Peer-review paper; submitted October 2017; accepted January 2018

"Why, why, why do I have such big teeth, why?" Low socio-economic status and access to orthodontic treatment

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Abstract

Background and objectives: A malocclusion has negative impacts on an adolescent's quality of life. Wish For a Smile (WFAS) is a New Zealand health initiative in which orthodontists provide heavily subsidised orthodontic treatment for adolescents whose parents/guardians are unable to afford it. This study documents the impact of a malocclusion on the lives of 151 adolescents who successfully applied for treatment through the WFAS, and the reasons why they/their parent or guardian desired orthodontic treatment. It also reports how not being able to afford orthodontic care impacted on them.

Methods: As part of the application process, adolescents and a parent/guardian have to write letters to the WFAS explaining why they desire orthodontic treatment. A descriptive analysis of 151 successful application letters (written between 2012 and 2015 inclusive) was undertaken.

Results: Over half of the adolescents mentioned how their malocclusion was affecting their social relationships. More than half reported hiding their mouth in social spaces and half reported being bullied. Parent/guardians also mentioned feeling sad/bad, or "heartbroken" about the emotional toll that a malocclusion and/or peer bullying was having on their child. Many also expressed feeling a sense of failure because of their inability to afford orthodontic treatment.

Conclusion: A malocclusion can have a negative impact on the physical health, peer relationships and self-esteem of adolescents, as well as the self-concept of parents/guardians who are unable to afford the orthodontic treatment that their child desires.

Introduction

There is a body of evidence that reports how a malocclusion negatively impacts on an adolescent's emotional wellbeing, their social connections and physical health (Mandall et al., 1999; Kiyak, 2008; Peres, 2011; Taghavi Bayat et al., 2013; Ukra et al., 2013; Claudino and Traebert, 2013;; Ghijselings et al., 2014; Perillo et al., 2014; Dimberg et al., 2015; Gavric et al., 2015; Vedovello, 2015). In Western cultures, the image of a 'beautiful smile' with straight white teeth is perpetuated as the epitome of attractiveness (Tessarollo et al., 2012). Adolescents considered to be attractive are likely to be rated as more popular, successful and desirable by their peers (Shaw, 1981; Kerosuo et al., 1995; Johal et al., 2006; Zhang et al., 2006; Twigge et al., 2016). During adolescence, many young people also start to become interested in dating and thereby become hyper-aware of their appearance (Johal et al., 2006). The perpetuation of a 'normal occlusion' as a beauty ideal can have a devastating impact on the self-esteem of adolescents with malocclusion. For instance, many learn to dislike their appearance, which in some instances, leads to poor self-esteem, social isolation, depression, and suicide ideation (Mandall et al., 1999; Kiyak, 2008; Peres, 2011; Claudino and Traebert, 2013; Taghavi Bayat et al., 2013; Ghijselings et al., 2014; Perillo et al., 2014; Dimberg et al., 2015; Gavric et al., 2015)

In social settings adolescents with malocclusions often experience anxiety because they fear being mocked or judged by others (Kiyak, 2008; Danaei and Salehi, 2010; Tessarollo et al., 2012; Al-Omari et al., 2014). Furthermore, people tend to concentrate on other people's mouths when interacting (Pithon et al., 2016; Twigge et al., 2016). As a consequence, many adolescents hide their mouths, teeth and smiles when interacting out of embarrassment or fear (Kiyak, 2008; Gavric et al., 2015; Twigge et al., 2016).

Adolescents with malocclusions are frequently bullied by their peers and in some cases, family members (both in person and on social media), which can lead to poor self-esteem, truancy, and premature exiting from school (Seehra et al., 2011(a)): Al-Omari et al., 2014; Scheffel et al., 2014; Basha et al., 2016; Chan et al., 2017). Bullying can also have long-lasting effects moving into adulthood, such as the development of poor social skills, passivity in social/romantic relationships, persistent low-self esteem and depression, as well as the development of anti-social behaviours (including violence and social withdrawal) (Zhang et al., 2006; Seehra et al., 2011(b); Scheffel et al., 2014).

National and international research has also shown that adolescents from low socioeconomic backgrounds are less likely to have orthodontic treatment (Drugan et al., 2007; Germa et al., 2010; Krey and Hirsch, 2012; Ulhaq et al., 2012; Healey et al., 2015). The New Zealand government or other national funding agencies generally do not provide publically funded orthodontic treatment (except instances of craniofacial anomalies including orofacial cleft) and the considerable cost of orthodontic treatment is out of reach of many low-income families (Foster Page and Thomson, 2005).

However, studies have shown that even in the United Kingdom where orthodontic care is available on the National Health Service, parents and adolescents from low socioeconomic backgrounds are less likely to seek orthodontic care (Krey and Hirsch, 2012; Ulhaq et al., 2012). A number of possible explanations have been proposed for why this might be the case. For instance, there may be a greater toleration for malocclusions among low socioeconomic populations and the treatment-seeking threshold may therefore be higher (Drugan et al., 2007; Krey and Hirsch, 2012; Healey et al., 2015). Adolescents from low socioeconomic backgrounds are also more likely to be episodic dental attenders and consequently, dentists may not refer these adolescents on to orthodontists as much as regular dental attenders (Drugan et al., 2007; Healey et al., 2015). Not having transport or money for transport is a further reason proposed for why adolescents from low socioeconomic backgrounds are less likely to seek orthodontic treatment (Drugan et al., 2007). Finally, middle-class parents tend to be more knowledgeable regarding how to access orthodontic care than their less affluent counterparts (Drugan et al., 2007; Krey and Hirsch, 2012; Healey et al., 2015).

In New Zealand, Wish For a Smile (WFAS) provides heavily subsidised orthodontic treatment for adolescents (aged 11 to 16 years at time of application) whose parents/guardians cannot afford it. Adolescents accepted for treatment through WFAS must perform 20 hours of community work during the course of their treatment. A requirement for acceptance for treatment through WFAS is that an adolescent's malocclusion has to be initially classified as severe by a dentist/dental therapist and applicants' parents/guardians are unable to afford orthodontic treatment. As part of the application process, adolescents and a parent/guardian must also write a letter to WFAS in which they outline the reasons why they/their child wants orthodontic treatment. This study aimed to document the impact of malocclusion on a group of adolescent applicants, and to investigate how the adolescents and their parents/guardians felt about being unable to afford orthodontic treatment. The research questions included: What impacts does a malocclusion have on an adolescent's life and why does this group of adolescents want orthodontic treatment? A further question was how do adolescents and their parents/guardians feel about being unable to afford orthodontic treatment?

Methods

Ethical approval to begin the fieldwork was obtained from the University of Otago Health Committee (reference HD16/067). Prior to the analysis all names of applicants were removed. Following this, LW and RP began to collate demographic information on 151 adolescents and/or their parent/guardians (letter writers) who had successfully applied to WFAS for orthodontic treatment (between 2012 to 2015 inclusive). Each applicant's street address was used to categorise participants as residing in an urban location (New Zealand's seven most populated cities) or a rural locale (including areas with high, moderate or low urban influence, as well as highly remote areas) (Statistics New Zealand, n.d (a)). Street addresses were also used to identify the meshblock (the smallest geographic unit used by Statistics New Zealand for sampling purposes, such as a city suburb) in which they resided (Statistics New Zealand, n.d (b)). Each meshblock has a New Zealand Deprivation Index score ranging from one (the least deprived) to ten (the most deprived). Each participant was allocated a deprivation score corresponding to the meshblock in which they resided (University of Otago, 2013). The total number of participants receiving Government benefits and those who had a community services card was tallied. Information on each participant's weekly disposable family income after net expenses (rent, utilities, outgoings and debts such as hire purchases) was collated.

An inductive thematic analysis of 151 successful application letters to WFAS was undertaken by LS (Thomas, 2006). In some applications, however, a letter from an adolescent (one) or a parent/guardian (eight) was missing. In most cases, only one of these letters was missing and applicants were accepted for treatment on the basis of the one application letter, as well as the dentists' or dental therapists' referrals. Most letters consisted of one paragraph, but there were a small number of one-page applications. In some instances, the letters were also very short with only one sentence written by the adolescent and/or the parent/guardian due to literacy difficulties. Consequently, little information could be obtained from these applications.

The first step in the analysis of the qualitative data was immersion in the raw data (Pope et al., 2000; Morrow, 2005). LS read the letters as a 'bloc' while noting initial patterns that were identified across the letters. Specific words and phrases that were repeated across the letters were also noted. A subsequent list of these initial themes and words was made, which served as a guide during the initial coding. The letters were reread and passages of text, which evidenced these themes, were coded using highlighter pens. More themes were identified during the initial coding and additional readings and coding processes occurred in order to form a robust analysis and subsequently, trustworthy research findings (Avis, 2005). Multiple readings, coding processes and interpretations were also necessary to ensure that the participants' responses were represented as accurately as possible (Sutton and Austin, 2015).

After the analysis was completed 32 themes were identified in the adolescents' letters, which were grouped into five analytical categories. A total of 13 themes were identified in the parent/guardians' letters. In some instances a participant's comment was grouped under one or more themes and categories.

Qualitative descriptive studies aim to provide detailed summaries of specific events or phenomena, which are presented in everyday language (Sandelowski, 2000; Lambert and Lambert, 2012; Kim et al., 2016). Unlike the findings of other qualitative approaches (e.g. ethnography), which are often interpreted through a theoretical lens (e.g. poststructuralism), qualitative descriptive studies do not involve 'a highly abstract

rendering of the data' (Sandelowski, 2000, p. 335). Instead, findings are presented in a straightforward manner, so as not to stray from the 'surface of words and events' in order to capture a reader's attention (Sandelowski, 2000, p. 334). Due to the nature of the data, that is, relatively short application letters to WFAS from which generalisations cannot be drawn, then a qualitative descriptive approach was utilised in the research.

Results

Demographic information of the 151 applicants, including age, sex, urban/rural location, their deprivation levels and weekly income after expenses (including rent, utilities, food, hire purchases and other debts) is reported in Table 1.

Social factors

The majority of adolescents mentioned how their malocclusion had negative social, psychological, emotional and physical impacts on their wellbeing. However, the greatest number of applicants' comments (195) were categorised into four themes grouped under the analytical category social factors. Over half of the applicants reported that they felt self-conscious because of their malocclusions and consequently hid their mouths in social situations. For instance, "I would like to have my teeth fixed because most of the time I feel embarrassed and also not confident to talk to or smile at people." (A62). Approximately, half of the applicants also reported that they were bullied as a result of their malocclusion or in their own words, because of their "bucked teeth" (A1). For example, "The kids at my school used to criticise me and call me names like 'buck tooth' and 'beaver' and other names I don't want to repeat" (A23). Slightly less than one third of the applicants made comments highlighting how they had either withdrawn from social interactions, or were isolated and lonely, which they attributed to their malocclusion. For instance, "Maybe if I got my teeth fixed more people would want to be friends with me" (A114). Similarly, four applicants made statements about their peers rejecting theme because of their malocclusion. The following statement from A77 typifies these comments, "I feel rejected by others as they are always teasing me about my teeth."

Table 1: Socio-demographic characteristics of the applicants

Characteristic	N%
Age of applicant	
11-12	38 (25.2)
13-14	63 (41.7)
15-18	50 (33.1)
Sex	
Male	96 (63.6)
Female	55 (36.4)
Location	
Urban	107 (70.9)
Rural	44 (29.1)
WINZ benefit	
Yes	133 (88.1)
No	18 (11.9)
Deprivation Index[a]	
High	63 (41.7)
Medium	64 (42.4)
Low	23 (15.2)
Weekly income post expenses ($)[b]	
<0	81 (53.6)
Between 1 and 100	44 (29.1)
>100	23 (15.2)

[a] Missing data for one applicant
[b] Missing data for three applicants

Physical effects

A total of 13 themes were grouped under the physical effects category. This analytical category was second in numerical order in terms of the total number of applicants' comments (118 statements were grouped into these 13 themes). Approximately one quarter of applicants said that they had difficulties eating or were embarrassed to be seen eating because of their malocclusion. For example, "Most times because I eat alone as I don't like people hearing me making noises when I'm chewing" (A10). Some applicants also reported experiencing pain because of their malocclusion. For example, "[I have] an aching jaw from a profound overbite and stinging teeth from sudden dental collisions are regular occurrences" (A11). The same number of applicants mentioned experiencing difficulties brushing their teeth, getting cuts in their gums, tongue or lips and having speech problems due to the impact of their malocclusion. The following statements typify these comments:

> My teeth are not straight and are difficult to clean. (A5)
>
> Every time I bite my teeth together it hurts because I can feel my teeth cutting into my top gum. (A31)
>
> I would like my teeth fixed so when I talk people would be able to understand me. (A53)

A few applicants reported that they could not close their mouth and also said they were told that they needed jaw surgery to correct their malocclusion. A small number of applicants also reported they had frequent ulcers, drooled or alternatively, had dry mouth because of their malocclusion. For example:

> I would like braces so I can close my mouth properly. (A95)
>
> They said…my whole jaw would have to be reconstructed, for my teeth to function normally. (A68)

> I am getting olsores [sic] in my mouth from my teeth hitting the top of my jaw. (A27)
>
> I would also be able to eat easier [with braces] and stop dribbling" (A53)

A couple of applicants reported that they had breathing difficulties because of malocclusion, while another two also said that had a "serious face deformation" (A7).

Psychological impacts

A total of 81 participant comments were grouped into three identified themes associated with the analytical category, psychological impacts. These three themes included low self-confidence, sadness and anxiety/fear of judgement. Over one third of applicants made comments that were grouped into the low self-esteem theme. Low self-esteem (as a result of their malocclusion and/or bullying) as well as the notion that braces would boost self-confidence was the most common theme in this category. For instance, "I'm not very confident because I have crooked teeth. If I had braces I would be more confident at school and socially. I would be able to get on with my life without people looking at my teeth" (A1). Furthermore, a number of participants reported that they felt sad because of their malocclusion and peer bullying. These applicants' comments specifically mentioned the words sad or sadness. For example:

> I feel ashamed in front of my friends because they laugh at me. They make fun of me and they make me cry. They make me sad. They call me 'big teeth' and 'rabbit teeth' and 'yellow teeth'... I always say to myself, "Why? Why? Why do I have such big teeth? Why? (A47)

A smaller number of applicants made comments about anxiety or the fear of being judged by others because of their malocclusion. For instance, "I feel it really hard to concentrate on doing my work because of feeling anxious. I am anxious of what other people think of me" (A12).

Aesthetics

The final analytical category into which applicants' responses were grouped (62 comments in total) was aesthetic impacts of the malocclusion and appearance reasons for seeking orthodontic treatment. Approximately one quarter of adolescents said that they hated their teeth. For instance, "When I look in the mirror I don't like my teeth because some are too small, some are too big and some are on the roof of my mouth. It looks terrible. If I have my teeth fixed I will look better… and handsome!" (A130). A smaller number of applicants mentioned that their malocclusion hindered their chances of obtaining their desired future career. The theme of getting braces as improving one's career prospects is included under this category as most of these comments were related to being unable to pursue a career as an actor, singer or dancer because of 'crooked' teeth. For example, "Doing this to my teeth will also help me get my dream job as an actress…with my teeth the way they are I will probably not be able to get an acting career" (A120). The same number of adolescents also reported that they wanted to get braces to 'fit in' or alternatively feel normal, for instance, "Most of all I would like braces so I can get a quarter a step closer to the kind of boy people expect-the typical boy" (A82).

Fewer applicants mentioned feeling ugly because of their malocclusion. These comments specifically mentioned the word ugly, for instance, "I look really ugly when I smile" (A77). A small number of applicants reported that they failed to feel pretty, beautiful or handsome because of their malocclusion. For example, "I don't feel pretty and I'm scared I'll be teased" (A23). Finally, a couple of applicants also reported that having orthodontic care would improve their chances of getting a girlfriend/wife in the future. For instance, "I don't have many friends and I don't even have a girlfriend or any girls liking me" (P74).

Parents/guardians' perspectives on the effects of malocclusion on their younger relatives

The parents/guardians also reported similar impacts that a malocclusion had on their child in their applications. The most common theme that emerged in the adult letters (over one third of the parent/guardian participants) was the notion that braces would boost their child's low self-confidence. For instance, "I believe [orthodontic treatment] would be helpful to her confidence and self-esteem, and that needs to be dealt with before she has further problems" (P/G79). Over one third of parent/guardians also said their child hid their mouth/smile and were self-conscious about their teeth. For example, "(Name) is very self-conscious and doesn't like to smile, and she covers her mouth with her hand when she laughs. I am worried about the long term effects this is going to have on her" (P/G46). The same number of parents/guardians also reported that their child was bullied because of their malocclusion. However, the parent/guardian's tended to write more detailed comments about the bullying that their child experienced than the adolescent applicants. For instance, "The teasing goes to the extent of seeing messages on the Internet. Most recent ones … are "You ugly c___, go fix your teeth … and … You're ugly go kill yourself" (P/G94).

Slightly less than one third of the parents/guardians' mentioned the physical effects of their child's malocclusion on their health. For instance, during our first visit to the orthodontist I was saddened to see how major her overbite was and the damage to her teeth" (P/G41). Slightly fewer parent/guardians reported that the child was self-conscious or alternatively, had low self-confidence because of their malocclusion. For example, "My daughter…is self-conscious of her teeth"(P/G45) and "(Name) loves to dance, but feels less confidence because of her smile" (P/G99).

Fewer parents/guardians' made comments that were grouped into both of the remaining themes in this section. The first of these themes included mentions of a child's social withdrawal as a consequence of their malocclusion, while the second included the belief that getting orthodontic care would make their child happier. These comments are typified by the following:

(Name) has gone from a happy-go-lucky and confident boy to depressed and recluse. (P/G131)

This tremendous opportunity to correct … her teeth … would change (name's) life in so many ways. Her confidence, her happiness, and her passion to perform her singing would return. (P/G101)

SES and the inability to afford orthodontic care

In their letters, one third of the adolescents mentioned their parent's/guardian's or their own inability (for those on the independent youth allowance, which is a government benefit provided for those aged 16 to 17 who are financially unsupported) to afford orthodontic treatment. These comments typically related to parent/guardian's inability to afford orthodontic treatment because they were a single parent raising other children, or were unable to work due to retirement, illness and/or long-term physical disabilities. Two adolescents also mentioned that their parent was unable to pay for braces due to the financial effects of a natural disaster. Nevertheless, three adolescents also made comments that highlighted how being unable to afford orthodontic care impacted on their parent/guardian. The following excerpts typify these statements:

My Mum feels bad because she can't afford to get me braces, I feel bad because my teeth are another expense and she worries about me. (A1)

Mum can't afford it. I know Mum is doing what she can and is worried about me getting bullied because of my teeth and I am worried about my Mum because she is sick all the time through the stress. I just want my teeth fixed so I don't get bullied anymore and Mum won't have to worr[y] so hopefully she can get better. (A3)

A small number of parents/guardians also described feeling bad or sad in their role as parent/guardian because they could not afford the orthodontic treatment their child needed and/or wanted. For example: "I feel disheartened and embarrassed that I cannot afford to provide my son with the orthodontic treatment that he needs and deserves" (P/G1). The phrase "breaks my heart" was repeated by a number of the parents/guardians in relation to seeing their child feeling self-conscious or bullied because of their malocclusion. For instance, "As his mother it breaks my heart to see him having problems at such a young age" (P/G94). Slightly less parents/guardian stated that their child experienced the dual impact of a malocclusion and other physical or mental health concerns. The following excerpts typify these comments:

(Name) has to deal with bad eczema…This is a constant embarrassment to her and tough on her own self-esteem. It welts up and is visible on her legs and arms, and sometimes her face. I think if she were blessed with some braces… this would be a great confidence lift. (P/G39)

I have seen (name) suffer over the years with depression, anger, and embarrassment. (P/G23)

Discussion

International studies have reported that female adolescents are more likely to have orthodontic treatment and will often seek treatment for 'milder occlusal issues' than their male counterparts (Harris and Glassell, 2011; Basha, 2016). In this study however, a larger number of male than female adolescents were applying for orthodontic treatment through WFAS. Although it cannot be ascertained why this was the case, perhaps more female adolescents were seeking treatment through a more conventional means. However, given that the majority of applications were from homes in which there was a weekly budget deficit or a minimal surplus, then this appears unlikely. More research is needed on the gendered dis/parity of adolescents from low SES backgrounds who seek treatment through initiatives, such as WFAS.

Furthermore, over 15 per cent of applicants were from low deprivation areas and the same number also reported a weekly budget surplus of over 100 dollars. Consequently, it would appear that some of these applications may have been able to pay for orthodontic treatment through more conventional means. However, since 2016, WFAS introduced additional financial assessment requirements including evidence of the receipt of a state benefit to ensure that it provides orthodontic treatment for adolescents from financially disadvantaged backgrounds.

Our findings support the multitude of studies that report the negative impacts that a malocclusion has on an adolescents' quality of life, such as low self-esteem, being bullied, feeling the need to hide their mouth in social situations, social withdrawal, anxiety and in some cases, the adoption of maladaptive coping behaviours such as self-harming (Mandall et al., 1999; Kiyak, 2008; Peres, 2011; Claudino and Traebert, 2013; Taghavi Bayat et al., 2013; Ghijselings et al., 2014; Perillo et al., 2014; Dimberg et al., 2015; Gavric et al., 2015). A unique finding of the study, however, was that more adolescents mentioned the social rather than aesthetic impacts that their malocclusion had on their lives, and reported that they were seeking orthodontic care for social rather than solely for appearance reasons. Such a finding contrasts with the results of many studies that report adolescents primarily seek orthodontic care out of appearance concerns (Johal et al., 2006; Kiyak, 2008; Feu et al., 2012; Ghijselings et al., 2014; Perillo et al., 2014). In stating this, however, feeling the need to hide one's mouth in social situations and being bullied because of a malocclusion are closely related to appearance.

During adolescence, the desire to be popular takes on increased significance as young people learn to become independent from parents and rely on their peers for a sense of social connection (Allen et al., 2005; Pachucki et al., 2015; Putarek and Kerestes, 2016). Given the importance of 'fitting in' during adolescence then it is not surprising that the most dominant theme that emerged was feeling the need to hide one's mouth or smile in social situations due to embarrassment. Furthermore, just over half of adolescent participants and slightly less than one third of parents/guardians reported that

they/their child hid their mouth in social situations. This difference in perception between adolescents and parent/guardians supports Kiyak's (2008) assertion that parents underestimate the impact that malocclusion has on their child's psychological wellbeing and social networks.

Similarly half of the adolescents and slightly less than one third of parent/guardians also reported experiencing/or their child experiencing bullying. This illustrates the social stigma attached to malocclusion and how adolescents tend to bully others who do not have 'socially acceptable' occlusion (Johal et al., 2006; Scheffel et al., 2014; Basha et al., 2016). Moreover, 16 adolescents reported feeling sad because of peer bullying. Some parents/guardians also mentioned that bullying had resulted in poor self-esteem and in some instances, maladaptive coping behaviours in their child. Such findings highlight how peer bullying directed at those with a malocclusion can contribute to poor mental health (Wolke and Lereya, 2015).

A large number of adolescents and parent/guardians also reported that if they did receive orthodontic treatment through WFAS then this would increase their/their child's self-confidence. Studies have shown that patients' self-confidence and liking of their appearance increases after they receive orthodontic treatment (Pietila and Pietila, 1996; Kerosuo et al., 2000; Lee et al., 2011). Nevertheless, the level of improvement in self-esteem is dependent on the degree of self-esteem that patients possess prior to treatment (Pietila and Pietila, 1996; Kerosuo et al., 2000; Lee et al., 2011). Prior to treatment, orthodontists need to discuss adolescents' expectations for their orthodontic treatment to ensure that they do not view braces as a magical elixir that will automatically remedy their low self-esteem.

As stated above, given that most studies report that young people primarily seek orthodontic care for aesthetic reasons, it is somewhat surprising that mentions of the physical effects that a malocclusion had on the adolescent applicants was the second most common category identified in applicants' responses (Johal et al., 2006; Kiyak, 2008; Feu et al., 2012; Ghijselings et al., 2014; Perillo et al., 2014). Nevertheless, malocclusion has been implicated with jaw joint, ear, head or back pain, tooth-sensitivity, periodontal and tooth trauma, as well as speech and masticatory difficulties (Guay et al., 1978; Suzuki et al., 1981; Hu et al., 1997; Nicola et al., 1999; Lee et al., 2002; Hassan and Naini, 2007; Scheid, 2007; Zhang, 2010; Antoun et al., 2015). All of the adolescent applicants were rated as having a severe malocclusion by referring dentists, dental therapists or oral health therapists. Consequently, we purport that the physical symptoms that the adolescent applicants experience may be greater than the general population of New Zealand adolescents who seek care through more conventional means.

Our findings show that a malocclusion also impacts on an adolescent's family, which also supports the findings of other studies. For instance, some parents have reported that they feel uncomfortable being seen in public with their child, which is likely to have a devastating impact on that adolescent's self-concept (Johal et al., 2006). However, comments from some adolescents highlight how a parent's/guardian's distress about their inability to fund orthodontic care may be a further source of anxiety for some adolescents. Nevertheless, our findings also show that many parents/guardians feel sad/bad about the effects of a malocclusion and/or bullying on their child, and inadequate in their role as parent/guardian because they cannot afford braces. A number of parents/guardians said it was "heartbreaking" to see the effects of a malocclusion and/or bullying on their child and not being able to do anything about it. Despite feeling bad in their role as parent/guardian because they could not fund braces, all of the adult participants were also attempting to secure orthodontic care for their child through how all of the adult participants were endeavouring to do their best and provide for their child despite their financial limitations.

The study has a number of limitations. Firstly, the letters were written in an attempt to gain heavily subsidised orthodontic care from WFAS. This purpose may have impacted on the letter content as some applicants may have embellished the effects of their malocclusion in order to be accepted for treatment through WFAS. Future studies on the reasons why adolescents and parents/guardians desire orthodontic care should ensure that there is not such a heavy outcome (that is, getting orthodontic treatment) dependent on the data. All applicants and associated letters that were analysed in this article were successful in obtaining braces through WFAS. As a consequence, comparisons with unsuccessful applicants could not be made. Furthermore, it would be interesting to compare whether reported impacts of a malocclusion on an adolescents' quality of life differ between low SES adolescents and their more affluent counterparts, when one group knows they will be likely to have orthodontic treatment and the other understands that they will not.

Conclusion

A malocclusion can lead to poor self-concept, bullying, dislike of one's appearance, physical health effects, social isolation, depression, and in some cases maladaptive coping behaviours. Low SES parents/guardians also experience sadness in regard to the impact that a malocclusion and/or related bullying has on their child's self-esteem and feel inadequate because they cannot afford the orthodontic treatment that their child needs. As many adolescents experience a boost in their self-confidence after orthodontic care, we argue that orthodontic treatment in New Zealand, like in the United Kingdom, should be publicly funded for those who are unable to afford it. In this way low SES parents/guardians can concentrate on meeting the everyday expenses of caring for their child without having to feel ashamed. At the same time, low SES adolescents would have the same opportunities for life-successes as their more affluent counterparts, while the despair many adolescents experience as a result of their malocclusion could be alleviated.

Acknowledgement

Thank you to the University of Otago for awarding an UORG which made this research possible.

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References

Al-Omari IK, Al-Bitar ZB, Sonbol HN, Al-Ahmad HT, Cunningham SJ, Al-Omiri M (2014). Impact of bullying due to dentofacial features on oral health-related quality of life. *Am J Orthod Dentofacial Orthop* 146:734-739.

Allen JP, Porter MR, McFarland FC (2005). The two faces of adolescents' success with peers: Adolescent popularity, social adaptation, and deviant behavior. *Child Dev* 76:747-760.

Anderson C (2010). Presenting and evaluating qualitative research. *Am J Pharm Educ* 74:1-7.

Antoun, JS, Fowler PV, Jack HC, Farella, M. (2015). Oral health-related quality of life changes in standard, cleft and surgery patients after orthodontic treatment. *Am J Orthod Dentofacial Orthop* 148:568-575.

Avis M (2005). Part 1: Starting out. In: *Qualitative research in health care*. I Holloway editor. Berkshire, UK: Open University Press, (pages. 1-6).

Basha S, Mohamed RN, Swamy HS, Parameschwarappa (2016). Untreated gross dental malocclusion in adolescents: Psychological impact and effect on academic performance in school. *Oral Health Prev Dent* 14:63-69.

Chan A, Antoun JS, Morgaine KC, Farella, M (2017). Accounts of bullying on Twitter in relation to dentofacial features and orthodontic treatment. *J Oral Rehabil* 44:244-250

Claudino D, Traebert J (2013). Malocclusion, dental aesthetic self-perception and quality of life in an 18 to 21 year-old population: A cross section study. *BMC Oral Health* 13:1-6.

Danaei SM, Salehi P (2010). Association between normative and self-perceived orthodontic treatment need among 12- to 15-year-old students in Shiraz, Iran. *Eur J Orthod* 32:530-534.

Dimberg L, Arnrup K, Bondemark L (2015). The impact of malocclusion on the quality of life among children and adolescents: A systematic review of quantitative studies. *Eur J Orthod* 37:238-247.

Drugan CS, Hamilton S, Naqvi H, Boyles JR (2007). Inequity in uptake of orthodontic services. *Br Dent J* 202:1-4.

Feu D, Oliveria BH, Celeste RK, Miguel JAM (2012). Influence of orthodontic treatment on adolescents' self-perceptions of esthetics. *Am J Orthod Dentofacial Orthop* 141:743-750.

Foster Page L, Thomson. W.M. (2005). Malocclusion and uptake of orthdontic treatment in Taranaki 12-13-year-olds. *NZ Dent J* 101:98-105.

Gavric A, Mirceta D, Jackobovic M, Pavlic A, Trinajstic Zrinski M, Spalj S (2015). Craniodentofacial characteristics, dental esthetics-related quality of life, and self-esteem. *Am J Orthod Dentofacial Orthop* 147:711-718.

Germa A, Kaminski M, Nabel C (2010). Impact of social and economic characteristics on orthodontic treatment among children and teenagers in France. *Community Dent Oral Epidemiol* 38:171-179.

Ghijselings I, Brosens V, Willems G, Fieuws S, Clijmans M, Lemiere J (2014). Normative and self-perceived orthodontic treatment need in 11 to 16-year-old children. *Eur J Orthod* 36:179-185.

Guay AH, Maxwell DL, Beecher R (1978). Radiographic study of tongue posture at rest and during the phonation of /s/ in class III malocclusion. *Angle Orthod* 48:10-22

Harris, EF, Glassell, BE (2011). Sex differences in the uptake of orthodontic services among adolescnts in the United States. *Am J Orthod Dentofac Orthop* 140:543-549.

Hassan T, Naini (2007). The Effects of Orthognathic Surgery on Speech: A Review. *J Oral Maxillofac Surg* 65:3536-3543.

Healey DL, Gauld RD, Thomson WM (2015). The socio-demographic and malocclusion characteristics of adolescents presenting for specialist orthodontic treatment in New Zealand practices. *Aust Orthod J* 31:20-25.

Hu W, Zhou Y, Fu M (1997). Effect of skeletal class III malocclusion on speech articulation. *Zhonghua Kou Qiang Yi Xue Za Zhi* 32: 344-346.

Johal A, Cheung YH, Marcenes W (2006). The impact of two different malocclusion traits on quality of life. *Br Dent J* 202:E2.

Johnson NCL, Sandy JR. (1999). Tooth position and speech— is there a relationship? *Angle Orthod* 69:306-310.

Kaselo E, Jagomagi T, Voog U (2007). Malocclusion and the need for orthodontic treatment in patients with temporomandibular dysfunction. *Stomatologija* 9: 79-85

Kerosuo H, Hausen H, Laine T, Shaw WC (1995). The influence of malocclusion on the social attractiveness of young adults in Sweden. *Eur J Orthod* 17:505-512.

Kerosuo H., Kerosuo E, Niemi M, Simola H (2000). The need for treatment and satisfaction with dental appearance among young Finnish adults with and without a history of orthodontic treatment. *J Orofac Orthop* 61:330-340.

Kim, H, Sefcik, JS, Bradley, C. (2017). Characteristics of qualitative descriptive studies: A systematic review. *RINAH* 40:23-42.

Kiyak A (2008). Does orthdontic treatment affect patients' quality of life. *J Dent Educ* 72:886-888.

Krey K-F, Hirsch C (2012). Frequency of orthodontic treatment in German children and adolescents: Influence of age, gender, and socio-economic status. *Eur J Orthod* 34:152-157.

Lambert VA, Lambert, CE (2012). Qualitative descriptive research: An acceptable design. *Pac Rim Int J Nurs Res* 16. 255-256.

Leavy KM, Cisneos CG, LeBlanc (2016). Malocclusion and its relationship to speech sound production: Redefining the effect of malocclusal traits on sound production. *Am J Orthod Dentofacial Orthop* 150: 116-123.

Lee, AS, Whitehill, TL, Ciocca, V et al. (2002). Acoustic and perceptual analysis of the sibilant sound /s/ before and after orthognathic surgery. *J Oral Maxillofac Surg* 60:364-373.

Lee Y, Nguyen T, Giang BT, Li I (2011). Effects of orthodontic treatment on self-confidence: Perspective survey by dental hygiene students. *CJDH* 45: 185-190.

Majid ASA, Abidia RF (2015). Effects of a malocclusion on oral health related quality of life (OHRQoL): A critical review. *ESJ* 11:386-400.

Mandall NA, McCord JF, Blinkhorn AS, Worthington HV, O'Brien KD (1999). Perceived impact of malocclusion and oral self-perceptions in 14-15 year old Asian and Caucasian children in Greater Manchester. *Eur J Orthod* 21:175-183.

Mohlin B, Derweduwen K, Pilley R, Kingdon A, Shaw, Kenealy P (2004). Malocclusion and temporomandibular disorder: a comparison of adolescents with moderate to severe dysfunction with those without signs and symptoms of temporomandibular disorder and their further development to 30 years of age. *Angle Ortho* 74:319-327.

Morrow S (2005). Quality and trustworthiness in qualitative research in counseling psychology. *J Couns Psychol* 52:250-260.

Oliver, RG, Evans SP(1986) Tongue size, oral cavity and speech. *Angle Orthod* 56: 234-243.

Pachucki MC, Ozer EJ, Barrat A, Cattuto C (2015). Mental health and social networks in adolescence: A dynamic study of objectively-measured social interaction behaviors. *Soc Sci Med* 125:40-50.

Peres SHdCS (2011). Self perception and malocccclusion and their relation to oral appearance and function. *CienSaude Cole* 126:4059-4066.

Perillo L, Esposito M, Attanasio S, Chiara Santini A, Carotenuto M (2014). Orthodontic treatment need for adolescents in the Campania region: The maloc-culsion impact on self-concept. *Patient Prefer Adher* 8:353-359.

Pietila T, Pietila I (1996). Dental appearance and orthodontic services assessed by 15-16-year-old adolescents in eastern Finland. *Community Dent Health* 13:139-144.

Pithon MM, dos Santos CR, de Lima Santos N, Lima SOAS, da Silva Coqueiro R, dos Santos RL (2016). Impact of malocclusion on affective/romantic relationships among young adults. *Angle Orthod* 86:638-643.

Pope C, Ziedland S, Mays N (2000). Qualitative research in health care: Analysing qualitative data. *BMJ* 320:114-116.

Putarek V, Kerestes G (2016). Self-perceived popularity in early adolescence: Accuracy, associations with loneliness, and gender differences. *J Soc Pers Relatsh* 33:257-274.

Rigby K (2004). Addressing bullying in schools: Theoretical perspectives and their implications. *Sch Psychol Int* 25:287-300.

Ruscello DM, Tekieli, ME, Van Sickels, JE (1985). Speech production before and after orthognathic surgery: A review. *Oral Surg, Oral Med, Oral Pathol, Oral Radiol and Endod* 59:10-14.

Sandelowski M (2000). Whatever happened to qualitative decription? *Res Nurs Health* 23:334-340.

Scheffel DLS, Jeremias F, Fragelli CMB, dos Santos-Pinto LAM, Hebling J, de Oliveira OB (2014). Esthetic dental anomalies as motive for bullying in schoolchildren. *Euro J Dent* 8:124-128.

Scheid, RC (2007). *Woelfe's Dental Anatomy: Its relevance to dentistry*. Philidephia: Williams & Wilkins.

Seehra J, Fleming PS, Newton T, DiBiase AT (2011a). Bullying in orthodontic patients and its relationship to malocclusion, self-esteem and oral health-related quality of life. *J Ortho* 38:247-256.

Seehra J, Newton T, DiBiase AT (2011b). Bullying in schoolchildren – its relationship to dental appearance and psychosocial implications: An update for GDPs. *Br Dent J* 210: 411-415.

Shaw WC (1981). Factors influencing the desire for orthodontic treatment. *Eur J Orthod* 3: 151-162.

Smith L, Adam L, Moffat S, Meldrum A, Ahmadi R (2017). How do educators in one New Zealand undergraduate Bachelor of Oral Health course teach and nurture professionalism? *Eur Jour Dent Educ* [accessed 2017 September 18]. https://www.ncbi.nlm.nih.gov/pubmed/28514054.

Statistics New Zealand (n.d (a)). Defining urban and rural New Zealand. [accessed 2017 August 14]. http://www.stats.govt.nz/browse_for_stats/Maps_and_geography/Geographic-areas/urban-rural-profile/defining-urban-rural-nz.asp.

Statistics New Zealand (n.d (b)). Defining urban and rural New Zealand. [accessed 2017 August 14]. http://www.stats.govt.nz/methods/classifications-and-standards-classification-related-stats-standards/meshblock/definition.aspx

Sutton J, Austin Z (2015). Qualitative research: Data collection, analysis, and management. *Can J Hosp Pharm* 68:226-231.

Suzuki N, Sakuma T, Michi, K, Ueno, T (1981). The articlulatory charc-teritstic of the tongue in anterior openbite: Observation by use of dynamic palatography. *Int J Oral Surg* 10: 299-303.

Taghavi Bayat J, Hallberg U, Linblad F, Huggare J, Mohlin B (2013). Daily life impact of malaocclusion in Swedish adolescents: A grounded theory study. *Acta Odontol Scand* 71:792-798.

Tessarollo FB, Feldens CA, Closs LQ (2012). The impact of malocclusion on adolescents' dissatisfaction with dental appearance and oral functions. *Angle Orthod* 82:403-409.

Thomas D (2006). A general inductive approach for analyzing qualitative evaluation data. *Am J Eval* 27:237-246.

Twigge E, Roberts RM, Jamieson L, Dreyer CW, Sampson WJ (2016). Qualitative evaluation of pretreatment patient concerns in orthodontics. *Am J Orthod Dentofacial Orthop* 150:49-57.

Ukra A, Foster Page L, Thomson WM, Farella M, Tawse Smith A, Beck V (2013). Impact of malocclusion on quality of life among New Zealand adolescents. *NZ Dent J* 109:18-23.

Ulhaq A, McMahon AD, Buchanan S, Gold S, Conway DI (2012). Socioeconomic deprivation and NHS orthodontic treatment delivery in Scotland. *Br Dent J* 213:1-3.

University of Otago (2013). *NZDep2013 Area Concordance file.* [accessed 2017 August 14]. http://www.otago.ac.nz/wellington/departments/publichealth/research/hirp/otago020194.html].

Vedovello SAS (2015). Association between maalocclusion and the contextual factors of quality of life and socioeconimic status. *Am J Orthod Dentofacial Orthop* 150:58-63.

Wolke D, Lereya ST (2015). Long-term effects of bullying. *Arch Dis Child* 100:879-885.

Zhang M, McGrath C, Hagg U (2006). The impact of malocclusion and its treatment on quality of life: A literature review. *Int J Paedatr Dent* 16: 381-387.