

IOS APPLICATIONS (APPS) FOR ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD/ADD): A PRELIMINARY INVESTIGATION FROM AUSTRALIA

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Background: Mobile health tools are currently available for both clinicians and patients. However, there were no published articles related to Attention Deficit Hyperactivity Disorder (ADHD) applications for smartphones or tablets.

Aim: Provide information in relation to apps available from iTunes store for managing ADHD.

Methods: A literature search was performed. The Australian iTunes App Store and Google were searched with the keyword ADHD. Only apps from the iTunes Store were downloaded and tested. Categorisation was done in order to elucidate their functionality.

Results: 32 apps were found and compared in ratings, functionality and cost. There were no customer ratings or reviews on any of the ADHD applications. Applications were categorised according to functionality. The cost ranged from free to \$10.49.

Conclusion: Apps specific to ADHD are available for suitable electronic devices. These provide education assistance with diagnosis and monitoring of the condition. The basic costs range from free of charge to \$10/-. Information is provided to assist in selecting applications based on the need of the user.

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Introduction

Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder characterised by Hyperactivity and Inattention¹. It is a condition that begins in childhood and continues into adulthood. The prevalence in adults is noted as 3 – 6%²⁻⁴ with about 5–10% in children⁵. These data were derived from general population studies. Polanczyk and others in a meta-regression noted a prevalence of 5.3% in children⁶. Distractibility and short attention span are well known features of ADHD^{1,7}. Hence,

those with the condition benefit from prompts, assistance with planning, and timely reminders. Smartphone applications (apps) were considered as one source of such help in the current climate where smartphones are increasingly being used.

1.2 billion people worldwide were using mobile apps at the end of 2012. This is forecast to grow at 29.8 percent each year, to reach 4.4 billion users by the end of 2017⁸. In 2012, approximately 46 billion apps from the iTunes App store were downloaded,

while in 2013, this number was 82 billion, almost double⁹.

Whalen and others have reported on the use of electronic diaries in studies of ADHD^{10,11}. Porter and others found that computer based data entry was superior to paper based systems¹². Although such studies have been reported we did not find any scholarly articles in PUBMED or Google scholar with searches using key words Apps and ADHD. On the other hand, a recent study highlighted the popularity of smartphones and apps for their education and clinical work¹³. However, limitations in relation to iPhone apps and the paucity of research in relation to their development from a limited survey were noted¹⁴.

A component of ADHD is difficulty in focussing attention, leading to functional problems. Since there is a growing popularity of smartphone and ready availability of applications that can assist in various tasks, we decided to review the apps with ADHD in their subject heading in order to ascertain their functionality both for the patient and clinician. On reviewing the literature there was a paucity of scholarly articles dealing with the use of smart phone applications.

Methods

The search engines used in relation to the literature search were PUBMED and Google Scholar. The key words used in the search were “adhd apps”, “adhd applications”, and “adhd iphone apps”. Although there were numerous papers retrieved none of them had any connection between the use of smart phone apps and ADHD. In order to locate applications the search engine Google and the iTunes App store were searched. In Google we searched with the key words “Android ADHD apps”. On the iTunes App store the key words “adhd apps” were used. Although there were numerous applications that were retrieved in the iTunes app store we selected only those apps with the word ADHD in their title. There were 32 apps in the iTunes app store which had ADHD as part of the title. There were 12 Android ADHD applications found after completing the Google search¹⁵ with the phrase “android adhd apps”. All searches were performed by one of us (KK) in January 2014.

All of the apps retrieved from the iTunes app store were downloaded and tested on the applicable device (iPhone and iPad). However, due to constraints, the testing and reviewing was only con-

ducted on Apple iTunes Store applications. Applications were then classified in order to delineate their functionality.

Results

Of the 32 apps that were identified seven could be used only with an iPad (Table 1). Most of the apps were under 100 MB. The majority of them ranged from 1 MB to 40 MB.

Cost

Almost all the apps were free to download, but the higher quality apps tended to cost more. The most expensive apps found were ADHD Treatment and ADHD Psychopharmacology which cost \$10.49.

The mean cost for all the apps was AUD \$1.88. There were some apps that were also upgradeable to a paid version where the advertisements were removed and more cognitive training games were collected. There was one app, ADDitude Magazine, which utilised the function of in-app purchases. Although it is a free app to download, if the user wishes to use the app then payment is required. The cost is \$20.99 annually in order to download the articles published. The Figure 1 is a graphic representation of the costs. A detailed breakdown of the cost for each app is provided in Appendix 1.

Functionality

All of the applications had an educational component, with the exception of ADHD 2013 which gave information only relating to ADHD conferences. The apps were further classified into categories that indicate their usefulness in various situations. Built into many of the apps were smartphone tools that

Name of Application (app)

ADDitude magazine
 ADHD Adult Trainer
 ADHD Alarm
 ADHD in practice
 ADHD Lite
 ADHD psychopharmacology
 ADHD Test

The 32 apps that we identified had many different uses and applications. Hence, the authors attempted to classify them in some meaningful ways.

Table 1: Apps for iPad only

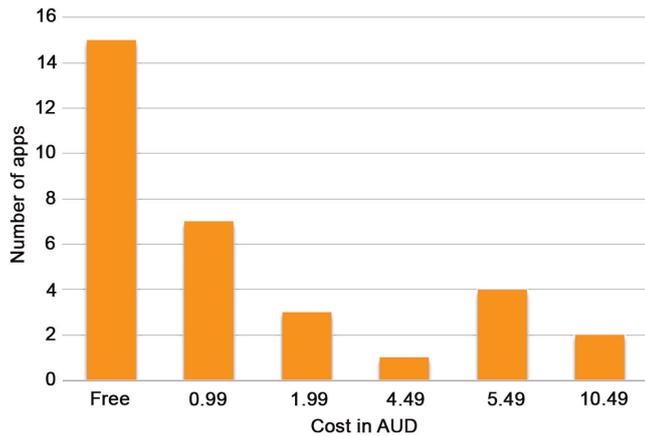


Figure 1: Cost of applications

allowed the user to remind them to complete daily activities or enhance brain activity so as to improve their condition. There were two major utility functions that were selected from among the applications i.e. apps that assisted with diagnosis and ones that enabled the individual user to monitor progress by creating a profile.

‘Diagnostic Apps’: Assists the individual and/or the clinician to evaluate the diagnosis of ADHD (Table 2)

‘Profiling Apps’: Allows users to create their own personal profile that can be accessed by them or others only who have been granted permission.

ADD8
ADHD
ADHD Adult Trainer
ADHD Angel
ADHD Guardian Angel
ADHD Maze
ADHD Psychopharmacology
ADHD Quiz
ADHD Survival Kit
ADHD Test
ADHD Test by PocketShrink
ADHD Test for iPhone
ADHD Tracker
ADHD Treatment
ADHDToolBox
Adult ADHD
Adult ADHD Screener
Robinson ADHD College Tracker

Table 2: Applications aiding diagnosis

ADD8
ADHD Angel
ADHD Guardian Angel
ADHD Tracker
ADHD Treatment
Adult ADHD
Adult ADHD Screener
MedOptimizer ADD/ADHD For Parents
Robinson ADHD College Tracker

Table 3: Applications that allow creation of creation of a profile

Hence, they were helpful in monitoring the progress of the individual (Table 3).

The applications were further categorised in order to delineate functionality. This would then be helpful both to the patient and clinician (Table 4). The app names and which each of the category/ies they belong to is in Appendix 2. There are apps that feature in more than one category and this is due to their versatility.

The ADHD Treatment app provided many functions such as a ‘Daily Treatment’ record and treatment games as well as sections for clinicians and patients that inform them of what ADHD is and how it can be treated. It is, therefore, in our view, the most versatile app. It is useful for both the clinician as well as the person who is attempting to control the symptoms.

Discussion

In the search for literature when the “Attention Deficit Hyperactivity Disorder” was used there were articles whose primary focus was not necessarily dealing with the condition and when the abbreviation ADHD was used the search once more yielded the studies with the condition. Hence we are of the view that use of ADHD is a more elegant option compared with using, “Attention Deficit Hyperactivity Disorder” as a search terms. Furthermore the term ADHD was used, as this is the current terminology as per DSM IV¹. Although there were no articles related to ADHD apps, the use of electronic devices¹⁰ and web based systems in ADHD had been discussed¹⁶. The use of computerised decision aiding systems enhanced management in children with ADHD when compared with those who did not have the intervention¹⁷. Applications are viewed as an extension and enhancement

Category Name	Explanation
Cognitive Training	Aids in improving the speed at which the brain processes information, long-term memory, short-term memory as well as attention skills.
Conference	An application that informs clinicians of the venue and date of global conferences as well as the speakers at these events.
Diagnostic	A screening or testing tool that allows patients to diagnose themselves or help clinicians to assess whether their patient has ADHD
Educational	This broad category of applications involve mobile health tools that can inform and educate individuals on how to treat specific symptoms of ADHD.
Guidelines	Most commonly in eBook form, these applications provide patients with information on how to deal with ADHD symptoms
Journal	Either in the form of a magazine or article, these applications provide access to magazines or monthly journals. These can be viewed on a tablet and do not require internet access once the articles have been downloaded.
Productivity	Usually used as a category of applications dedicated to helping accomplish certain tasks whether it be for work or personal interest
Profiling	These applications allows users to create their own personal profile that only they or the clinician can access in order to keep track of progress of their specific condition
Reminder	This category of application provides customers with daily notices or prompts in order to remind themselves of completing specific jobs
Strategies	Similar to 'Guidelines'; however, these applications offer plans, recommendations and specific advice on how to treat ADHD.

Table 4: Explanation of categories for applications featured in Appendix 2

to aforementioned work. The apps we reviewed varied in their usefulness and functionality. The degree of user-friendliness is likely to depend on the individual's capacity to be technologically competent. The need for use of electronic methods has been highlighted using ADHD as an example¹⁸.

Most of the apps analysed during the research focused on the broad range of ADHD symptoms that patients require help with. The categories allow patients and clinicians to be aware of the vast array of different ADHD apps on the market. The subdivisions of the broad categories would further assist patients and clinicians in determining which apps are most suitable to their symptoms and needs. According to US databases, clinical treatment as well as medication for ADHD received by an individual can cost between USD 12,000 and 18,000 annually¹⁹.

The majority of the apps did not offer users the chance to record data or their health progress. Instead, they provided one test to confirm their condition and therefore the app became redundant

after just one use. We would, therefore, consider these as having limited utility value. However, they do provide a role in the ADHD gestalt.

Some common issues such as sleep problems faced by ADHD patients²⁰ were not addressed in the apps that were reviewed by the authors. However, such problems, although associated with the syndrome, are not part of the core symptom profile. Harrison and Goozee²¹ in their brief review found that psychiatry related apps in general were not based on theoretical principle and costs were identified as a deterrent factor in their utilisation. Our findings varied in that these apps were specifically based for ADHD and there were a number of apps that were free to the user.

Management of ADHD is multi-faceted²². Smartphone or tablet apps would form part of the treatment armamentarium. Hence, these mobile applications can help patients improve their productivity as well as provide more information and knowledge about their condition. Awareness on the part of the clinician and patient will enhance and add value to the management regime.

Although iPads and iPhones are widely used, we acknowledge that reviewing apps only from the Apple iTunes App Store is a limitation of this study.

Conclusion

ADHD apps for both iPad and iPhone are available with some that can be used only on the iPad. They assist in diagnosis, providing information, skill training, acts as *aide de memoirs*, and assists individuals in monitoring their condition. Most apps incorporated several of these functions. The basic costs vary between \$0.00 and \$11.00. App users need to select the most suitable based on their need. Evaluation of apps that are used on Android devices is made as a suggestion for future research.

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Name	Cost AUD
ADDitude Magazine	Free
ADHD 2013	Free
ADHD Angel	Free
ADHD eBook	Free
ADHD Guardian Angel	Free
ADHD in practice	Free
ADHD Lite	Free
ADHD News	Free
ADHD Test	Free
ADHD Test for iPhone	Free
ADHD Tracker	Free
ADHDToolBox	Free
Adult ADHD Screener	Free
MedOptimizer ADD/ADHD For Parents	Free
Robinson ADHD College Tracker	Free
ADHD Complete Guide	0.99
ADHD Guide	0.99
ADHD Maze	0.99
ADHD Test by PocketShrink	0.99
Adult ADHD	0.99
Coping with ADHD (Aimfire LLC)	0.99
Coping with ADHD (App Warrior)	0.99
ADHD Organizer (for ADD/ADHD)	1.99
ADHD Quiz	1.99
ADHD Survival Kit	1.99
ADHD Alarm	4.49
ADD8	5.49
ADD-ADHD, Memory and Bed Wetting	5.49
ADHD	5.49
ADHD Adult Trainer	5.49
ADHD Psychopharmacology	10.49
ADHD Treatment	10.49

Appendix 1: Cost of Applications

Categories (See Table 4 for explanation of each category)

Name of app	Categories (See Table 4 for explanation of each category)									
	Cognitive Training	Conference	Diagnostic	Educational	Guidelines	Journal	Productivity	Profiling	Reminder	Strategies
ADDitude Magazine			✓		✓	✓				✓
ADD8		✓			✓		✓		✓	✓
ADD-ADHD, Memory and Bed Wetting			✓		✓		✓		✓	✓
ADHD			✓		✓					
ADHD 2013		✓								
ADHD Adult Trainer	✓		✓			✓	✓			✓
ADHD Alarm	✓		✓			✓	✓		✓	✓
ADHD Angel	✓		✓		✓	✓		✓		✓
ADHD Complete Guide			✓		✓					
ADHD eBook			✓		✓					
ADHD Guardian Angel		✓				✓				
ADHD Guide			✓		✓					
ADHD in practice			✓		✓					✓
ADHD Lite	✓					✓				
ADHD Maze		✓			✓		✓			✓
ADHD News			✓		✓					
ADHD Organizer (for ADD/ADHD)			✓		✓		✓			✓
ADHD Psychopharmacology			✓		✓					✓
ADHD Quiz		✓			✓					
ADHD Survival Kit		✓			✓				✓	✓
ADHD Test		✓			✓					
ADHD Test by PocketShrink		✓			✓					✓
ADHD Test for iPhone		✓			✓					✓
ADHD Tracker		✓			✓		✓		✓	✓
ADHD Treatment		✓			✓		✓		✓	✓
ADHDToolBox		✓			✓		✓		✓	✓
Adult ADHD		✓			✓		✓		✓	✓
Adult ADHD Screener		✓			✓		✓		✓	✓
Coping with ADHD (Aimfire LLC)					✓		✓			✓
Coping with ADHD (App Warrior)					✓		✓			✓
MedOptimizer ADD/ADHD For Parents			✓				✓		✓	✓
Robinson ADHD College Tracker			✓		✓		✓		✓	✓

Appendix 2: More detailed classification of Apps