

JSAMR

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VOLUME 1 ISSUE 2

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LESSONS LEARNT FOUNDING JSAMR

p. 34

Balanced planning, failing fast, and iterating to achieve the best solution to a real world problem

APPS TO DETECT SKIN CANCER

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Cover image: are Apps better at detecting skin lesions that dermatologists?

ANATOMY OF AN ABSTRACT

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Our first education article covering how to write a scientific abstract

Editorial Board



Founding Editor-in-Chief

Matthew Byrne

MBBS, Newcastle University

Matthew's interest in academia was sparked following an audit in fourth year where he felt as though he could make an innovative difference in the clinical environment rather than rote learning symptoms, diagnoses, and management plans. He is now working as an Academic Foundation Doctor in Cambridge and aims to complete a PhD in the future and to pursue a career as an academic surgeon.



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5th year medical student, University of Leicester

Stephanie has a keen interest in Critical Care Medicine, and hopes to combine this with research throughout her training. She has undertaken an intercalated BSC in Cardiovascular research. She enjoys medical education, and has done work into reflective practise in medical students, and the use of high fidelity simulations in medical training.



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Helen is taking some planned time away from clinical medicine before starting foundation training. She currently works as a freelance consultant in health technology and business, mostly in the not-for-profit and public sectors, as well as in academic research. She is passionate about the potential for technology combined with evidence-based medicine to improve patient health and care, being one of the organisers of the longstanding NHS Hack Day series of hackathons. She graduated from King's in June 2017, having previously finished her BA in Natural Sciences and PhD in auditory signal processing at the University of Cambridge. From 2014-2017 she held a Pathfinder Fellowship from the RCPsych, and her main interests within medicine lie in psychiatry, neurology and public health. She likes Open, good science and common sense.



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4th year medical student, University of Birmingham

Godwin graduated from the University of Glasgow with a BSc in Anatomy and an interest in microglia. He believes that sexual dimorphisms in the brain have an association with the predilection of males to certain neuropsychological disorders. As an aspiring clinician scientist, Godwin hopes to expedite the bench-to-bedside process in the future.



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4th year medical student, Newcastle University

Sherilyn has an interest in paediatrics, and is planning to undertake SSCs and electives in children's health in the coming year. She has previously been Editor-in-Chief of a magazine for medical students, and is now looking to delve more into the world of medical journalism, with the hope of melding this with clinical practice in the years to come.



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4th year medical student, Imperial College London

Helena is keen on pursuing a career as clinician-investigator specializing in internal medicine. She is currently enjoying her intercalated BSc in Immunity and Infection and hopes to complete a PhD in the future. Besides being on the editorial board, she is involved in projects raising interest and encouraging engagement in research amongst medical students at her university.



Education Editor

Anna Harvey

4th year medical student, King's College London

Anna is now in her fourth year of medicine, having graduated as part of the first ever cohort of iBSc History of Medicine students at King's in 2017. She has a keen interest in medical journalism and is currently Editor of two medical magazines. As an aspiring clinician educator she has worked extensively with peer led teaching schemes and is a current Medics.Academy Fellow.



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Hadassah Buechner

1st year medical student, University of Oxford

Hadassah completed an undergraduate degree in Neuroscience, as well as leading the development of an App for students who self-harm. She is passionate about mental health, including exploring the interaction between body and mind. In the future she would like to explore how practicing clinicians can get involved with public health.



Education Editor

Anamika Banerjee

4th Year medical student, Imperial College London

Anamika is currently undertaking an intercalated BSc in Pharmacology and also has a keen interest in medical education. She is Academic Officer in Imperial College's Clinical Genetics Society, leading the development of tutorials and educational resources. She hopes to further develop her skills for research academia as she progresses through her medical career.

**Social Media Editor**

Arunima Batra

2nd Year medical student, King's College London

Arunima is a 2nd year medical student at King's with an interest in medical technology and medical education. She has a range of roles in student societies including King's Medtech, leading the organisation of major events on innovative topic areas such as artificial intelligence in radiology. She is passionate about teaching and in the future she hopes to get involved in strategies to improve medical education as she goes through her career.

**Information Technology Editor**

Brandon Smith

3rd Year medical student, King's College London

Brandon is now a 3rd year medical student after finishing an iBSc in Anatomy. A keen academic surgeon, he holds a number of roles in surgical societies, with a special interest in Neurosurgery as a potential career path. He has a strong interest in the fields of medical technology, and is currently working on a number of 3-D printing and virtual reality projects to augment existing surgical practices, and is keen to pursue a PhD in this field the coming years.



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Issue summary: Volume 1, Issue 2

Matthew Byrne^{1,α}

¹National Student Association of Medical Research, United Kingdom

^αCorresponding author: byrnem@nsamr.ac.uk

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We are delighted to present the second issue of JSAMR. You might be surprised it has come round so quickly, so are we! But since submissions had been opened for a while, there was too much content for just one issue. We aim to resume a regular publication schedule of every six months in our next volume.

We start this issue with an editorial article that describes the long, enjoyable (and at times tumultuous) journey we took when developing our journey from scratch. A must read for any aspiring leaders, who can learn from the process of building and leading a team undertaking a complex project.

For the first of the two review articles in this issue, Mussad writes a thought provoking article on the role of social media in pre-existing mental health disease. In an age where social media dominates and younger people feel as though they 'have' to be online at all times, the take home messages from this review are particularly important. Especially, given current issues in managing mental health in younger people, such as stigma and inadequate capacity to deal with a unique patient population, which results in unmet needs (Patel, Flisher, Hetrick, & McGorry, 2007).

Continuing the theme of the interplay between medicine and technology, Charalambides discusses the role that skin cancer applications have in detecting dermatological malignancy, and evaluates what is best for patients: an 'App' or a Doctor?

In our case report section, Ahmed and Nitiahpapand highlight a bizarre, seemingly underused, last line treatment to restore vision in keratinised corneas. It's not going to come up in your OSCEs but it demonstrates that even old procedures can still be beneficial.

We are starting our educational series with something simple, but no less important. The 'Anatomy of an abstract': because "if you can't do the little things right, you will never do the big things right" (McRaven, 2014). Our Education Editors Harvey and Banerjee deliver a masterclass in how to write an abstract, be it for submission for a conference or as a part of a manuscript, they have got your back.

We hope that this gives you the inspiration to write up and submit the project, audit, or poster that's been lying around.

Author statements

in this article.

Conflicts of interest statement

Matthew Byrne is the Founding Editor in Chief of the Journal of the National Student Association of Medical Students. He has held a role as Trustee of the National Student Association of Medical Students. He has received reimbursement for travel expenses, but no other monetary benefit.

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Lessons learnt from founding a journal: planning and iteration



Matthew Byrne^{1,α}

¹National Student Association of Medical Research, United Kingdom

^αCorresponding author: byrnem@nsamr.ac.uk

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Earlier this year I went on holiday to Romania, which might seem like an unusual place to go but one of my close friends had taken a year out and with money he had saved he bought himself a classic Mercedes car and was midway through his 'Grand Tour' of Europe.

In Romania, there is a famous driving route called the Transfăgărășan route, which was built by the Romanian Government to provide a route to the east of the country to allow rapid military deployment in case of invasion by Russia. This was the main reason we went to Romania, to drive on this road, Figure 1.



Figure 1: The summit of the Transfăgărășan route — a bit chilly.

Our journey started out well planned. We had packed plenty of water and food. The weather was good and the route was spectacular. As we started the climb, it started to get colder and the fog set in. At the summit it was snowing, progressed slowed, and at one point we thought we might have to get out and push — thankfully not! On the descent the weather improved, it got warmer, and we could take off our winter jackets. But then the ferry was cancelled because it was too windy, and we had to take a four hour detour to the nearest bridge. Begrudgingly, we drove as the sun set and arrived at our destination at two o'clock in the morning, after a total of 14 hours driving. But would we do it again? Definitely. Without a doubt.

Why am I talking about driving in Romania? I think it sums up the journey of JSAMR has taken perfectly. Even though we set out with the best of plans, when we started tackling the project we realised there were many things we had not accounted for, and even when we got through these rough patches other problems appeared, yet despite this we still reached our destination and enjoyed the process nonetheless. Our journey with JSAMR demonstrates that by having a balanced

planning process and taking an iterative approach to problem solving a project can be completed despite the occasional 'hiccough'.

At the start of every project there is at least a semblance of planning, and one of the phrases commonly attributed to Benjamin Franklin, "if we fail to prepare, we prepare to fail" (Agustin-Israel, 1996), largely holds true.

Broadly speaking people's approach to planning can be broken down into two types: 'doers' and 'thinkers'. The doers like to jump straight in, whereas the thinkers like to ponder all the possibilities before they decide on the best approach. There are pros and cons to each approach: if you do not spend anytime planning your project, you may end up going down completely the wrong route and waste time; conversely, if you spend all your time planning, you might make the perfect plan only for it to fail when it is implemented. For example, every medical student should know the theory behind venepuncture: wash hands; apply tourniquet; palpate vein; clean area; insert needle; obtain blood. But not every medical student can obtain blood on their first attempt. Why? Because they have not tested their theoretical plan in a 'real world' situation. They may know the perfect theory, but they do not know what to do when the situation is not perfect: where you cannot find a good vein; where the vein moves as the needle is inserted; where the blood stops flowing on the second vacutainer bottle.

Many entrepreneurs adopt an approach of "fail fast" when undertaking a new project (Giles, 2018). They accept that it is inevitable that something will fail because there are many things that cannot be anticipated when they are planning and "trying to predict, control, and eliminate variances is a losing game" (Giles, 2018). Instead, when undertaking a project one may as well accept that it will fail at some point and aim to get to that point as quickly as possible, so that time, energy, and money is not wasted. This approach proposes that the plan should be put into action in a real world situation as soon as is possible, so that it can fail. But failure's bad, right? Throughout our educational lives we've been taught that failure is the the worst thing that could possibly happen. This has resulted in an overemphasised fear of failure, which can lead to spending too much time planning and failure anyway. Instead, we should embrace failure, and this is where an iterative approach to failure is important: a plan is put into a real world situation as soon as possible; areas of weakness are identified; a solution is suggested and subsequently tested; and the process repeats. The solution will either work, fail, or demonstrate a new area of weakness in the project that was not predicted. Through this iterative approach of trial and error, the best solution to the real world problem can be arrived at as quickly as possible.

An example from our experience with JSAMR, were Section Editors. We initially thought that having Section Editors for each specialty would be the best way to oversee the Peer Review process for articles within that specialty. Our reasoning was that the Section Editors were selected from medical students with a specific interest in that specialty and so should be more familiar with those articles, which would help facilitate the peer review process. In theory, it sounded like a good solution as it could improve the quality of the review process, and so we interviewed and recruited 29 Section Editors to cover all the specialties. However, in reality we found that it simply did not work. There were too many people to communicate with and rely on for the Editorial team to ensure prompt progress of the Peer Review process. Reflecting on this, we should have tested our plan earlier and we would have seen that it failed earlier. Instead, we wasted time recruiting all the Section Editors before we realised.

When undertaking a new project, a careful balance must be struck between 'thinking' and 'doing' during planning. Once a plan is in place it should be tested as early as possible without a fear of failure and an iterative approach should be taken so that the best solution to the real world problem can be arrived at as quickly as possible.

Author statements

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Social media: a literature review of its impact on adolescents with mental health disorders



Basil Mussad^{1,α}

¹Barts and the London school of medicine and dentistry, Queen Mary University of London, London, United Kingdom

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^αCorresponding author: b.mussad@smd14.qmul.ac.uk

Abstract

Introduction: In the last few years, there have been several public enquiries into the impact of social media on mental health. The discussion of how the use of social media can affect adolescents with current psychiatric diagnoses has become relevant to the public interest. This narrative review explores three common psychiatric illnesses in young people: depression, body dysmorphic disorder, and attention deficit hyperactivity disorder, and how adolescents with these diagnoses are affected by social media.

Methods: Initially, three searches were conducted in PubMed (2012-2018) for articles with 'social media', 'adolescent', or 'teenager' used alongside the three terms 'depression', 'body dysmorphic disorder (BDD)', or 'attention deficit hyperactivity disorder (ADHD)' in the title or abstract; that were assessing the impact of social media on adolescent psychiatric disorders.

Results: The review shows that adolescents with psychiatric disorders are much more vulnerable to social media addiction and are more likely to partake in hazardous activities online. Adolescents with diagnosed depression who used social media excessively were more likely to be affected by social isolation, altered sleep, and low mood than those who do not use social media excessively. The progression of body dysmorphic disorder was shown to be accelerated by highly-visual social media such as Snapchat and Instagram, with hashtags and filters currently allowing unrealistic comparisons with peers. Social media addiction was also shown to exacerbate traits of impulsivity and disinhibition that are common in adolescents with attention deficit hyperactivity disorder with violence as a potential consequence.

Conclusions: Social media use has been associated with negative effects in adolescents with three common psychiatric disorders. Nevertheless, punitive action and withholding access to social media from adolescents is not a feasible option to solve this issue. However, further investigation is required into methods of positive engagement that can increase help-seeking and provide healthcare professionals with therapeutic tools that the patient can use when accessing social media.

1 Introduction

In the last decade, there has been an upsurge in the number of adolescents described as 'extreme internet users'. Technology and social media have recently become an integral part of 21st century adolescent life, with over 71% reporting regularly viewing more than one social media site (Lenhart, 2015). It is common for children to begin creating an online presence as early as eight years of age, and the impacts of this early exposure remain unknown. Clinicians and parents alike are becoming increasingly concerned about the impact of social media on adolescents today (Walsh & Walsh, 2017), and modern media articles reinforce these fears, with the British Broadcasting Company claiming, 'social media is bad for mental health' (Ridley, 2017). The Science and Technology Committee held a 2018 inquiry into the impact of social media on adolescents' mental health and well-being and concluded that the negative effects outweigh the positive effects (The Children's Commissioner, 2018). The aim of this review is to discuss the challenges faced by adolescents with three current psychiatric diagnoses when it comes to having an online presence and to pose future research opportunities into the topic.

The Organisation for Economic Cooperation and Development Wellbeing study demonstrated that in the UK, 37.3% of 15 year olds will use the Internet for longer than six hours outside of school time. These adolescents are described as 'extreme internet users' (Beardmore, 2015). The Office of National Statistics found a 'clear association' between mental health problems and length of time spent on social media (Frith, 2017). Sampasa-Kanyinga et al. showed that adolescents who reported an unmet need for mental health service support were statistically more likely to spend more than two hours a day on social media compared to those who have no identified unmet need for support. The study also found that individuals who spent over two hours a day on social media experienced more instances and increased severity of self-harm and suicidal ideation (Sampasa-Kanyinga & Lewis, 2015). A discussion into the impact of excessive social media use on adolescent mental health is imperative and the topic of several experimental studies and reviews. However, little is known about the impact social media and its excessive use has on an adolescent currently experiencing a severe mental health disorder, which will be discussed in this review.

1.1 Definition of keywords

'Feedback addiction' describes the difficulty of development while attempting to navigate a complex online world that provides instant gratification in the form of likes, comments, follows, retweets and shares (Wiederhold, 2017). The modern teenager gains instant approval through these platforms, but may not have the appropriate developmental maturity to differentiate this from real life relationships. Therefore, the insatiable need for approval can become an addiction and begin to impact their mental health.

'Social currency' is the measure of an individual's value based on their social media presence. Social currency can allow an individual to express themselves, launch and advertise personal projects and demonstrate their sense of individuality. However, if they receive negative reviews or their online pres-

ence is rejected, it is possible to lose hope and confidence. This can have a similar psychological impact to losing one's financial currency (Alecks, 2017). While an adolescent is experiencing emotional and physical development they must also contend with unpredictable relationships and the juxtaposition between dependence on authority figures and the gaining of independence. This makes it more difficult to navigate the online world whilst maintaining adequate mental health. In addition, adolescents with current psychiatric diagnoses remain vulnerable and can be more easily influenced by external factors. This leaves them at even greater risk of declining mental well-being because of social stimuli than those without a psychiatric diagnosis.

'Deliberate self-harm (DSH)', now recognised in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition as 'non-suicidal self-injury disorder' is defined as 'deliberate, direct, self-inflicted destruction of body tissue without suicidal intent and for purposes not socially sanctioned' (Zetterqvist, 2015a). DSH can occur alongside several psychiatric disorders, including, depression, post-traumatic stress disorder and eating disorders. However, it can be a unique clinical entity, entirely separable from other psychiatric diagnoses. Often patients will engage in DSH to somehow solve an interpersonal issue or escape from damaging thought patterns or emotions (Zetterqvist, 2015b).

'Suicidal ideation' is thoughts that one has about taking one's own life, and can range from a well-defined plan to a fleeting thought or feeling. Most people with suicidal ideation do not end up acting on their thoughts or feelings (Nordqvist, 2018).

'Depression' is defined as the presence of low mood, low self-esteem and anhedonia for at least two weeks, accompanied by at least five additional symptoms of depression, such as hypersomnia/insomnia, loss of concentration and loss of appetite (World health organisation, 2012).

Depression, DSH and suicidal ideation are distinct but inter-linked diagnoses/behaviours. In most cases, an adolescent will demonstrate one or two of them at a time. However, in some circumstances the patient will experience complex trauma and may demonstrate all three of these diagnoses/behaviours (Refaat, 2017).

'Body dysmorphia' or 'body dysmorphic disorder (BDD)' is defined as a distressing preoccupation with imagined or slight defects in body image and can be a distinguishable clinical diagnosis that can cause a patient significant psychosocial impairment (Bjornsson, 2010). Nevertheless, the link between body dysmorphia and eating disorders such as anorexia nervosa is strong, and it can often be the principal cause or trigger of the eating disorder (Phillipou, Castle, & Rossel, 2017). BDD is under diagnosed due to trends that lean towards a non-pathological preoccupation with exercise, fitness, and physical beauty.

Social media provides a daily platform for several overlapping and unhealthy messages related to attractiveness and weight management that can lead to rumination on the three fundamental symptoms of BDD:

1. Idealisation of a slender body image
2. An irrational fear of fat

3. A conviction that body image and shape are central determinants of one's identity

A meta-analysis showed a strong link between BDD and suicidality (Angelakis, Gooding, & Panagioti, 2016), therefore awareness of this disorder and its treatment are imperative for medical professionals.

'Attention deficit hyperactivity disorder (ADHD)', is defined by the National Institute of Mental Health as an ongoing pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning and development (National institute of mental health, 2016). ADHD is a common clinical condition affecting 3.62% and 0.85% of boys and girls aged five-fifteen, respectively (Asherson, 2017). It is often well controlled by medications and regular outpatient clinic appointments to review progress and any side effects. However, it can often be complicated by other psychiatric comorbidities that may mask the symptoms of ADHD (Arthur, 2009). ADHD is an important comorbidity that can act as an antecedent of anti-social personality disorder in adults (Loeber, Burke, & Lahey, 2002). These disorders are more difficult to define clinically as they can be recognised as traits of 'a troubled child' (Beauchaine & Neuhaus, 2008). Adolescents with conduct disorder tend to disrespect social norms and take little consideration of the rights of others; they are often dishonest and may cause damage to other people, animals, and property. An insecure attachment, involving an imbalance between the primary caregiver and the child in terms of receipt of comfort and care, is overrepresented in those with conduct disorder and anti-social personality disorder. This leads to an inability to regulate one's emotions and redirect one's anger appropriately (Theule, Germain, Cheung, Hurl, & Markel, 2015). The complex nature of a patient with ADHD and conduct disorder can lead to an increased likelihood of criminal activity and violent behaviours and can be a prelude to adult criminal activity (Underwood & Washington, 2016).

2 Methods

2.1 Data sources, search methods, sifting and validation

A PubMed search was conducted for relevant papers in June 2018 using the above-mentioned methods. Papers that highlighted the impact of social media using quantitative evidence were then included and backwards citation was used to identify further useful papers with any applicable theoretical information.

2.2 Refining the inclusion process

The screening process was refined following the initial search. For example, a more restrictive PubMed search that only allowed for the words 'adolescents' and 'social media' was extended to include the word 'teenagers' as an alternative, to allow for a wider net of included papers. In addition, having initially searched for those words within the titles of papers the search was extended to include those found in the abstract, to avoid missing relevant papers. This enabled a broader view to be taken of the topic to write this review. In addition, no studies were included that suggested social media as a cause

for any of the psychiatric disorders included, as this review is specifically looking at those adolescents who have a currently diagnosed psychiatric disorder.

2.3 Inclusion and exclusion criteria

Papers were included that were published in English, with a publication date (print or electronic) between 1 January 2012 and 1 June 2018. A six-year span was deemed sufficient to collect enough research on this novel topic. In addition, the rise of social media has been most prominent in recent years and knowledge of its impact of psychiatric disorders has not been studied widely prior to 2012. Popular social media platforms such as Snapchat and Instagram were not available to the public prior to this date (Royal society for Public Health, 2017). Three PubMed searches were conducted, all three had the words 'adolescents' or 'teenagers' and 'social media' in the title or abstract. This was done to narrow the search to ensure that the review was answering the appropriate questions about the impact that social media use has on adolescents, rather than children or adults. The additional words used in the three different searches were as follows:

1. 'Depression'
2. 'Body Dysmorphic Disorder' or 'BDD'
3. 'Attention Deficit Hyperactivity Disorder' or 'ADHD'

If the study mentioned 'adolescents' or 'teenagers', 'social media' and one of the above disorders within the title or the abstract it was included. However, if the study focussed on a different physical or psychiatric disorder it was excluded from the search. Controlled trials were also excluded if the studies were done on less than 100 patients or patients who did not fit the remit of an adolescent between the ages of 11 and 19 years (Ridley, 2017).

3 Results

In this section, a total of 39 papers are discussed and analysed, these were a mixture of review articles and primary research papers. Twelve articles on depression, 11 on body dysmorphic disorder (BDD) and 16 on attention deficit hyperactivity disorder (ADHD).

3.1 Depression

The link between excessive social media use and depression has been widely studied in recent years, with the idea of 'Facebook depression' coming to light on common media platforms. The idea of 'social comparison' was described as the main causative feature (Steers, Wickham, & Acitelli, 2014). Individuals will compare themselves to peers and rank their most positive and most negative qualities against those of others. This manufactures envy within an individual that has been shown to increase levels of anhedonia, a primary depressive symptom, in adolescents [vogel2014]. A cohort of 1,500 young people aged 11-25, were asked to track their mood whilst using the five most popular social media outlets; results showed that Snapchat and Instagram were the most likely to arouse feelings of inadequacy, with YouTube providing

the most positive influence. This is suggested to be due to YouTube content being unrelated to social status and the reduction in comparison with known individuals (Royal society for Public Health, 2017).

There has been less research into the impact of excessive social media use on those adolescents already diagnosed with depression and its correlated features. A six-month study showed a deterioration of low mood in depressed adolescents who used the Internet excessively: out of 628 respondents, 49% of teenagers reported lower mood and feelings of social isolation when they used social media (Van-den Eijnden, Meerkerk, Vermulst, Spijkerman, & Engels, 2008). Depression may influence the selection and maintenance of adolescent friendships, as teenagers tend to socialise with peers experiencing a similar level of depression, this is known as homophily (Kiuru, Burk, Laursen, Nurmi, & Salmela-Aro, 2012). Due to homophily, social media feeds are often individually tailored micro-societies of people with similar ideologies, and depressed adolescents may withdraw from existing social networks and seek solace with similarly isolated individuals (Nalin, 2016). Given adolescents' limited capacity for self-regulation and susceptibility to peer pressure, the risks of social media use are of special concern (O'Keeffe & Clarke-Pearson, 2011). An ability to view, share, and rate unrestricted content daily was shown to validate the posting of riskier content on social media to receive amplified validation and increase social currency. During a depressive episode, adolescents were found to publish hyperbolic posts and tweets more frequently than when not identifying as depressed (Mikal, Conway, & Hurst, 2017). 'Likes' and 'shares' from peers can somehow bridge a gap that is no longer filled by real-life relationships, exacerbating anhedonia, sleep deprivation and reduced appetite and augmenting risk-taking behaviours (Sherman, Payton, Hernandez, Greenfield, & Dapretto, 2016). One study showed several social media groups were dedicated to isolated individuals considering deliberate self-harm or suicide. Within these groups, there appeared to be an idolisation of people who may have successfully committed suicide and many groups had organised suicide pacts. Peer pressure and a sense of community reduce the doubts and fears of adolescents who are ambivalent towards the idea of suicide (Baume, 1997).

Adolescent and parental reports of social media use by depressed teens have shown an increase in reported loneliness and decreased help-seeking and decreased engagement with Child and Adolescent Mental Health Services with greater time spent on social media sites (Barry, Sidoti, Briggs, Reiter, & Lindsey, 2017). In addition, 2,293 adolescents diagnosed with depression were assessed for depressive symptoms and social media use at diagnosis and then one year later. For the purposes of this study, social media 'addiction' is defined as use of social media above six hours per day. They were divided into an 'incidence' group (125 participants), where the patient was not 'addicted' to social media at first, but developed the addiction after a year, and a 'remission' group (71 participants), where they were 'addicted' at initial research but were no longer addicted to social media after one year. It was found that the number and severity of depressive symptoms were more enhanced in the incidence group than those in the remission group. This suggests a correlation between high levels of social media use and increased depressive symptoms in vulnerable teenagers (Ko et al., 2014).

3.2 Body dysmorphic disorder

The growth of mass media, such as television, magazines and the Internet has a multidimensional link with negative self- and body-image. This issue is particularly pertinent when associated with a developing adolescent, who is struggling to come to terms with their own identity. However, there appears to have been a shift in recent years with the increasing popularity of social media. More specifically, highly-visual social media platforms such as Instagram and Snapchat, are being accessed more frequently. Repeated use of highly-visual social media, over two hours per day, was found to be related to internalising symptoms of BDD, with those using them the longest reporting the most significant body image concerns (Marengo, Longobardi, Fabris, & Settanni, 2018). Clinicians report that half of 14-24 year olds state that Instagram made them feel worse about their body image (Wakefield, 2018). In addition, image concern is exacerbated using popular hashtags on Instagram including, #thinspiration, #fitspiration and #bodygoals. These allow tailored images to appear on an individual's Instagram feed, accessing the most popular content first. Despite intending to motivate oneself to get healthy, these have an unintended detrimental effect on the most vulnerable adolescents, and those already experiencing BDD or eating disorders (Aziz, 2016).

A 'dieting mentality', with no discrimination of ethnicity or social class, is commonly demonstrated on social media, with constant portrayals of the positive features of being 'thin' and the negative features of being 'fat' (Roberts & Good, 2010). A study by Khanna and Sharma found that adolescent girls with BDD and a level of neuroticism, were much more likely to be affected by regular appearance-focussed internet adverts than those who did not have BDD, suggesting a vulnerability related to an emotionally charged, self-schema for appearance (Khanna & Sharma, 2017).

Rumination and excessive preoccupation with physical appearance can lead to significant impairment of the quality of life of an adolescent. There may be constant anxiety-led checking behaviours such as mirror checking or putting on excessive amounts of make-up. The steep growth of the selfie culture and the obsession with the 'insta-famous' has led to a constant need for verification, comparing one's flaws to others perceived perfection (Tiggemann & Slater, 2017). Filters and image manipulation techniques that were once only found in public advertisements now demonstrate an idealised image of beauty in an adolescent's peers, to which they have personal contact. Moreover, this rose-tinted image of one's peers can, for a vulnerable adolescent, be devastating for self-esteem and aggravate pathological ruminations (Olinek-Shemesh, 2017).

Adolescents who do not conform to the constructed image of 'beauty' or express alternative views, particularly in terms of 'diverse sexuality', can find themselves at risk of cyberbullying on social media. In an analysis of a 2016 study of 4,500 adolescents aged 12-17, those with BDD were more likely to be cyber victims as their posts were significantly more likely to relate to body image and this would attract a torrent of abuse that could impact even the most resilient of teenagers (Higgins & Wysong, 2018). Adolescents with BDD sometimes require constant reassurance regarding their perceived flaws. However, cyber bullying can maliciously focus on that which is most detrimental to the individual's self-esteem and this

can lead to alterations in the patient's entire thinking process, where reassurance no longer has a positive effect. This caused patients to avoid physical contact with their social support network, often having a major impact on their physical as well as mental health. They were shown to be unable to escape their virtual reality even to attend psychiatric appointments (Mufaddel, Osman, Almugaddam, & Jafferany, 2013).

Studies have shown that neurobiological factors are implicated in the development of BDD and with excessive social media use (Phillips & Menard, 2006). Abnormal serotonergic and dopaminergic functions can be caused by social media addiction and are linked aetiologically with BDD development. This leads to a self-perpetuating cycle, where BDD can make an adolescent more susceptible to social media addiction (Phillips & Menard, 2006). In addition, psychiatric comorbidity such as obsessive compulsive disorder, major depressive disorder and suicidal ideation are common in those with BDD and social media addiction. One study showed 79.5% of 126 subjects with a long history of BDD had experienced at least one of these comorbidities (Phillips et al., 2005).

3.3 Attention deficit hyperactivity disorder

The dependence of our culture on social media has had a marked impact on the development of adolescents. There is an increased focus on visual stimuli relative to audio communication and children are more likely to engage with short snippets of communication, disengaging from longer sentences or paragraphs. This shift is attractive to those adolescents who are diagnosed with ADHD (Weiss, Baer, Allan, Saran, & Schibuk, 2011). A prospective study of adolescents with psychiatric diagnoses showed that ADHD was the most significant predictor for the development of Internet addiction (Ko et al., 2005). One study showed that adolescents with ADHD demonstrated greater addiction than controls and were more distressed when screen time was taken away from them (Bioulac, Arfi, & Bouvard, 2008).

Traits associated with ADHD, such as disinhibition, low self-esteem, extraversion and impulsivity have been correlated with the addicted brain and with the presence of excess use of social media (Sun et al., 2009). Therefore, it is no surprise that the use of social media can provide solace and comfort for an overactive mind. Nevertheless, the vulnerable nature of the addicted adolescent with ADHD can cause several problems when it comes to social functioning as well as exacerbation of psychiatric symptomatology. For example, hours spent on the Internet can consolidate a child's impulsive nature, including their hyper-focused reactivity. Patients with ADHD can be more sensitive to reward pathways, with an apparent aversion to delayed reward and preference for immediate reward reported as an endophenotype of ADHD (Castellanos & Tanock, 2002). The opportunities for self-expression provided by social media sites provide ample incentive for overuse (Yen, Ko, Yen, Wu, & Yang, 2007). Social involvement is then reduced due to lack of impulse control, depriving the patient of creative activities that may condense the use of important brain functions such as working memory, attention, executive functioning and patience (Nimrod, 2013). This could lead to an exacerbation of ADHD symptoms and a reduced quality of life for the patient.

ADHD can often be accompanied by comorbidities such

as conduct disorder, substance abuse, anxiety and depression. Adolescent boys with ADHD reported greater frequency of conduct disorder symptoms, earlier age of onset and greater dependence on dangerous substances (Vitulano, Fite, & Wimsatt, 2012). In addition, excessive social media use has been repeatedly linked with decreased attention and hyperactivity; aggression and antisocial behaviour and poor sleep quality due to physiological arousal (Alava, Frau-Meigs, & Hassan, 2017). These effects make it much more likely for comorbidities and violent or risk-taking behaviours to occur. At risk youth are provided with abundant exposure to violent narratives that can shape a troubled mind. The use of 'hypermedia seduction', where vivid images of events that evoke psychological, emotional and potentially violent reactions are made familiar to young people online. This may offer them a cause or a purpose that is distorted from cultural norms (Alava et al., 2017).

Gang membership is easily formed on social media that can lead to 'identity fusion', where children with ADHD, who may previously have been 'solitary actors', find their need for belonging satisfied in a radicalised group identity (Swann & Buhrmester, 2015). The creation of these groups, such as gangs, leads to the illusion of 'extimacy', where virtual meetings and virtual encounters allow 24-hour access to intimate connections and predisposed adolescents can easily be coerced into public acts of violence or anti-social behaviour (Shapiro & Margolin, 2015). Social media is not shown as a cause of violent behaviour, but can encourage and exacerbate detrimental decision-shaping in an adolescent suffering from disorders such as ADHD.

ADHD has been shown to be more prominent in socially deprived, inner-city areas and often these children are affected by an insecure attachment as described by Bowlby (Wilson & Lipsey, 2003). Family difficulties, domestic violence, parental conflict or childhood neglect all lead to an insecure attachment and an overall feeling of rejection (Bowlby, 1988). Insecure attachments, lack of impulse control, and rejection by peers online provides a basis for adolescents to seek deviant peer cliques on sites such as Facebook, creating a narrow sphere of influence. Their newsfeeds feature violent videos, sexualised images, crime related statuses and inappropriate language. Soon the expectation is that this is 'normal' and creates an unbreakable cycle where the patient's self-worth lies simply in their aggressive actions (Allen, Moore, Kuperminc, & Bell, 1998; Damon, Lerner, Kuhn, Siegler, & Eisenberg, 2012). ADHD symptoms can lead to a reduced ability to weigh up the consequences that impulsive actions online may have on those around them. When an adolescent is exposed to a public platform such as Facebook, Twitter, or Instagram they have no choice but to prescribe to the 'anti-social child' label, to which they may have been assigned (Lillis, 2015).

4 Discussion

Although the construct of social media has not been shown to directly cause psychiatric illness, these online communities can cause vulnerable adolescents to become confined in a virtual reality that can exacerbate psychiatric symptoms. Social currency increases pressure on young people having to meet certain standards to achieve acceptance among their peer

groups, whilst feedback addiction in the form of likes, shares and retweets provides instant gratification to a child with an unsettled mind. Homophily causes all, to a certain extent, to narrow their online sphere to those whose views, experiences and interests most reflect their own. However, in the case of vulnerable adolescents, this is exacerbated by being subjected to the constant censure and judgement of their peers, which can increase feelings of isolation and depression. In addition, this social censure causes teens to seek out those who will 'accept' them. Examples could include being groomed by an older man, or seeking online communities in the form of violent gangs. Therefore, these online communities can encourage vulnerable adolescents to engage in more dangerous behaviours to gain the approbation of their 'virtual peers', even organising criminal activities or making suicide pacts.

Depression, body dysmorphic disorder and attention deficit hyperactivity disorder are illnesses that leave a patient vulnerable to the negative impacts of excessive social media use and have been described by several studies. However, there are increasing online social networks that are tailored to support these teenagers and are used as adjuncts to traditional therapies. One pertinent question could be: is there a way for healthcare professionals, schools, and web content developers to work together to utilise modern technological advances to provide more positive engagement and more active support networks for vulnerable users? This could be used particularly in the case of the most popular social media sites such as Facebook, Instagram, and Snapchat who could use external applications to enhance user-experience. Patients who find it difficult to engage with Child and Adolescent Mental Health Services and traditional methods may feel more connected to user-controlled therapies and online networks and thus promote help-seeking behaviours. The use of these and other therapeutic methods could also increase resilience, heightening the threshold required for professional intervention in milder cases, as well as being utilised by professionals as a tool during more severe psychiatric distress. Perhaps educational services and youth offending teams can be used to advance creative means of self-expression through social media, to improve mental health outcomes.

The promotion of creative expression is widely available on social media sites. Graphic design and website development are two such means that could inspire a more positive relationship between adolescents with mental health disorders and social media. When describing adolescents with mental health problems Claire Lillis notes 'these volatile young people are fragile and need consistent support networks. They must develop the self-esteem and interpersonal skills to become responsible adults with fulfilling careers and relationships' (Lillis, 2015). It is important to note that positive alternative engagement, rather than punitive restriction of social media use, is more likely to influence successful mental health outcomes. Further research is required into which methods of engagement are most beneficial to adolescents with specific psychiatric disorders.

4.1 Strengths and limitations

The search and data extraction methods used were thorough and overarching, providing a relevant overview of the literature on this important topic. However, although PubMed is

extensive, it is not exhaustive and some relevant papers may have been overlooked.

The topic of social media and its impact on adolescents with psychiatric disorders is novel and relevant. However, the fact that the topic is unique means that quantitative research was difficult to access and not many extensive studies have been conducted. Nevertheless, this highlights the importance of this review to establish this topic as a sufficient concern for researchers and clinicians to consider further.

Another limitation related to the lack of empirical data collected is that certain conclusions are speculative and leave room for interpretation. This means that researchers can use ideas emphasised within this review as a basis for further exploration. Positive aspects of social media on adolescents with mental health disorders were not explored in great depth. However, not much research has come to this conclusion.

The criteria of 'excessive social media use' is subjective and another potential limitation to this type of research. Different papers highlighted alternative cut-off points for what is 'excessive'. Following extensive research, a definition we would like to propose as 'excessive', is the use of social media for over four hours in a twenty-four hour period.

This review was also limited in that it does not highlight the many other psychiatric diagnoses that affect adolescents. The impact of social media is wide reaching and can affect those with other disorders such as bipolar disorder. On the other hand, by focussing on three of the most commonly impacted disorders the review could focus on specifically identified traits that can be affected by excess use of social media. The review was also able to link these three disorders to psychiatric traits such as suicidal ideation and deliberate self-harm that are common in adolescents with these diagnosed disorders.

5 Conclusions

This review highlights the impact of excessive social media use on adolescents currently diagnosed with depression, body dysmorphic disorder, and attention deficit hyperactivity disorder. Online risk taking behaviours are more prevalent in these cohorts, and more research is recommended into how this can be avoided. In addition, clear correlations were noted with symptomatic exacerbation linked with excessive use of social media, emphasizing the need for novel help-seeking methods that avoid serious consequences. This review recommends that utilisation of social media as a help-seeking resource, rather than punitive restriction of its use will improve the prognosis of these disorders for currently diagnosed adolescents. Further research is required into methods of utilisation.

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No conflicts of interest have been declared by any authors.

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Dermatology skin cancer applications: the future of healthcare provision?



Maria Charalambides^{1,α}

¹University of Birmingham College of Medical and Dental Sciences, Birmingham, United Kingdom

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^αCorresponding author: mariacharalambides@hotmail.co.uk

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Abstract

With 6.3 billion smartphone subscriptions estimated to be in use by 2021, the field of telemedicine and specifically teledermatology has begun a period of evolving growth and there is now widespread availability of skin cancer related dermatology applications (apps). The Aim of this review is to evaluate the benefits and limitations of skin cancer apps and teledermatology.

A variety of apps are available for public download. Examples of apps include teledermatology, photo storage, risk calculation, and educational apps. Apps that sent images directly to a dermatologist had the higher specificity and sensitivity (97% and 88% respectively). The second most effective apps (73% sensitivity and 83% specificity) use fractal theory analysis algorithms.

The benefits of teledermatology include education, encouragement of personal responsibility, effective triage, and provision of equitable services to remote areas. Early diagnosis results in up to 99% five-year survival, compared with 20% when diagnosed at stage 4. However, there is a lack of validation, regulation and scientific input into apps. Studies are required to evidence a safe and efficient teledermatology service in the UK.

As suggested by the British Association of Dermatology, teledermatology apps have benefits when integrated in care as a first step in early detection. Concerns regarding encryption of images and accountability for inaccurate diagnoses made by apps should be addressed. According to NICE, patients with potential skin malignancy should be seen in person by specialists. Therefore, apps can currently supplement but not substitute standard medical care.

1 Introduction

In the UK, 50% of dermatology referrals relate to skin cancer, with melanoma being the fifth most common cancer, accounting for 4% of incident cancers (Cancer Research UK, n.d.; Levell, Jones, & Bunker, 2013). Timely diagnosis results in 99% 5-year survival, compared with 20% if diagnosis occurs at stage four (Cancer Research UK, n.d.). Consequently, the

early detection of skin cancer is central to improving prognosis. With 6.3 billion smartphone subscriptions estimated to be in use by 2021, the field of telemedicine and specifically teledermatology has begun a period of growth and there is now widespread availability of skin cancer-related dermatology applications (apps) (Perednia & Brown, 1995; Senior, 2011). Although promising advancements are being made, the British Association of Dermatologists is concerned about their overall

effectiveness (British Association of Dermatologists, 2010). Acknowledging and evaluating the benefits and limitations of such apps is paramount to their future development.

2 Overview of applications available for download

A variety of melanoma-detecting apps are available for download by non-specialist users, ranging from teledermatology, photo storage/monitoring, melanoma risk calculation and skin cancer education (Kassianos, Emery, Murchie, & Walter, 2015). Studies report that diagnostic accuracy and sensitivity of melanoma diagnosis differs depending on the way the image is interpreted, with sensitivity ranging from 6.8-91.8% (Wolf et al., 2013). The methods with the higher sensitivity and specificity for melanoma diagnosis were those that sent the image directly to a dermatologist for analysis (88% sensitivity, 97% specificity) (Wolf et al., 2013). The second most effective apps (73% sensitivity and 83% specificity) used fractal theory analysis algorithms to assess the risk of pigmented moles by identifying geometric features of irregular shapes, including the number of distinct regions with different textures (Brewer et al., 2013; Maier et al., 2015). The algorithm recognises 'low-risk' lesions as having regular patterns compared to the varying textures and irregular borders of higher risk lesions (Brewer et al., 2013). These apps can subsequently advise those who score at least a 'medium-risk' to obtain a consultation and those with 'low-risk' to archive the mole and observe any changes (Brewer et al., 2013).

In the UK, the use of store-and-forward teledermatology has been proposed as a service delivery model to manage capacity demands as real-time teledermatology is not cost-effective (Wootton et al., 2000). TELEDerm is being increasingly implemented around the UK and following patient consent, general practitioners or nurses record a clinical history using the TELEDerm App and upload and send a dermatoscopic image to a secure server over Wi-Fi to be assessed by dermatologists or skin specialist general practitioners (Soyer et al., 2005).

3 Benefits of skin cancer applications

Teledermatology can educate users on skin cancer, encourage personal responsibility, and provide equitable services to remote areas, allowing primary care professionals to refer patients to secondary care from a distance (Perednia & Brown, 1995). As limited dermatologic expertise in rural areas increases the risk of skin-related death, the development of such apps means that patients could receive dermatologic advice and education without great travel expenses (Perednia & Brown, 1995).

Studies show that when high quality images taken by trained personnel (trained general practitioners or dermatology specialist nurses) are accompanied by a clear clinical history, teledermatology is an effective triaging tool (Halpern, 2010; Tan, Yung, Jameson, Oakley, & Rademaker, 2010). TELEDerm apps require a clinical history, which increases diagnostic accuracy from 57% to 70% (Oztas et al., 2004). The process is also time effective, taking four minutes with 95% of reports

being issued the following day (Soyer et al., 2005). Therefore, considering 88% of two-week wait referrals for suspected skin cancers are non-malignant, patients with suspicious skin lesions can be seen in the most appropriate setting at first appointment via the two-week wait, ensuring timely treatment and alleviating NHS pressures, especially with the current deficit of dermatologists (Cox, 2004; Tan et al., 2010). This integrated method of teledermatology using teledermatoscopy is the most effective way of using apps in care and is accessible for less technologically aware elderly, who have the highest rates of skin cancer (Garcovich et al., 2017; Halpern, 2010).

Apps focused on patient education are useful public health tools that can be used to raise awareness around skin cancer and administer prevention advice (Finch, Janda, Loescher, & Hacker, 2016). Photoaging apps have also been designed for melanoma prevention (Brinker et al., 2017). However, specific studies examining the effectiveness of such apps within risk groups from a range of cultural backgrounds are required (Brinker et al., 2017). Photo storage apps allow for monitoring of suspicious skin lesions, which can be useful to assess change over time.

With regards to future advancements, deep convolutional neural networks can be as effective as dermatologists at differentiating between benign naevi and malignant melanomas, providing promising opportunity for this mechanism to be incorporated into future apps (Esteva et al., 2017). The use of these apps could result in cost effective, early diagnosis, if they are implemented and regulated appropriately. For example, if the algorithm identifies the lesion as suspicious or is uncertain, users can subsequently be advised to gain expert advice via a consultation, leading to patients presenting to their dermatologist earlier (Brewer et al., 2013).

Additionally, mobile apps can also be used to aid physicians in clinical practice. The American Academy of Dermatology launched a mobile app to provide users with evidence-based guidance on which types of skin cancer cases are most appropriate for Mohs surgery, used to treat basal and squamous cell carcinomas (American Academy of Dermatology, 2017). Patient and tumour characteristics and risk are considered, whilst also providing an opportunity for patient education (American Academy of Dermatology, 2017). This ensures that the highest quality care can be delivered to those who will benefit most from Mohs surgery (American Academy of Dermatology, 2017).

4 Limitations of skin cancer applications

First and foremost, there are no rigorous UK published trials to confirm that teledermatology does indeed provide a safe, efficient service and so, it remains less advantageous than a face-to-face consultation with a dermatologist in the assessment of malignant potential (Gilmour et al., 1998; Piccolo et al., 2000, 1999). Despite studies reporting high rates of diagnostic accuracy using teledermatoscopy for suspected skin malignancy, uncertainty still exists in the diagnosis of melanoma using teledermatology alone (Levin & Warshaw, 2009; Moreno-Ramirez et al., 2007; Warshaw et al., 2009). According to the National Institute for Health and Care Excellence, the current practise for skin cancer diagnosis involves a thorough history and examination, dermatoscopic analysis

and histopathology (The National Institute for Health and Care Excellence, 2010).

There are issues surrounding the lack of validation, regulation, scientific and speciality input of the apps available for non-specialist users to download, leading to concerns about delayed and misdiagnosis, especially when a naevus is falsely identified as 'low-risk' (Levin & Warshaw, 2009). For example, amelanotic melanomas may not be correctly identified by the colour and pattern recognition software. Therefore, suboptimal app implementation and reliance on apps can severely compromise patient health, especially if users mistakenly believe that the app's evaluation is a substitute for professional medical advice (Maier et al., 2015).

Importantly, evidence surrounding the effectiveness of these apps is only focused on melanoma detection, limiting the extent of conclusions drawn. As pattern recognition apps are currently unable to recognise scaly, crusted or ulcerated areas, if the app reports that the patient is 'low-risk' for skin cancer, it is purely excluding a melanoma, without considering the possibility of basal and squamous cell carcinomas (Maier et al., 2015). Therefore, the diagnosis of these cancers may be missed, and treatment delayed, especially since users may not be aware of different types of skin cancer. Research has shown that such delay or failure in diagnosis combined with a lack of timely inclusion of a Mohs Surgeon, are the most common reasons for liability claims for Mohs Surgery (D'Souza et al., 2015). Closer coordination of care between non-Mohs and Mohs surgeons has been suggested to improve patient outcomes and reduce liability claims, but teledermatology apps could further hinder effective coordination, delaying diagnosis (D'Souza et al., 2015).

The inability of apps to construct differential diagnoses and recognise pre-cancerous conditions such as actinic keratoses and Bowen's disease, means that they will be reported as 'low-risk' by the app (Maier et al., 2015). Ignoring these lesions may postpone treatment and increase the likelihood of the patient developing a more advanced and difficult to treat cancer. Apps do not have capacity to differentiate non-cancerous pigmented lesions such as seborrheic keratosis, which may risk a false positive result (Maier et al., 2015). This will lead to pressures on the two-week wait system and create unnecessary anxiety for the patient (Wolf et al., 2013).

Apps which send images to dermatologists for review are limited in accuracy by the experience of the teledermatologist and user error (Brewer et al., 2013), whilst app algorithms only give reliable results when all distorting factors, including poor lighting and low image quality, were excluded (Maier et al., 2015). Specifically, large, ulcerated lesions or lesions surrounded by mottled skin or other naevi are difficult to evaluate, with ulcerated lesions inducing glowing (Maier et al., 2015). Additionally, users may also be concerned with the wrong naevi, focusing on those that are more noticeable and in exposed areas rather than more discrete lesions, which would be identified during full body clinical examination in a dermatology appointment (Kantor & Kantor, 2009). Therefore, the possibility of human error limits the accuracy of apps.

5 Conclusions

As suggested by the British Association of Dermatologists, the development of apps using teledermatology and fractal analysis has benefits when integrated into care as a first step in early detection, if they are used in a regulated, validated manner, with a focus on patient education (Maier et al., 2015). To avoid harm to users, apps should be reviewed to ensure that they do not deceptively claim accurate diagnosis or calculation of melanoma risk, and that scientific evaluation of apps is publicised. Concerns regarding accountability for inaccurate diagnoses made by apps need to be addressed. Encryption of images, patient consent to photographic documentation and strict adherence to European guidelines on information collection are essential considerations for teledermatology (British Association of Dermatologists, 2010; The European Commission and EU Member States, 2008). Further UK-based research into the efficacy, acceptability, and economic viability of teledermatology is required before it can be recommended as a widespread method for skin cancer triage (British Association of Dermatologists, 2010; Eedy DJ, 2001).

According to the National Institute for Health and Care Excellence, patients with potential skin malignancy should be seen in person by specialists (The National Institute for Health and Care Excellence, 2010). Therefore, apps can currently supplement but not substitute standard medical care.

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No conflicts of interest have been declared by any authors.

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All authors fulfill ICMJE authorship criteria, which can be accessed at <http://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html>. All authors have read and approved the final version, and accept responsibility for information published in this article.

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Keratoprosthesis — a case report on restoring vision in keratinised corneas



Rynda Nitiahpapand^{1,α,*}, Syed Naqib Ahmed^{2,*}

*Both authors contributed equally as first author

¹Bedford Hospital Trust, United Kingdom

²Eastbourne Hospital Trust, United Kingdom

^αCorresponding author:

rynda.nitiahpapand@bedfordhospital.nhs.uk

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Abstract

Background: Osteo-odonto-keratoprosthesis (OOKP) is a radical procedure that was developed 50 years ago by Strampelli, working uniquely for a hostile dry keratinised ocular surface. It is currently the keratoprosthesis of choice for patients with inflammatory corneal blindness, using the patient's own tooth root and alveolar bone to support a central optical cylinder. The cylinder replaces the optical elements of the eye, providing significantly improved image resolution and quality.

Case description: A 54-year-old Caucasian female presented with Stevens-Johnson syndrome secondary to a prolonged course of diclofenac. Initially the patient had symptoms of dryness, however this developed into left corneal perforation and required tectonic lamellar grafts. The grafts however failed, and the disease further progressed causing bilateral keratinisation, vascularised, scarred and thinning of her peripheral cornea. Her visual acuity was perception of light in her right eye and hand movements in her left. Due to the extent of her disease, she was suitable for OOKP in the left eye. After the procedure performed over 2 years, her final corrected visual acuity was 6/4 in her left eye.

Conclusions: This case report demonstrates the primary indication for OOKP and aims to increase awareness of the treatment option. It has the potential to dramatically improve the visual acuity in patients resulting in a better quality of life.

1 Introduction

Stevens-Johnson Syndrome (SJS) is a rare life threatening adverse reaction known to be induced by infection and drugs. Non-steroidal anti-inflammatory drugs have been implicated, however only a few cases relating to diclofenac have been reported in the literature (Shetty, Chatra, Shenai, & Rao, 2010). SJS can cause ocular surface inflammation and ulcer-

ation and destruction of the glands that secrete and maintain the tear film. This culminates in severe dry eyes that can be difficult to manage and is not indicated for keratoplasty due to the extensive corneal scarring (Jain et al., 2016). Osteo-odonto-keratoprosthesis (OOKP) is therefore an option in these patients.

OOKP is a radical procedure that was developed 50 years ago (Strampelli & Marchi, 1970), working uniquely for a hostile dry keratinised ocular surface. Keratoprosthesis in-

volves the surgical replacement of a diseased cornea with an artificial cornea. The OOKP aims to use the patient's own tooth root and alveolar bone to support a central optical cylinder. The cylinder replaces the optical elements of the eye, providing excellent image resolution and quality. It is currently the keratoprosthesis of choice for patients with inflammatory corneal blindness. Patients with corneal damage may initially report symptoms and signs including pain in the eye, light sensitivity, reduced and/or blurry vision and redness or inflammation of the eye. Severe corneal damage can be treated with penetrating keratoplasty (PK), a full-thickness transplant of the cornea from a donor corneal graft. However, PK is contraindicated for patients with complete loss of vision. OOKP is therefore an option in whom PK is not amenable in the treatment of damaged corneas. Indications for OOKP include patients with bilateral end-stage corneal blindness resulting from severe Stevens-Johnson syndrome, ocular cicatricial pemphigoid, chemical burns, trachoma, severe dry eyes and multiple corneal graft failure. OOKP is only considered in end stage corneal disease when no other options are available to the patient.

2 Purpose

The aim of this case report is to increase awareness of Osteo-odonto-keratoprosthesis as a treatment option for end-stage corneal blindness.

3 Case description

A 54-year-old Caucasian female, presented with Stevens-Johnson syndrome secondary to a prolonged course of diclofenac. Initial symptoms included itchy eyes with discharge, progressing to severe dryness and resulting in perforation of her left cornea, for which she required tectonic lamellar grafts (reconstructive grafts to preserve the corneal anatomy). Her grafts failed, due to a vascularised and scarred cornea. The right eye, previously amblyopic, showed reduced and delayed responses to light. Lid operations were performed to correct cicatricial entropions (outward eyelid rotation due to shortening of the skin and orbicularis muscle — anterior lamella). The result of the disease was bilateral keratinisation, vascularisation and thinning of the peripheral cornea. Ultrasound B scan revealed a normal vitreoretinal interface. Visual acuity was defined as perception of light in her right eye and perception of hand movements in the left eye. The patient was suitable for keratoprosthesis in the left eye. The two-stage procedure was subsequently performed over a period of almost 2 years, with an initial delay due to graft membrane thinning from infection. Her final corrected visual acuity was 6/4 in her left eye.

4 Procedure

Patient is assessed for previous ocular history. A and B scans are performed to ascertain an intact, functioning retina and determine axial length of eye. A psychological assessment of the patient is performed. Oral assessment for buccal mucosal membrane graft and selection of appropriate tooth to form

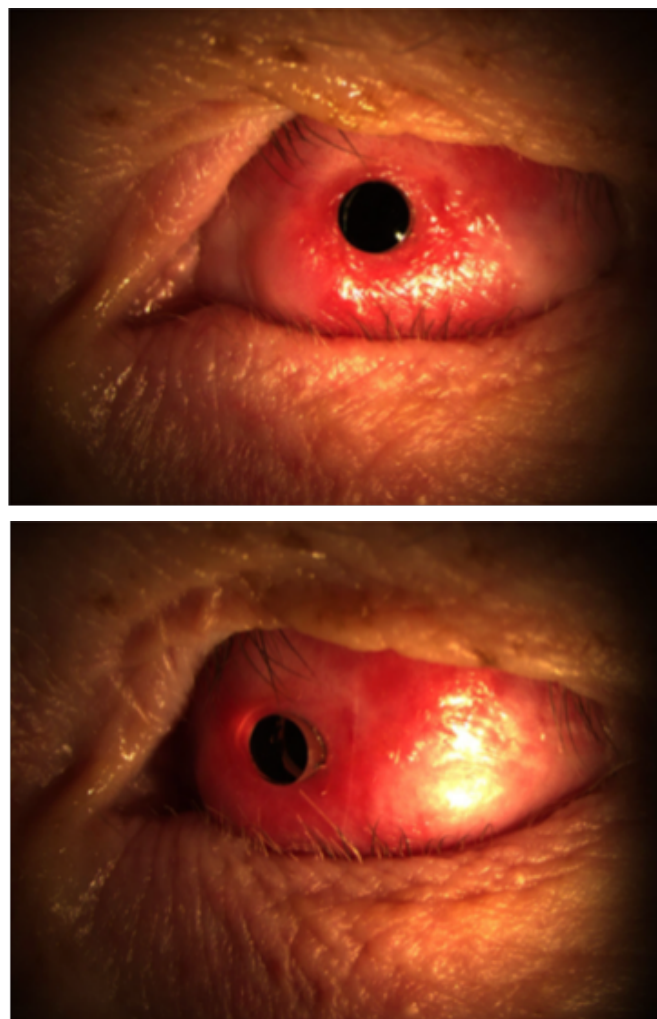


Figure 1: Left eye after the OOKP showing the prosthesis and corneal keratinisation, vascularisation and thinning. Entropion of the upper lid also noticeable.

lamina is then required. OOKP surgery is performed usually in two stages spaced two to four months apart.

Stage 1 involves ocular surface reconstruction and the fashioning of an osteo-odonto lamina and its optical cylinder. Buccal mucous graft is used to create a new ocular surface. Tooth root and surrounding bone form lamina. Lamina contains dentine on one side and bone on the other, with optical cylinder cemented in. Placed into sub-muscular pocket under orbicularis oculi muscle to acquire soft tissue covering.

Stage 2 involves retrieval of the lamina and insertion of device into the eye. Centre of cornea is marked and small hole trephined. Iridodialysis, lens extraction and anterior vitrectomy is then performed. Posterior lamina is inserted through central corneal hole and sutured onto the cornea and sclera. Mucosal flap is replaced with a hole for optical cylinder protrusion (Figure 1).

Following the OOKP, patients are monitored life-long to ensure the viability of the mucosa and lamina is maintained and to treat any complications.

5 Discussion

Despite being developed over 50 years ago, the OOKP enables patients to achieve vision of 6/12 or better (Liu et al., 2008) and can last up to 20 years (Falcinelli, Falsini, Taloni, & Colliardo, 2005). The durability of the OOKP is due to the preservation of lamina (Falcinelli et al., 2005). Lamina volume is important as it provides structure for the OOKP. Loss of lamina volume by resorption can cause changes in visual acuity, aqueous leak and endophthalmitis (Zarei-Ghanavati, Avadhanam, Vasquez Perez, & Liu, 2017). Lamina resorption rates can be up to 28% (Falcinelli et al., 2005; Tan, Tan, Tan, & Mehta, 2012). Methods to reduce resorption include bone augmentation using mandibular bone grafts (Iyer et al., 2015).

Other complications associated with the OOKP include basement membrane graft problems such as mucosal overgrowth, glaucoma (Liu et al., 2005) and retinal detachment (Hughes et al., 2008). The prompt treatment of these complications relies on close follow-up and patient recognition of signs and symptoms to preserve vision.

Nonetheless, synthetic laminae for the OOKP is currently being investigated. Preliminary reports have demonstrated promotion of cell adhesion and growth (Avadhanam, 2016).

6 Conclusion

This case report demonstrates the primary indication for OOKP and aims to increase awareness of the treatment option. It has the potential to dramatically improve the visual acuity in patients resulting in a better quality of life. However, these patients will experience a limited visual field, and complications of the procedure include glaucoma, retinal detachment and lamina resorption. Therefore, the procedure is only amenable in patients that have no other options of treatment. Life-long, meticulous, follow-up is required to detect these early and offer potential treatments.

7 Learning points

- Common medications can cause significant adverse events.
- Severe dry eyes can, if progressive and left untreated, lead to corneal perforation and blindness.
- OOKP is a viable treatment option for severe end-stage corneal blindness when other options have failed or are unlikely to be successful.

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No conflicts of interest have been declared by any authors.

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Anatomy of an abstract: a guide to writing a scientific abstract



Anna Harvey^{1,2,*}, Anamika Banerjee^{1,3,*}, Godwin Tong^{1,4}, Helena Brezovjakova^{1,3},
Stephanie Rees^{1,5}, Matthew Byrne^{1,α}

*Both authors contributed equally as first author

¹National Student Association of Medical Research, United Kingdom

²King's College London, United Kingdom

³Imperial College London, United Kingdom

⁴University of Birmingham, United Kingdom

⁵University of Leicester, United Kingdom

^αCorresponding author: brynem@nsamr.ac.uk

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Abstract

Introduction: Whilst many medical students become involved in research during their medical school careers, there is often little formal guidance on how to write this research up into a paper that is suitable for publication. Abstracts are often used for screening and selection of research by journals, conferences/meetings as well as the readers. Therefore, a good, clear abstract that accurately conveys research in an engaging manner is necessary to provide a competitive advantage for publication/poster presentation.

Methods: A non-systematic search of PubMed and Google was conducted to identify articles published prior to November 2018 that were relevant to writing an abstract.

Results: There are three main types of abstracts: informative, critical, and descriptive. Each is used under different circumstances to summarise different types of work. In this paper, provide worked examples of each of the different types of abstract and discuss the style and formatting of an abstract. Focus is also given to how to write concisely and develop an academic writing together, with additional tips on submitting an abstract to journals or conferences.

Discussion: This paper provides a comprehensive overview of the types of abstracts that medical students may need to write and how to write them. Whilst structure and content are of course important, the key to writing a good abstract is the ability to develop a concise, formal academic writing style, which takes practice. Specific journals and conferences may have their own rules on the style of abstract needed, and these should always be followed.

1 Introduction

An abstract is 'a self-contained, short and powerful statement that describes a larger work' (The Writing Centre & University of North Carolina at Chapel Hill, n.d.). They are found at the beginning of research articles published in journals, poster presentations, and during oral presentations of work in formal academic settings, such as conferences.

The purpose of an abstract is to provide a summary of the body of work described in an article, poster, or oral presentation. This summary may be used as a standalone overview of the work, to screen work for publication or poster presentation, or to help the reader quickly decide whether or not to read the full article or poster (The Writing Centre, 2018). Abstracts are also often the only part of an article that can be seen in online databases prior to accessing the

whole article. As abstracts are generally the first part of your research that will be read, it is crucial that they are well structured and written to convey the key aspects of your work (International Committee of Medical Journal Editors, 2018).

The approach to writing an abstract can differ depending on the type of abstract required by your piece of work. This guide summarises the three main types of abstracts and how each should be structured, as well as providing an overview of the style and tone of an abstract, and some useful external resources.

2 Methods

A non-systematic search of PubMed and Google was conducted to identify articles published prior to November 2018 that were relevant to writing an abstract.

3 Types of abstract

There are several different types of abstract, which can be broadly divided into: informative, critical, and descriptive (Labaree, 2018).

Informative abstracts are the most common type and are used by most research articles. They provide a formalised overview of the study, with distinct sections for each part of the study. As such, informative abstracts should be able to act as a surrogate for the study itself. They should not provide any new information that is not already in the main body of text and hence no references should be used in this type of abstract. Informative abstracts are used by most scientific journals and conferences, including those run by the National Student Association of Medical Research (NSAMR).

In addition to the study description that is provided in informative abstracts, critical abstracts provide an evaluation of the research and its relevance, validity, and reliability. Consequently, they are usually longer than informative abstracts (Labaree, 2018). They are designed to aid readers in deciding on whether or not to read the particular piece of work the abstract is critiquing, although they are not commonly used (Juhasz & Amminger, 1965).

Descriptive or indicative abstracts provide an overview of the scope and method of the research, but do not include results, evaluation, or discussion of the research. They are usually very short, and are rarely used in scientific papers. Descriptive abstracts can be considered an overview of the work, and may act as a substitute for a contents list (The Writing Centre & University of North Carolina at Chapel Hill, n.d.). Alternatively, descriptive abstracts can be used for reviewing books or films in an academic setting (Schall & John A Dutton e-Education Institute, 2014).

3.1 Informative abstract

The informative abstract has distinct sections for each part of the study, and should give the reader a summary of the pertinent points of the paper. The main sections are: introduction or background; materials and methods; results; discussion or conclusions. This is commonly abbreviated to the 'IMRaD' structure (The Writing Centre, 2018).

3.1.1 Introduction or background

The first section in the abstract is the introduction or background. It should be a brief overview explaining the background to your study, such as what research has already been done in this field and why your research is important. You should include the aims and hypotheses of your study in this section.

3.1.2 Materials and methods

The materials and methods section describes how the author has conducted their study; for example, the number of patients involved in a study and the type of study performed or the types of experiments that were performed.

In the case of experimental research, this would include description of the equipment and methods used, or for a data or patient project, this would include a brief description of inclusion or exclusion criteria, and the statistical tests you analysed your data with. For reviews (systematic or literature), the methods should detail databases you searched (e.g. Medline, EMBASE, CINAHL), the search terms you used, selection and/ or screening criteria used to identify relevant papers. When writing a systematic review, good practice is to refer to and follow the PRISMA checklist (Moher, Liberati, Tetzlaff, Altman, & Group, 2009a) and flow diagram (Moher, Liberati, Tetzlaff, Altman, & Group, 2009b). Some examples are given below:

Clinical

"Data were collected from 106 adults consecutively admitted to the ICU of a U.K. tertiary hospital and requiring exclusive EN ≥ 3 days. Protein targets based on local guidelines (1.25, 1.5, or 2.0 g/kg/d), nutrition prescription, and delivery were recorded for 24 hours between days 1-3, 5-7, 8-10, and 18-20 post-ICU admission." (Mitchell et al., 2018).

Experimental

"Methods. Left ventricular (LV) tissue of 24 patients with end-stage heart failure was obtained during cardiac transplantation. Gene expression of NOS II and endothelial NO-synthase (NOS III) was quantified by competitive reverse transcription-polymerase chain reaction and compared to tissues of five nonfailing donor hearts. Nitric oxide synthase II activity was determined by citrulline assay and related to changes in force of contraction induced by the β -adrenergic agonist isoproterenol, NO-donors and/or N-mono-methyl-L-arginine (L-NMMA), an inhibitor of NOS" (Drexler et al., 1998).

"Site-directed mutagenesis was used to mutate specific amino-acids in the GluN1 subunit of rat NMDA receptors. Mutant GluN1/GluN2A receptors were expressed in HEK 293 cells and were assessed functionally using patch-clamp electrophysiology. The responses of the mutant receptors to glycine and anesthetics were determined." (Armstrong et al., n.d.).

Systemic Review

"We searched CENTRAL, MEDLINE, Embase, LILACS, SCI-Expanded, BIOSIS for eligible trials comparing digoxin versus placebo, no intervention, or other medical interventions in patients with atrial fibrillation or atrial flutter in October 2016. Our primary outcomes were all-cause mortality, serious adverse events, and quality of life. Our secondary outcomes were heart failure, stroke, heart rate control, and conversion to sinus rhythm. We performed both random-effects and fixed-effect meta-analyses and chose the more conservative result as our primary result. We used Trial Sequential Analysis (TSA) to control for random errors. We used GRADE to assess the quality of the body of evidence." (Sethi et al., 2018).

It is important the methods describe what you set out to do, not what you found. Ergo, there should not be any results in the methods section. A common mistake is to state the number of individuals involved in the study in the methods when it was not predefined. For example, 'a retrospective study of 127 individuals was completed between the dates 16/1/18 and 15/1/19' when the author actually meant to say 'a retrospective audit was completed between the dates 16/1/18 and 15/1/19' and 127 individuals were found as a result of that audit. In the methods, it is possible however to include the calculated number of test subjects required to provide statistical significance in results. However, while the methods section in the main text of publications strictly follow these rules, solely including information on methodology, equipment, and conditions used, given the concise nature of abstracts, this rule is sometimes broken in abstracts and, as some published examples (see above) do include the actual number of subjects studies, which ideally should be included in the results section.

It is important to note that some journals require the methods to be written at the end (after the discussion) in the main body of text and sometimes in the abstract, so as mentioned before it is important to consult the journal or conference guidelines prior to submission.

3.1.3 Results

The results section of the abstract should highlight the main findings in your research. It should include the number of individuals the study involved and demographic details (if these were not predefined as part of the methods, as well as the most pertinent findings. These findings can be presented in a number of ways, for quantitative research this can be as raw numbers or percentages, with p values or power calculations included if relevant. If the research is qualitative, descriptive analysis can be included instead.

3.1.4 Discussion or conclusion

The conclusion is often regarded as the main part of the abstract and should summarise what the main findings of the research were and provide recommendations either of how to apply this knowledge or what further research might be required. This should be no more than a few sentences.

3.2 Example of a structured informative abstract

Anna Harvey et al. (2018) 'Abstracted to distraction: an imaginary retrospective cohort study,' *JSAMR*, 1(1), 1–2.

Introduction: Whilst many medical students become involved in some form of research during their medical school careers, there is often little formal guidance on how to write this research up into a paper that is suitable for publication.

Methods: In this study, we recruited a cohort of medical students who had written at least one scientific paper. Students were anonymously surveyed on their confidence writing abstracts using an online survey.

Results: 73 students responded and the study showed that 37 % of students surveyed rated their confidence writing abstracts as 'very poor', with a further 42 % rating their confidence as 'poor.'

Discussion: Based on these results, it is clear that students need more guidance on how to write abstracts. The authors recommend that all students wishing to learn how to write an abstract read the National Student Association for Medical Research 'Anatomy of an Abstract' article.

Word Count: 145.

3.3 Critical abstract

A critical abstract is generally written about a different author's work and contains all of the information mentioned above, but also an element of evaluation or critical appraisal of the study, which may include discussion of the reliability and validity of the results (Labaree, 2018). For this purpose, references can be included to provide supporting evidence for your arguments from relevant literature.

The critical abstract includes information regarding the article e.g. author, title etc. and then briefly provides their key findings/conclusion. The main content of the abstract then highlights the positives and negatives of the article.

Examples of things to consider here could include:

- How relevant is this research question?
- Is the hypothesis clearly stated?
- Type of study/trial/research?
- What is the sample size? Is it large enough to provide statistically significant findings?
- Were the methods used appropriate and justified? Could they be improved?
- Is the conclusion valid based on the evidence?
- Are there any conflicts of interests?

Provide your interpretations and opinions on what you thought of the author's work, what was good and what could have been done differently/what could be improved (Young & Solomon, 2009). Critical appraisal frameworks, such as the Critical Appraisal Skills Programme (CASP) checklists can

be used to guide your critical examination of a piece of work (CASP, 2018).

Usually in abstracts, references are not included, however in critical abstracts, as critical analysis of articles usually requires referral to other literature, this is sometimes accepted. Again check the guidelines as provided by the relevant journal/publisher.

3.3.1 Example of a structured critical abstract

Anna Harvey et al. (2018) 'Abstracted to distraction: an imaginary retrospective cohort study,' *JSAMR*, 1(1), 1–2.

Introduction: Whilst every study published in a scientific journal contains an abstract, little research has been done on the exact format, content and style with which an abstract should be written. This makes it difficult for authors to adequately summarise their work in an abstract.

Methods: In this study, the authors recruited a cohort of medical students who had written at least one scientific paper. Students were anonymously surveyed, on their confidence writing abstracts using an online survey, maintaining confidentiality. However, this method may have been subjected to selection bias, where those who have completed abstracts but not written a full scientific paper may be excluded. Use of online surveys may also contribute to selection bias, based on the fact that subject participation is voluntary and particular characteristics e.g. access to internet, whether the students view the site/email providing access to the questionnaire, time available for completion, etc., may differ per individual and hence reduce the representativeness of the sample regarding the medical student population (The Writing Centre & University of North Carolina at Chapel Hill, n.d.).

Results: 73 students responded and the study showed that 37% of students surveyed rated their confidence writing abstracts as 'very poor,' with a further 42% rating their confidence as 'poor.'

Discussion: Based on the author's results, it is clear that students need more guidance on how to write abstracts. The authors recommend that all students wishing to learn how to write an abstract read the National Student Association for Medical Research 'Anatomy of an Abstract' article. However, further controlled studies should be done to eliminate biases attributed to methodology in this cohort study to truly determine whether medical students lack confidence in writing abstracts.

References: 1. Nulty, D. D. (2018) The adequacy of response rates to online and paper surveys: what can be done? *Assess Eval High Educ*, 33(3), 301–14. doi: 10.1080/02602930701293231

Word Count: 272

3.4 Descriptive or indicative abstract

A descriptive abstract is different to the types of abstract described previously. They are usually very short, around 50–100 words. The key sections of a descriptive abstract are background, purpose and focus. Descriptive abstracts do not include results or discussion of results, and thus are rarely used in science papers (Writing Centre & The University of Adelaide, 2014).

3.4.1 Example descriptive abstract

Anna Harvey et al. (2018) 'Abstracted to distraction: an imaginary retrospective cohort study,' *JSAMR*, 1(1), 1–2.

Background: The writing and publication of research material by medical students is an area that occupies the time and efforts of the students themselves, but does not yet have a large evidence base.

Purpose: Consequently, it is important to undertake research that expands this body of knowledge.

Focus: This review aims to assess the confidence of medical students in writing up abstracts for their research, to gain a better overall picture of medical students' feelings about undertaking and writing up research.

Word count: 81

4 An approach to writing an abstract

Abstracts are usually written once the main bulk of the study is finished and when all results and conclusions have been written. This is because one will have a better understanding and feel of the paper after a draft is written, making the organisation of an abstract an easier task. However, some authors may prefer writing their abstract prior to writing the actual paper.

4.1 Formatting

The format of the abstract can differ per journal, so please check the requirements on the relevant journal's guide, this can usually be accessed online.

Some abstracts can be written with the subheadings for each section and this is known as a 'structured abstract'. Other journals do not require the subheadings and instead require a paragraph with all the content.

4.2 Style

The style of the abstract is the language, tone and tense used. It is essential that the style of your abstract is appropriate for publication, so formality is preferred. Developing a formal, academic writing style is important so that publishers and reviewers are able to make a judgement about the quality of your academic writing from your abstract. Having a good writing style also ensures readability and can help with concision.

The passive voice used to be the classic 'formal' method of writing, however academic writing appears to be moving more

Table 1: The key dos and don'ts of writing an abstract

Do	Don't
Make sure to look at the guidelines for the specific journal or conference.	Include lengthy background or introduction — save words for the main sections!
Include brief introduction, methods, results and conclusion where possible.	Include references in the abstract — the abstract should only summarise your work.
Emphasise the importance of your research and why it is relevant.	Use abbreviations or jargon that may be confusing to the reader.
Ask someone else to read it — to ensure it is coherent and reads well.	Include any images, figures or tables in the abstract.
Write concisely.	

towards the active voice (Bostian, 1983). The more direct approach of the active voice, which clearly describes what the author(s) or the work achieved makes the text easier to read and can also help to maintain brevity.

- Passive voice: The abstract was written by the stressed medical student.
- Active voice: The stressed medical student wrote the abstract.

Additionally, an abstract should not include any references, images or figures, unless specifically stated by the journal. One should also try to avoid using too many acronyms where possible, and these should always be explained in full the first time they are used.

4.2.1 Word count

For publications, abstracts are usually allocated a specific word limit. For most journals and conferences, including NSAMR, this is 250 words. Other journals and conferences have word limits ranging from 100 words to 400 words. For shorter word limits, it is necessary to be concise.

4.2.2 Writing concisely

Abstracts are short and sweet; writing concisely is key. This is a skill developed through practice, and you may need many revisions before your abstract is ready for submission to a publication or conference. Some strategies to consider when revising an abstract with the aim of reducing the word count could include:

- Cutting any descriptive words, e.g. 'very' or 'extremely'.
- Cutting linking words, such as 'that' or 'and.' These can often be replaced with punctuation, either a comma, semi-colon or full stop.
- Re-wording to reduce the number of words used to convey the same information.
- Minimise background information to allow for more words to be used discussing results and conclusions.

For example:

This field of study is extremely important for considering the general welfare of medical students all across the country, and, indeed, the entire world; and currently there is little or no published literature or case discussion on the effect that being involved in lots of research at medical school has on the overall satisfaction students have with their studies, and eventually their careers.

Word Count: 63

Which can be revised to:

This field is important for considering the welfare of medical students worldwide; currently there is little literature on the effect of involvement in research at medical school on student satisfaction regarding their studies and careers.

Word count: 36

5 Submitting your abstract

If you are writing an abstract with the aim of submitting your piece of work to a publication or conference, make sure to submit well within the deadline given; late submissions are very unlikely to be accepted (Lee & Kumar, 2006).

As previously mentioned, it is important to make note of any formatting or style rules outlined by the particular publication or conference to which you are submitting your abstract. Again, abstracts which don't adhere to any specific guides given are unlikely to be accepted.

6 Other useful resources

There are many online resources that can help you in writing up an abstract for your piece of work. A few of them are outlined below and you can also see Table 1 for a quick reference list of abstract writing tips.

- Most universities will have their own online guidance to writing abstracts in different departments - try looking at your university's online Library Services or similar for guidance.
- For another comprehensive guide to writing an abstract, see Writing Centre: How to Write an Abstract (Writing Centre & The University of Adelaide, 2014).

- For further tips on writing concisely, consider books such as 'To the Point' by Fiske (Fiske, 2002).
- If evaluating research for a critical abstract, CASP checklists can be used - see the Critical Appraisal Skills programme website (CASP, 2018).

7 Conclusion

Writing an abstract that contains all the necessary information needed to summarise research within a tight word limit is a skill that is a challenge for many students - and, indeed, even later career researchers. It is key to remember the structure of the particular type of abstract you are aiming to write and the content you need to include in your abstract. Other skills, such as writing formally and concisely, are developed mainly through practise, and you may need several drafts before it is ready for submission. This article helps facilitate students to select and construct the correct type of abstract for their various pieces of research, as well as provide them with a framework upon which they can build their own unique style of concise academic writing.

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