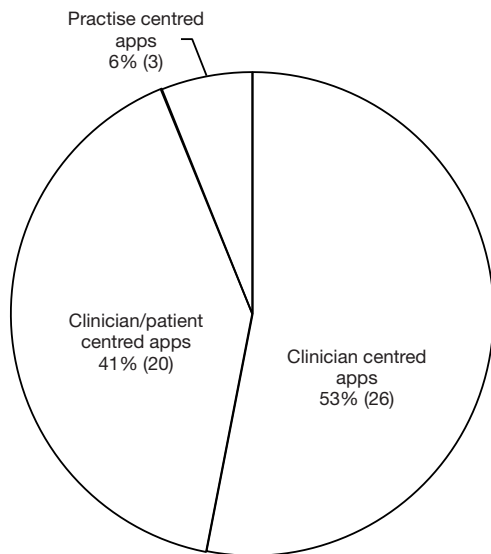
Number	Apps (practice centred apps)	Apple/Google play store	Apple/Google play category	Apple/Google play ratings	Apple/Google play costs	App developer
47	OrthoPro	+/-	Medical/-	12+/-	Free/-	John Baughman
48	Revolve Metrics—For Orthodontic Clinics	+/-	Medical/-	12+/-	Free/-	HC Technology, Inc
49	3Shape TRIOS® for orthodontic clinics	+/+	Medical/-	4+/3+	Free	3Shape Dental/3Shape



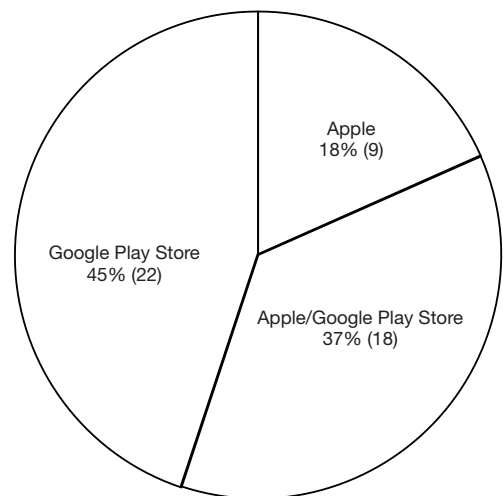
**Figure 2** Pie chart showing the percentages and numbers of orthodontic apps falling under different app categories.



**Figure 4** Pie chart showing the percentages and numbers of paid orthodontic apps.



**Figure 3** Pie chart showing the percentages and numbers of orthodontic apps falling under different app divisions.



**Figure 5** Pie chart showing the orthodontic app distribution in percentages and number under respective app stores/markets.

analyses, video demonstrations and profile transformation by way of active simulations. Overall, the apps reviewed have shown to provide information, appointment and reminder services, general and specific information for patients and orthodontists alike. The apps provide a huge resource for keeping the trend of current health apps which contribute to

a major extent in the mobile app industry. The orthodontist can use these apps to spread the word about orthodontic care, the practice locations, and orthodontist's competence through pre and post-treatment photographs, patient education literature and videos thereby motivating the patient and parents to seek appropriate care. The patients, on the other

hand, can access information based on their needs before making an appointment with the orthodontist which will help them better understand the different options they have which can encourage more interaction with the orthodontist on the first formal meeting itself saving time and resources for both the orthodontist and the patient. The mobile orthodontic apps though can provide all the resources, the potential patient still needs validation from an orthodontist and has to be approved for content provided on the app from a regulatory health authority.

## Conclusions

The orthodontic apps are a new tool for both the orthodontist and the patient which is reflected in the download rate. The ethical considerations, educational background of people accessing information, location and marketing strategies further limit the usage and deployability. Therefore, professional groups, universities or app developers in medical fields with access to updated information can create apps suiting the wider requirements of orthodontic care, management and regulatory barriers. Orthodontic apps should have an interface which is easy to access, easy to use, easy to find information, references and sources. The apps should help create an environment for people to interact, learn, be aware and decide on orthodontic needs based on individual traits to seek an efficient and professional support. There is currently a need for developing educative tools to support the use of orthodontic apps on a day to day basis which might have an impact on patient's health, compliance and finance.

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## Footnote

*Conflicts of Interest:* All authors have completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/jhmhp.2018.01.07>). The authors have no conflicts of interest to declare.

*Ethical Statement:* The authors are accountable for all aspects of the work in ensuring that questions related

to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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