

What are people tweeting about orthodontic retention? A cross-sectional content analysis.

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### **Authors' contributions**

DA and PSF designed the study and undertook the pilot coding, DA coded the rest of the data. Interpretation of the results and writing of the manuscript was done jointly (DA, AJ, PSF). All three authors approved the submitted version.

## Introduction

Social media can offer valuable insight in relation to the perceptions and impact of medical treatments on patient groups. There is also a lack of information concerning patient experiences with orthodontic retainers and indeed little insight into barriers to optimal compliance with orthodontic retention. The aim of this study is to describe the content of Twitter posts related to orthodontic retainers.

## Methods

Publicly available tweets were prospectively collected over a period of 3-4 weeks using a bespoke social media monitoring tool. A total of 7037 tweets were collected, of which 827 were randomly selected for the analysis. Pilot coding was undertaken on a subset of tweets (n= 70) and a coding guide was developed. Tweets were iteratively categorized under the main themes and subthemes. The frequency of tweets within each theme and sub-theme was subsequently determined.

## Results

Out of 827 tweets, 660 were included in the analysis. Main themes identified included: compliance, impact, maintenance, patient-clinician relationship and, positive and negative feelings. Compliance with orthodontic retainers was the most frequently-coded theme (n= 248), with most reporting suboptimal compliance. The negative impact of orthodontic retainers on social and daily activities (n= 192), in addition to maintenance requirements (n= 115) were commonly referred to. Patients also frequently expressed feelings toward their clinician.

## Conclusions

Subjective experiences in relation to orthodontic retainers was commonly shared on Twitter. The majority of publicly-available tweets portrayed retainer wear in a negative light.

## Introduction

Increasingly, orthodontic retention is recommended on an indefinite basis implying that it may be a lifelong experience. Fixed retention has variously been linked to altered speech, discomfort, tongue irritation, hindrance of oral hygiene measures and esthetic concerns.<sup>1-3</sup> Furthermore, failure to comply with removable retention has been attributed to associated discomfort and hassle,<sup>4,5</sup> with embarrassment related to speech and esthetics also commonplace with removable retainers.<sup>6</sup> In spite of these barriers to retainer wear, relatively little is known about patients' experiences during the retention phase, especially in the long term, or indeed concerning factors affecting compliance levels.<sup>7,8</sup>

Recent estimates have suggested that two-thirds of orthodontists and orthodontic patients use social media.<sup>9,10</sup> Orthodontists use social media for advertising,<sup>10</sup> research dissemination<sup>11</sup> and patient education.<sup>12</sup> In contrast, patients' documented use of social media in the context of orthodontics has encompassed posting of videos on YouTube related to treatment<sup>13</sup> and tweeting concerning experiences with active appliances and aligners.<sup>14,15</sup> In terms of seeking orthodontic-related knowledge, surprisingly only 7-8% of prospective patients considered using the Internet or social media to access relevant information.<sup>9,16</sup> Social media content in relation to orthodontic retainers has not previously been investigated.

The perils of seeking orthodontic information have been highlighted with suboptimal quality of websites in relation to adult orthodontics, orthodontic extractions, pain and oral hygiene maintenance during orthodontic treatment identified.<sup>17-20</sup> Furthermore, a study evaluating recommendations given regarding retainer wear regimes exposed inconsistent advice.<sup>21</sup> This is important as patients increasingly seek medical information online,<sup>22</sup> and may use this information for self-diagnosis and behavioral alteration. The latter may be particularly influential for patients during retention as they may no longer be under the supervision of an orthodontist.

Twitter is a popular online social networking website established in 2006, with more than 300 million active users in 2016.<sup>23</sup> Twitter users can post and re-post tweets, and follow other users enabling social communication and networking. Twitter is seen as a safe space in which users can share real-time experiences, and nearly a quarter of orthodontists and orthodontic

patients use it.<sup>10</sup> Data derived from Twitter has gained little attention within the orthodontic literature, with isolated studies reporting on the content of tweets concerning orthodontic treatment and aligners, and bullying in relation to malocclusion and fixed appliances.<sup>14,15,24</sup> No studies have evaluated Twitter content with regard to orthodontic retainers. Analysis of Twitter posts is likely to portray experiences of retainer wear and may provide important insight into how compliance may be influenced by peer experience. The aim of this cross-sectional study is therefore to describe the content of Twitter posts related to orthodontic retainers.

## Materials and methods

Tweets were prospectively collected from publicly available posts on Twitter ([www.twitter.com](http://www.twitter.com)) using a bespoke social media monitoring tool (<https://www.brand24.com>). The search was limited to original English language tweet. Tweets containing the keywords "retainer or retainers" were collected over a period of 3 weeks (October 13th to November 2nd, 2016). This search yielded 6,900 tweets; these were exported and randomly ordered using MS Excel™, with 10 % randomly selected (n= 690). This number was anticipated to be sufficient to obtain thematic saturation based on previous research.<sup>25</sup> Thereafter, a follow-up search, in which tweets were collected over a 1-month period (December 2016) was undertaken to ensure no new themes emerged from the data, using the following keywords: "Retainers AND dentist" or "Retainers AND orthodontist". The later search yielded 137 tweets, and were all to be included in the analysis. The exported data included the tweet, date and time of posting, and the number of followers. Tweets were excluded if the content was unclear, not in English, irrelevant to orthodontic retainers or a duplicate. Pilot coding was undertaken on a subset of tweets (n= 70) by two authors (DA, PSF) to agree on themes. Reconciliation of disagreement followed joint discussion and an initial coding guide was agreed upon. If a link was provided in the tweet, it was investigated in order to better understand the content. Each tweet was categorized according to its content; in certain scenarios, tweets were categorized under multiple themes. In order to classify the tweeter into patient or professional, the public profile was checked as required.

## *Content analysis*

The data was categorized under initial themes (Table 1). When a new theme emerged, the list of themes was reviewed iteratively, refined and retested against the data. Frequencies of Tweets within each theme and sub-theme were subsequently determined.

## Results

Of 827 tweets, 660 were included in the content analysis (Figure 1). The included tweets were posted by 642 users, who had 483,458 followers overall. The themes most frequently referred to were compliance, impact, negative feelings and maintenance (Figure 2). Sub-themes were identified within each of these areas (Figure 3) with, for example, impact incorporating issues such as pain; social effects; issues with fit, eating and sleep; and gingival symptoms (Figure 3).

Compliance with orthodontic retainers was the most frequently-coded theme (n= 248). Non-compliance was reported 6 times more frequently than being adherent to retainer wear (n= 131 vs. 20). Some of the non-compliers reported not wearing their retainers for prolonged periods, extending to a few months and even to years (n= 53), while 18 tweeters reported not wearing their retainers for short periods of a few days, and three reported never wearing retainers after debond. Twenty-four alluded to relapse or the need for orthodontic retreatment as a consequence of non-compliance.

Barriers and facilitators to retainer wear were mentioned in some tweets (n= 40), with the most commonly-listed issue being forgetting to wear the retainers (n= 8). Conversely, the most common facilitator mentioned was fear of relapse and unwillingness to undergo orthodontic retreatment (n= 7). Other facilitators and barriers are listed in Figure 4. In terms of the impact of retainer wear on their daily activities or social life, pain or discomfort associated with retainer wear was referred to commonly (n= 107; Table 2).

Retainer loss was frequently reported (n= 47); of these, seven reported throwing away their retainers accidentally. In addition, specific reports in relation to retainer breakage (n= 18), misplacing retainers (n= 10), and damage by pets or during cleaning (n= 8) were delineated. On the corollary, finding previously lost retainers was described (n= 15) and modes of storage, including in pockets, wallets and cases, were alluded to. Issues associated with maintaining

optimal hygiene was also reported with both fixed and removable orthodontic retainers. While concerns with fixed retainers chiefly described difficulty in flossing, the issues with removable retainers were associated with the odor, taste and cleaning methods (n= 14).

Patients frequently tweeted about anticipating disapproval or actually being rebuked by their dentist or orthodontist for suboptimal retainer wear, inadequate flossing around fixed retainers, and for having lost or ill-fitting retainers (n = 16). Interestingly, being repeatedly asked by the clinician about their retainer wear was a common source of irritation (n = 7), while not being given the option to select retainer type was also mentioned (n= 1). Being dishonest regarding retainer wear was also alluded to (n= 9), with some recounting persuading their orthodontist that they were wearing their retainers as required and that their retainers still fitted. Four tweeters also pointed out that their orthodontist was unable to detect non-compliance, while just a single tweet referred to the orthodontist's ability to detect suboptimal retainer wear.

The majority of tweets portrayed retainer wear in a negative light, with most of these related to the experience of wear (n = 103), with a few also unhappy with the length of retainer wear or necessity for impressions (n= 8). Some tweeters explicitly expressed regret for either not wearing their retainers as required or for losing their retainers. There were considerably fewer positive (n=17) than negative (n= 126) tweets. Positive comments were related to excitement about tapering wear, or to graduating to night only wear. Few tweeted about being proud or feelings of accomplishment related to being compliant, while admiration for those more compliant was also mentioned.

Advice on the importance of adhering to retainer wear was emphasized by patients (n= 10) and professionals (n= 12). Professionals also tweeted about the rationale for retainer wear and storage (n= 4). The wear regimen was for "night time for long term" according to one orthodontic practice. However, there was a lack of consensus among patients regarding wear regime, with "every other day", "for life" and "night time" reported in single tweets. In general, tweeters did not seek advice regarding required wear time, with only one enquiry concerning the required length of wear. Comparison between fixed appliances and retainers were discussed (n = 6), with most preferring the previous. Five tweeters also discussed preferences regarding retainer type; most preferred fixed over removable.

## Discussion

Based on the number of identified tweets, it seems that Twitter is a platform in which experiences concerning orthodontic retainers are shared. However, the number of tweets from patients dwarfed those made by orthodontic practices and clinicians with the latter primarily using Twitter as an advertisement platform. The relative preponderance of patient tweets may go some way to explaining the negative overall impression of orthodontic retainers highlighted within the present study. The impact that this may have on compliance levels among social media users can only be speculated upon; however, further positive engagement in social media by clinicians may help to counterbalance this narrative. The issue of noncompliance with removable orthodontic retainers along with the associated effects on daily and social activities was identified in the majority of tweets. Moreover, this was found to induce feelings of regret, and anxiety among orthodontic patients. Interestingly, the nature of the patient-clinician relationship during the retention phase was commonly referred to.

The majority of tweets concerning orthodontic retainers posted by patients were in the context of sharing experiences, in keeping with previous studies concerning Twitter posts related to fixed orthodontic treatment, aligners, and dental pain.<sup>15,24-26</sup> Although a limited number of tweets related to seeking advice and expressing concerns, the number of patients accessing Twitter for specific orthodontic information remains unclear. Moreover, the methods that patients use to seek advice in relation to active orthodontics or indeed the retention phase remains incompletely understood. Stephens *et al.*, (2013)<sup>9</sup> highlighted that prospective orthodontic patients seek information from a range of sources including general dentists, orthodontists as well as written and electronic advice with 8% alluding to accessing information with regard to orthodontics on the Internet. It would be intuitive to expect, however, that those in the retention phase utilize less formal or established approaches to garnering advice as they may no longer have formal follow-up appointments.<sup>27,28</sup> Moreover, if patients are perusing social media and websites to seek information without professional clinical guidance, the availability of balanced, ideally evidence-based information would be preferable. This is especially important in the view of the lack of consistent advice given regarding retainer wear regimes available on other orthodontic websites.<sup>21</sup> Furthermore, the use of social media has proven effective in educating orthodontic patients and improving knowledge retention in previous research using YouTube videos;<sup>12</sup> social media may therefore

present an opportunity to clinicians to provide balanced, easily accessible information to orthodontic patients. Moreover, Twitter can be harnessed to promote positive behaviours by allowing patient interaction through contests or events,<sup>29</sup> and by relaying meaningful research findings to patients in a digestible manner. Nevertheless, there remains little appreciation of orthodontists' usage of Twitter; accessing and setting up an account can be done relatively easily.<sup>30</sup>

Quantitative analysis of the identified tweets suggested that numbers reporting not wearing retainers exceeded those reporting good retainer wear by a factor of three. While this figure is not likely representative of the orthodontic population more widely, the negative connotations associated with reports of problems associated with retainer wear should not be overlooked. Indeed, the impact of negative peer influence on compliance with glycemic control in diabetic patients has previously been reported.<sup>31</sup> The net effect, therefore, is likely to be detrimental and potentially disproportionate in view of the accessibility of publicly available tweets in comparison to the limited access to evidence-based research findings published through conventional written or electronic means.<sup>32</sup>

It is important to note that the time period elapsed without wearing the retainers is likely to have a bearing on the impact of non-compliance; this aspect was not always clear within this subset. In line with previous research, the most frequently reported cause of failure to wear retainers was simply forgetting to wear them.<sup>33</sup> However, follow-up appointments, good communication and the use of reminders were associated with improved compliance. Therefore, novel techniques developed to enhance compliance during the retention phase, such as text messages, e-mail reminders, or use of mobile applications, which may involve less exposure to formal follow-up appointments should be developed with an appreciation of these issues. Furthermore, some form of prolonged and regular follow-up should be encouraged. Notwithstanding this, the optimal intervals between and duration of follow-up required remain unclear.<sup>27,28,34-36</sup>

The present cross-sectional analysis does suggest that orthodontic retainers have an impact on daily and social activities, such as pain and embarrassment related to esthetics and speech, and difficulty in maintaining oral hygiene around fixed retainers.<sup>3,6</sup> However, a number of



previously unreported issues including teasing, embarrassment during their removal in public and displacement due to sneezing and during sleeping were exposed. Furthermore, symptoms related to the gingival health such as pain and bleeding, allied to concerns related to the smell and taste of removable retainers were reported. Furthermore, loss or damage of removable retainers were frequently referred to, the latter is in line with previous research in which mean retainer survival did not exceed a year.<sup>37</sup> The provision of spare removable retainers following removal of appliances has been suggested to remedy this.<sup>38</sup>

The role of the treating clinician in improving compliance was apparent. This reinforces previous research which has confirmed that the dentist-patient relationship is instrumental in enhancing compliance with orthodontic adjuncts.<sup>39-41</sup> The importance of clear and realistic delineation of the implications of retainer wear with both fixed and removable retainers during is clear. By extension, it may be reasonable to consider giving patients the option of selecting retainer type in certain instances, especially in the absence of high-quality evidence to support the use of one type of retainers over the other.<sup>8</sup>

The present analysis involved an assessment of patient perspectives; previous research in orthodontics has exposed that a limited number of studies involve patient-centred analysis, with questionnaires being the predominant method used.<sup>1,6</sup> The latter approach can risk recall bias in view of the time-lag between the experience and the timing of the study. A further limitation is the risk of response bias in which the patient may try to please the clinician. As such, an analysis of Twitter is powerful as it reflects unvarnished, real-time experience of orthodontic patients. Notwithstanding this, the possible limitation of using Twitter as a source of data is selection bias, in which the characteristics of patients posting about their experience with retainers are not necessarily representative of the population. Furthermore, it was not feasible to identify the demographic data, as this is dependent on information shared by the user. Another challenge, was the inability to determine whether patients were referring to fixed or removable retainers in some tweets, and indeed the specific type of removable retainer. Although the sample size in this study was low compared to other studies including data from Twitter posts<sup>14</sup>, it was sufficient to allow for thematic saturation. Furthermore, in this study, coding was performed manually. The use of sentiment analysis software can aid in categorizing tweets into positive, negative or neutral; however, it does not facilitate in-depth

understanding of the context. Furthermore, the lack of ability to detect irony, sarcasm or the ability to understand of unusual use of words and phrases is a major limitation with sentiment analysis software, ensuring it is not a substitute for detailed individual review of comments.<sup>42</sup>

## Conclusions

Negative experiences in relation to orthodontic retainers are extensively shared by patients on Twitter. In particular, negative social effects of retainers and impacts on daily activities in addition to maintenance requirements were mentioned, while the impact of the clinician-patient relationship was also commonly referred to. In view of the growing reach of social media, as well as the negative portrayal of orthodontic retention, the importance of offering balanced and useful professional orthodontic information is clear.

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Figure captions

Figure 1. Flow diagram of the included tweets

Figure 2. Frequency of tweets within each main theme

Figure 3. Distribution of tweets within each theme and subtheme

Figure 4. Facilitators and barriers to retainer wear

Table 1. Main themes, with associated definition and a relevant representative tweet

Main themes	Definitions	Representative tweets
Compliance	Indicates retainer wear status, consequences of poor compliance, barriers or facilitators.	“Omg i just realized Ive been forgetting to sleep with my retainers in... for like.. the last three years”
Impact	Illustrates the effects of retainers on daily activities or social life.	“the dentist told me I need to start wearing my retainers again... cant wait to look nerdy w ugly lips”
Maintenance	Refers to the care needed to maintain or avoid the loss of orthodontic retainers.	“Flossing with permanent retainers is difficult. I should be paid for this. I made my orthodontist so much money”
Patient-clinician relationship	Concerns the ease or difficulty in dealing with or accessing clinicians, or describes the quality of communication between patients and clinicians.	“when your orthodontist says you can start wearing your retainers at night only but youve already been doing that”
Positive feelings	Any tweet related to retainer wear expressed in a positive tone.	“feel so accomplished for having worn my retainers every night this week lol”
Negative feelings	Any tweet related to retainer wear expressed in a negative tone.	“I HATE HATE HATE HATE HATE RETAINERS”
Miscellaneous	Any tweet providing information not categorized within the main themes.	“Dentist tomorrow to pick up retainers and finally get this ... screw out my jaw then post brace life officially starts”

Table 2. Impact of orthodontic retainers on daily activities and social life

	Negative impact	Positive impact
<b>Pain</b>	Pain attributed to recommencement of wear following a period of no wear, subsequent to retainer adjustment, during retainer removal, or related to broken fixed retainers (n= 107)	Less pain with increased retainer wear (n= 1)
<b>Gingival health</b>	Gingival pain and bleeding (n= 7)	-
<b>Quality of fit</b>	Difficulty of removing, or wearing both maxillary and mandibular retainers at the same time (n= 16)	Retainers fitting well (n= 1)
<b>Speech</b>	Stuttering and lisp (n= 25) Teased about altered speech (n= 1)	-
<b>Eating</b>	Inability to eat with retainers in place, eating for long periods interfere with retainer wear and mistakenly chewing food while retainers <i>in situ</i> (n= 15)	Avoid binge eating (n= 1)
<b>Embarrassment</b>	The necessity to remove retainers prior to meals, being displaced due to sneezing or excessive salivation (n= 3)	-
<b>Appearance</b>	Being described as “nerdy” or having “false teeth” (n= 6)	Appearance of fuller lips (n= 1)
<b>Sleeping</b>	Retainers displaced during sleep (n= 10) Difficulty in sleeping (n= 2)	-