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**Propensity of Using Direct-to-Consumer Orthodontics on Perceived and Desired
Orthodontic Needs: A Survey of US Army Soldiers**

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Objective: This cross-sectional study aimed to assess Soldiers' perceived need of orthodontic treatment and propensity to seek care using direct-to-consumer (DTC) products versus orthodontic providers.

Methods: A 9-item questionnaire was administered to 378 Soldiers from Fort Sam Houston. Descriptive statistics were compiled.

Results: 267 (70.6%) Soldiers reported they did not need orthodontic treatment, whereas 111 (29.4%) respondents did. Among those 111, 85 (76.6%) members expressed an interest in receiving care using DTC products. However, only 24.7% (21) of those 85 members preferred care provided by using DTC products than by orthodontists or general dentists.

Conclusions: Nearly one-third of Soldiers surveyed indicated a propensity to seek orthodontic treatment. For those who would pursue orthodontic therapy, three in four respondents would consider DTC products and only one in four respondents would prefer using DTC products over treatments provided by orthodontic providers.

INTRODUCTION

Dental readiness is an integral component of individual medical readiness and deployability. To achieve dental readiness, military dentists are responsible for ensuring all soldiers are free of existing and potential dental disease expected to become a dental emergency within the next 12 months.¹ Military dentists, therefore, are pivotal in sustaining warfighters' oral health and conducting comprehensive oral assessments to include surveillance of epidemiology resulted from battle injuries and non-battle diseases. In addition, military dentists work diligently with unit commanders. Together, they share the responsibility with the soldier, ensuring each soldier receives an annual dental exam, to assess dental fitness. If treatment is recommended, the soldiers then receive immediate and "patient-focused" dental care so the risk of dental emergencies while deployed is prevented or minimized.

The scope of practice for military dentists is complex and is constantly evolving with challenges from patient expectations, emergence of new technologies, and the ever-changing, multi-domain landscape of military operations. However, military dentists are still underutilized. In a recent study by Carter et al. (2022)², amongst the different dental specialties, the role of military orthodontists in treating post-warfare or other craniomaxillofacial injuries is vastly under-exploited. Furthermore, there is a growing demand for orthodontic care in the military community, seeking treatment to restore dental malocclusions and to improve teeth and smile esthetics. This desire for straight teeth has led some soldiers to engage in do-it-yourself (DIY) orthodontics. Soldiers are proactively seeking care from direct-to-consumer aligner companies that offer less expensive services – whose products are delivered to "your

doorstep” without having to visit a dentist or orthodontist. In some cases, this decision results in misaligned occlusion, loss of bone and gingival tissues, and threatens the dental readiness of the soldiers.

Briefly, malocclusion, which includes crowded and misaligned teeth, is a dento-facial “handicap”. It affects not just esthetics but also oral function, facial harmony, and psychosocial well-being. For example, past studies^{3,4} have attributed malocclusion as the culprit for a lesser quality of life, resulting in low self-esteem, heightened insecurity, and increased level of social withdrawal and anxiety. Additionally, crowded dentitions and misaligned teeth can obstruct good oral hygiene practices. Consequently, poor oral hygiene can exacerbate dental problems such as pain or infection caused by caries, pericoronitis associated with impacted wisdom or canine teeth, or bleeding and inflammation of gingival tissues as a result of acute gingivitis and periodontitis.^{5,6} Also, service members with dental malocclusion may have an increased prevalence of dental trauma because traumatic dental injuries are significantly associated with malocclusion such as increased overjet and overbite.⁷ These behaviors and consequences can certainly degrade wellness beyond just the oral cavity and can impede a soldier’s overall ability to complete his or her mission.

With a growing prevalence of malocclusion, it is unsurprising that more military service members and their families are seeking orthodontic treatment than ever before. Unfortunately, there are simply not enough orthodontists in the military healthcare network, whereby the demand and supply ratio is far insufficient. The Army currently has just 24 billets for orthodontists to serve a population of nearly a half million Active Duty soldiers.⁸ Because of this scarcity, military orthodontists often have a long patient priority list or “waitlist”, and they must be meticulous in patient selection, ensuring that the most severe and time-sensitive cases are being treated first. If time, manning, and availability allow, only then, additional patients are selected from the next tier of the repository, based on case severity. Many of the patients screened are turned away from military orthodontics because their case is not complex enough to meet the severity threshold established by the practice, and if a space becomes available, the soldier may not have enough time on station to be treated at that point.

For the motivated soldiers with moderate to less severe orthodontic problems, this leaves the option to search on the economy for orthodontic care, which likely will be paid completely out-of-pocket. The average price of braces in the US is around \$5,500.⁹ Alternatively, a quick internet search produces multiple Direct-to-Consumer (DTC) “orthodontic” providers, boasting clear aligner therapy with attractive costs of around \$2,000.¹⁰

Both the American Dental Association (ADA) and the American Association of Orthodontists (AAO) have passed resolutions, alerts, and warnings against unsupervised dental treatment such as the services rendered by “direct-to-consumer” (DTC) orthodontics. Amongst the military orthodontist profession, there is a real concern about whether those soldiers who seek DTC services understand the undue adverse effects of DIY orthodontics. Ubiquitous advertisements for aligner therapy is quite appealing to the esthetically minded adult population and the use of aligners is a common practice today among orthodontist and general dentists. Trends in DTC aligner use have been reported and analyzed in the civilian population, but no study has examined the influence of DTC products on the military population.

This study aims to determine today’s soldiers’ perceived need of orthodontic treatment, their propensity to seek care outside military means, and the reasons why they would choose DTC products with the hypothesis: If soldiers perceive the need for orthodontic treatment, they have equal interest in receiving care from DTC products. Given the risks of DTC orthodontics to dental readiness, the results of this study may require action from the Army Dental Corps to warn of the potential consequences.

MATERIALS AND METHODS

This study was reviewed by the Institutional Review Board (IRB), 59th Medical Wing, and was determined to be IRB exempt research, meeting the criteria under 45 CFR § 46.101(b), including waiver of informed consent. Also, the study protocol was approved by the commander of the local military treatment facilities.

The study used a cross-sectional design. Data were collected for 4 months, from June to October 2021. All participants were recruited voluntarily with no incentive offered, and no direct identifiers were collected. A 9-item paper questionnaire was developed and underwent multiple rounds of internal review and editing by the orthodontic staff at the Tri-Service Orthodontic Residency Program, Joint Base San Antonio-Lackland, Texas. The survey (Addendum) was then issued to active duty soldiers presenting for treatment or annual examination upon check-in at two different dental clinics on Joint Base San Antonio-Fort Sam Houston, Texas. Each participant upon completion of the questionnaire was given an information paper on the risks of DTC orthodontic care.¹¹

Statistical Analysis

Data were recorded onto Excel spreadsheets (Microsoft Office Professional Plus 2016, Microsoft Corp, Redmond, WA) for analyses. To reduce clerical transcribing error, the entered data were re-verified by another researcher. The respondents were categorized into officer and enlisted ranks and female and male genders. Pearson's chi-squared test was then used to determine whether officer versus enlisted ranks as well as female versus male genders form different opinions for the following questions: "Do you think you need orthodontic treatment (braces/aligners)?" ; "How would you describe your condition?" ; "Why you haven't received orthodontic treatment yet?" When a significant association ($p < 0.05$) was found between an opinion and one or more levels of categorization, odd ratios and 95% confidence intervals were calculated. Preference by what or by whom the participants would rather receive orthodontic care were assessed using the Kruskal–Wallis test followed by the Steel–Dwass multiple comparison test. Statistical analyses were performed using JMP software (version 15.2.0, SAS Institute Inc., Cary, NC)

RESULTS

A total of 378 soldiers from Fort Sam Houston participated in the questionnaire. Of these 378, five did not indicate one or a combination of their rank, gender, age statuses. Demographics for this sample are shown in Table I. There was a slightly greater number of enlisted soldiers (E1-E8), particularly in the ranks of E5-E8 compared to officers to include warrant officers, and nearly double the amount of males to females in all rank groupings. Youngest ages typically correlated with the lower enlisted ranks of E1-E4 where the mean was 25 ± 5 , and oldest age group was found in the field grade officers (O4-O6) of 43 ± 7 .

Question 4: *Do you think you need orthodontic treatment?*

When given a dichotomous endpoint, 111 soldiers (29.4%) out of a total 378 participants responded "yes" and 267 (70.6%) soldiers reported they did not need orthodontic treatment. When analyzed based on soldiers' ranks, the odds of a soldier who tends to say "no" in self-perceived need of orthodontic treatment are less for Enlisted than for Officer. However, no significant difference in self-perceived need for orthodontic treatment was observed between female and male. Individuals who were currently receiving orthodontic treatment were prompted to select "yes" to this question. Those individuals who responded a "no" were instructed not to continue with the survey and those who selected "yes" were then requested to answer question 5.

Question 5: *How would you describe your condition? Mild, Moderate, Severe*

Of all the participants that responded to question 5, more than half (Enlisted + Officer = 60.8% or female + male = 60.0%) perceived themselves as having mild conditions of malocclusion, whereas 32.7% reported moderate conditions. Only 6.5% of Enlisted and Officer and 7.3% of female and male were self-evaluated to have severe conditions. However, neither their rank ($p = 0.9209$) nor gender ($p = 0.5652$) has been found to be statistically associated with their self-perceived “mild, moderate, and severe” conditions.

Question 6: *Rate the following reasons as to why you haven't received orthodontic treatment yet*

Of those 111 soldiers, who answered “yes” to question 4, almost more than half of them listed “orthodontics was not offered on post” and “too expensive”, as the top two reasons why they have not yet received orthodontic treatment. The third highest ranked reason was they “did not like the appearance of metal braces”. Of the reasons given, “do not have time for appointments”, “fear of pain/dentist/surgery”, and “Commander will not approve” were selected to be the least influential (Figure I).

Question 7: *Rank your preferred level of interest on receiving orthodontic care from each of the following: Military orthodontist, Civilian orthodontist, General dentist, At-home aligner product*

Data for question 7 were collected in nonparametric format ranked from 1 (not interested) to 5 (extremely interested), so Kruskal-Wallis with Steel-Dwass post hoc test were performed. When converted to parametric, the statistical results for question 7 were the same as ANOVA/Tukey. Based on the Kruskal-Wallis/Steel-Dwass test, the null hypothesis for question 7 was rejected, Chi-squared = 0.0003. When soldiers perceived a self-need for orthodontic treatment, there was a preferential difference in receiving orthodontic care offered by an orthodontist versus care by a general dentist or DTC aligners (Figure II). In total, 85 of the participants expressed an interest, including “slightly interested” to “extremely interested”, in DTC products and only 13 participants were “not interested” in aligners. Out of the 85 who showed interest in DTC products, 21 preferred DTC products more than all other providers. The first null hypothesis failed to be rejected in the case of DTC products versus any orthodontist, since preference for all three were equal, but the null hypothesis for DTC products versus general dentist was rejected as the preference for DTC products was higher.

Question 8: *Would you consider an at-home aligner company?*

A total of 73 (76.8%) selected “yes” to question 8 that they would consider using a DTC company and were instructed to answer the final question to rank the reason why they would choose a DTC product.

Question 9: Rate the following reasons as to why you would choose an at-home aligner:

Convenient, Affordable, Cosmetic/ it looks better than metal braces, recommended to me by a friend/family member

Figure III shows how more than 95% of participants selected “convenience” as the key reason for considering at-home aligners. This was followed by cosmetics (84.2%) and then affordability (65.8%). Recommendation by a friend or family member (38.2%) ranked last. Therefore, the second null hypothesis was rejected since all respondents did not disagree with any of these reasons as to why they would choose DCT products.

DISCUSSION

Given the choices of a military orthodontist, a civilian orthodontist, a general dentist, or direct-to-consumer aligners, soldiers significantly preferred to receive orthodontic care from a military or civilian orthodontist more than from a general dentist. However, soldiers showed no significant preference in receiving orthodontic care whether it is offered by a military orthodontist, a civilian orthodontist, or direct-to-consumer aligners. Similarly, a survey given to civilians by Olson et al. also found that the general dentist ranked lower than DTC aligners in preferences.¹²

The questions failed to ask the participants to rank an order of their preferred provider but instead asked to list their level of interest, meaning they could all be the same answer. By using the total means, the preferred levels of interests ranked from the highest to the lowest are: military orthodontist, civilian orthodontist, direct-to-consumer aligners, and then general dentist. The data may suggest that soldiers’ top choice would be treatment by a military dentist, possibly since it is free of charge or that they trust the care given.

Based on question 9, where convenience and cosmetics are the top two reasons for choosing direct-to-consumer aligners, perhaps these two reasons outweigh the benefits of being treated by a general dentists. Inferentially, it may be that soldiers believe the treatment provided by general dentists is of a lesser quality than an orthodontist or that the treatment provided by a DTC aligner company is perceived to be equal in quality to an orthodontist. Further studies would be needed to delineate consumers’ opinions on those topics.

Many US Army Soldiers see enticing advertisements for direct-to-consumer (DTC) aligners and ask their dental providers if they should engage, but there is likely a large group who pursue treatment without ever consulting their dentist. For those with malocclusions that are not conducive to aligner therapy without orthodontic supervision, this decision can be detrimental to the health of their teeth and periodontium.¹³ The majority of Soldiers polled did not believe they needed orthodontic care, but of those who believed they did, most reported they would consider DTC products to address their needs. This number may seem small, however, given the risks of DTC orthodontics and potential harm, action by the US Army Dental Corps will be requested to inform soldiers of the risks engaging in DTC orthodontics.

CONCLUSIONS

The data collected and analyzed by this study determined that roughly one third of soldiers' perceived a need of orthodontic treatment, enlisted more than officers, and that most considered their misaligned teeth conditions to be of mild severity. The majority of soldiers interested in orthodontic treatment indicated no significant preference between military or civilian orthodontic care or DTC aligner companies. The soldiers displayed a propensity to seek care outside military means, with the majority of those interested in orthodontic treatment stating an interest in DTC products for its unmatched convenience.

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