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Version: Supplemental Material

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**Article:**

Barber, S, Bekker, H [orcid.org/0000-0003-1978-5795](https://orcid.org/0000-0003-1978-5795), Marti, J et al. (3 more authors) (2022) Adolescent and Parent Preferences for Hypodontia: Discrete Choice Experiment. *Journal of Dental Research*, 101 (13). pp. 1590-1596. ISSN 0022-0345

<https://doi.org/10.1177/00220345221111386>

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### Supplementary Material

**Appendix Table 1: Attributes and levels used to describe hypodontia care in the DCE choice tasks**

<p><b>Discomfort during treatment</b></p> <p>Dental treatment for your missing teeth might sometimes be sore or cause discomfort when you are eating and talking.</p>	0	There will be little or no discomfort during treatment
	1	Discomfort during treatment will be moderate and may require painkillers
	2	Discomfort during treatment will be severe and may stop you seeing friends
<p><b>How long treatment takes in total</b></p> <p>This is how long dental treatment for your missing teeth will take overall.</p>	0	Dental treatment for your missing teeth will take 2 months to be completed
	1	Dental treatment for your missing teeth will take 3 years to be completed
	2	Dental treatment for your missing teeth will take 5 years to be completed
<p><b>Waiting time</b></p> <p>This is how long you have to wait to start treatment due to waiting lists or because your teeth need to grow</p>	0	Waiting time to start treatment is 3 months
	1	Waiting time to start treatment is 1 year
	2	Waiting time to start treatment is 3 years
<p><b>Problems during treatment</b></p> <p>During your dental treatment there is a chance you will have problems. This is the type of problems that may be caused by dental treatment.</p>	0	There is a chance dental treatment will cause minor problems that mean you need to see your dentist e.g. to have an X-ray of your tooth
	1	There is a chance dental treatment will cause moderate problems that make your treatment longer e.g. an infection needing a filling
	2	There is a chance dental treatment will cause severe problems e.g. damage to a front tooth that means the tooth needs removing
<p><b>Bite</b></p> <p>How your teeth feel and bite after treatment</p>	0	After your dental treatment, your teeth and bite feel much better
	1	After your dental treatment, your teeth and bite feel the same
<p><b>Appearance</b></p> <p>How your teeth look after treatment based on the colour and shape of the teeth and if there are any gaps</p>	0	After treatment, your teeth are straight without gaps and the colour match of the teeth is good
	1	After treatment you might have small gaps between your teeth or some teeth might look slightly grey or yellow

**Appendix Table 2: Summary of method for developing and testing the DCE questionnaire**

Stage	Method
<b>Attribute identification</b>	<p>Mixed methods:</p> <ul style="list-style-type: none"> <li>• Systematic review of hypodontia literature</li> <li>• Interviews with adolescents with hypodontia and parents</li> <li>• Observation of hypodontia clinical consultations</li> <li>• Environmental scan of hypodontia patient information resources</li> <li>• Systematic analysis of social-media posts.</li> </ul>
<b>Attribute selection</b>	<p>Stakeholder consultation to develop long list of items.                      Rating and ranking questionnaire for young people and parents to create short list of items.                      Further stakeholder consultation to select items for testing and</p>
<b>DCE questionnaire development</b>	<p>Experimental design: fractional factorial with blocking. Multinomial logit model with main effects design with d-optimising efficiency.                      Choice tasks: Paired with generic labelling. Option to opt-out after forced choice. Measure of choice difficulty and strength of preference.                      Survey design: Explanation of attributes-levels and choice tasks.                      Choice of demographic questions.</p>
<b>DCE questionnaire testing</b>	<p>Mixed methods:</p> <ul style="list-style-type: none"> <li>• Cognitive interviews with adolescents (n=12) and parents (n=8) to assess face and content validity.</li> <li>• Analysis of preference data to provide coefficient estimates for each attribute-level.</li> </ul>
<b>Final design choices</b>	<p>Finalisation of attributes and levels.                      Preference estimates used to improve efficiency of final experimental design.                      Seven choice tasks - based on feedback about acceptable length and burden                      No dominance task - easily identified by participants so considered an ineffective test of choice validity.                      Simplification of explanations.                      Simplification of choice tasks.</p>

## Adolescent & parent preferences for hypodontia: discrete choice experiment

Appendix Table 3: Characteristics of the sample. (NB. For the online questionnaire, 56 parents answered alone so these parents were asked to provide the characteristics of their child with hypodontia)

			Respondent answering questionnaire				
			Online			Face-to-Face (young person only n=15)	TOTAL (n=219)
			Young person (n=122)	Parent (n=56)	Dyad (n=26)		
Characteristic of young person with hypodontia	Gender	Female	78	37	13	9	137
		Male	41	17	13	6	77
		Other	1	1	0	0	2
		Not reported	2	1	0	0	3
	Age	12 years	16	5	6	0	27
		13 years	22	10	5	0	37
		14 years	21	13	6	7	47
		15 years	30	16	8	5	59
		16 years	33	12	1	3	49
	Severity of hypodontia	Mild	58	21	11	6	96
		Moderate	38	18	12	4	72
		Severe	22	16	4	4	46
		Not sure	4	1	0	0	5
	Stage of treatment	Pre-treatment	42	15	10	8	75
		Mid-treatment	73	37	15	6	131
		End of treatment	7	4	1	1	13

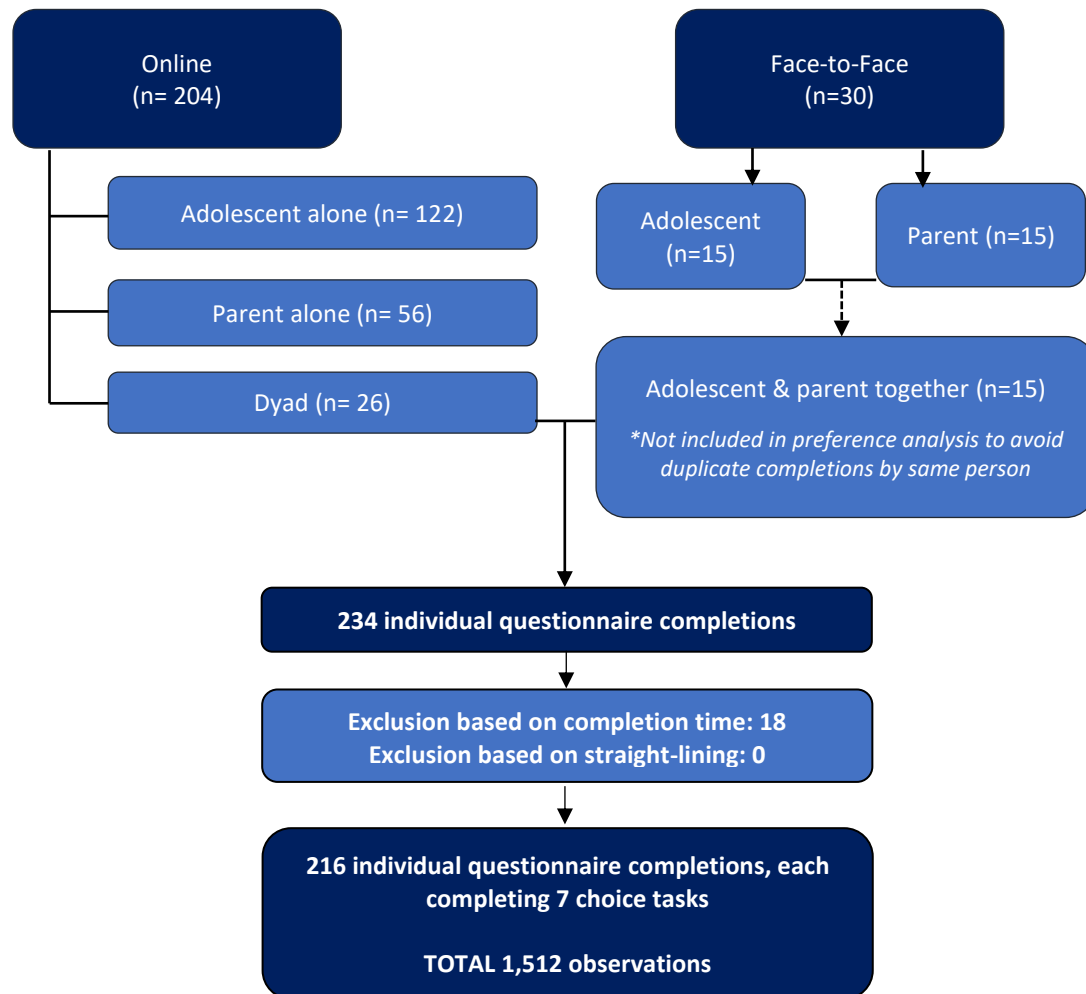
## Adolescent & parent preferences for hypodontia: discrete choice experiment

**Appendix Table 4: Respondent characteristics which appeared to be associated with choosing 'No Treatment'.**

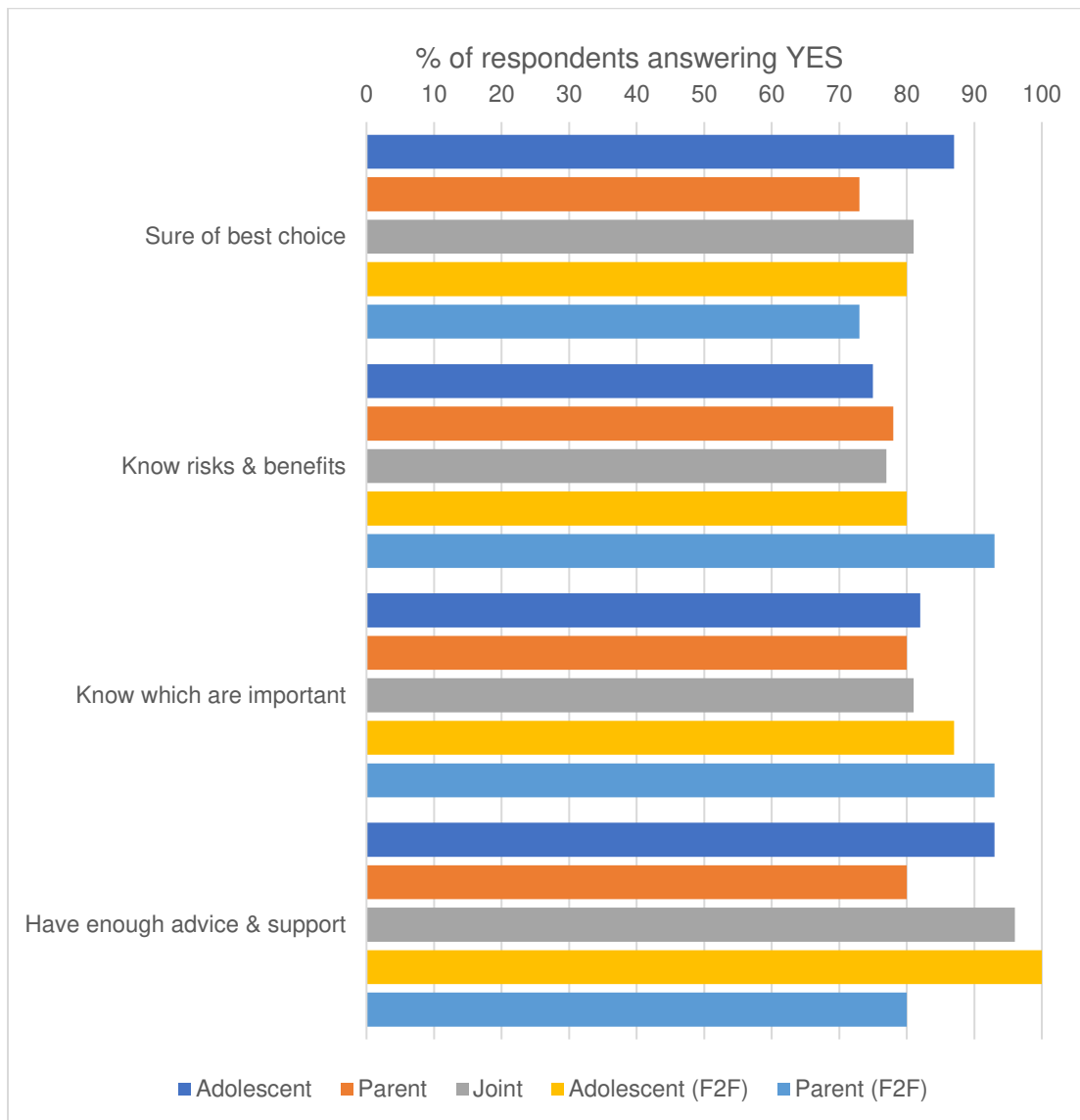
	Odds Ratio	95% CI		P value
Mild hypodontia compared to severe	3.23	2.3	4.35	<0.001
Mild hypodontia compared to moderate	1.85	1.44	2.32	<0.001
Dentally anxious, compared to non-anxious	2.26	1.82	2.80	<0.001
Older (15-16y) compared to younger (12-14y)	1.07	0.86	1.32	0.59
Males compared to females	1.69	1.37	2.08	<0.001
Parents compared to adolescents	1.74	1.4	2.16	<0.001
High OHRQoL impact compared to moderate	3.33	2.43	4.55	<0.001
High OHRQoL impact compared low	1.39	1.09	2.13	0.01
Online questionnaire compared to face-to-face	1.52	1.10	2.13	0.012
Constant	0.41	0.30	0.55	<0.001

## Adolescent & parent preferences for hypodontia: discrete choice experiment

Appendix Figure 1: Questionnaire responses and exclusions to determine the number of observations included for analysis

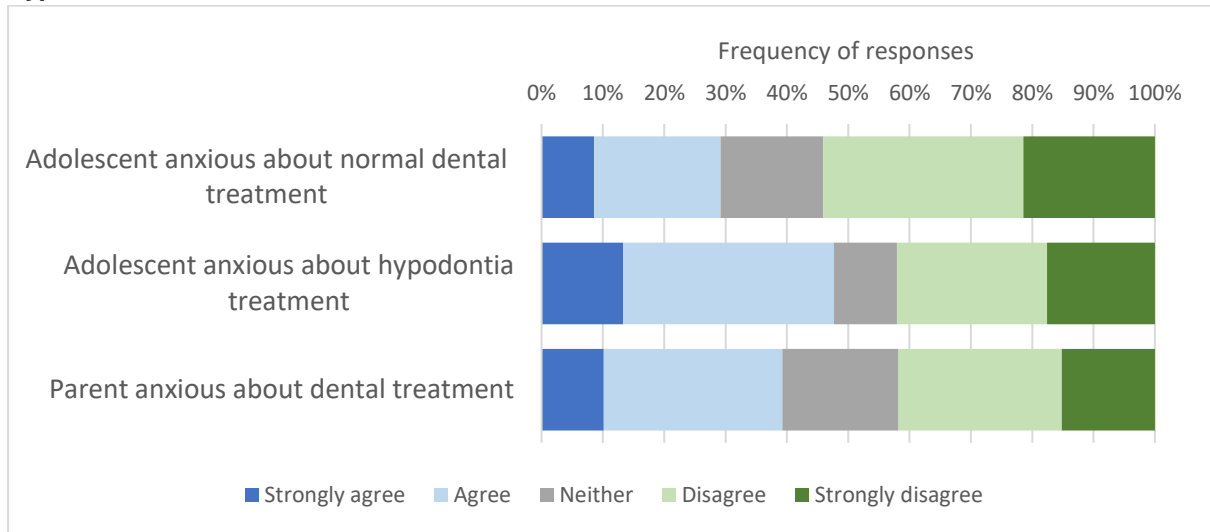


Appendix Figure 2: Respondents' certainty about decision-making

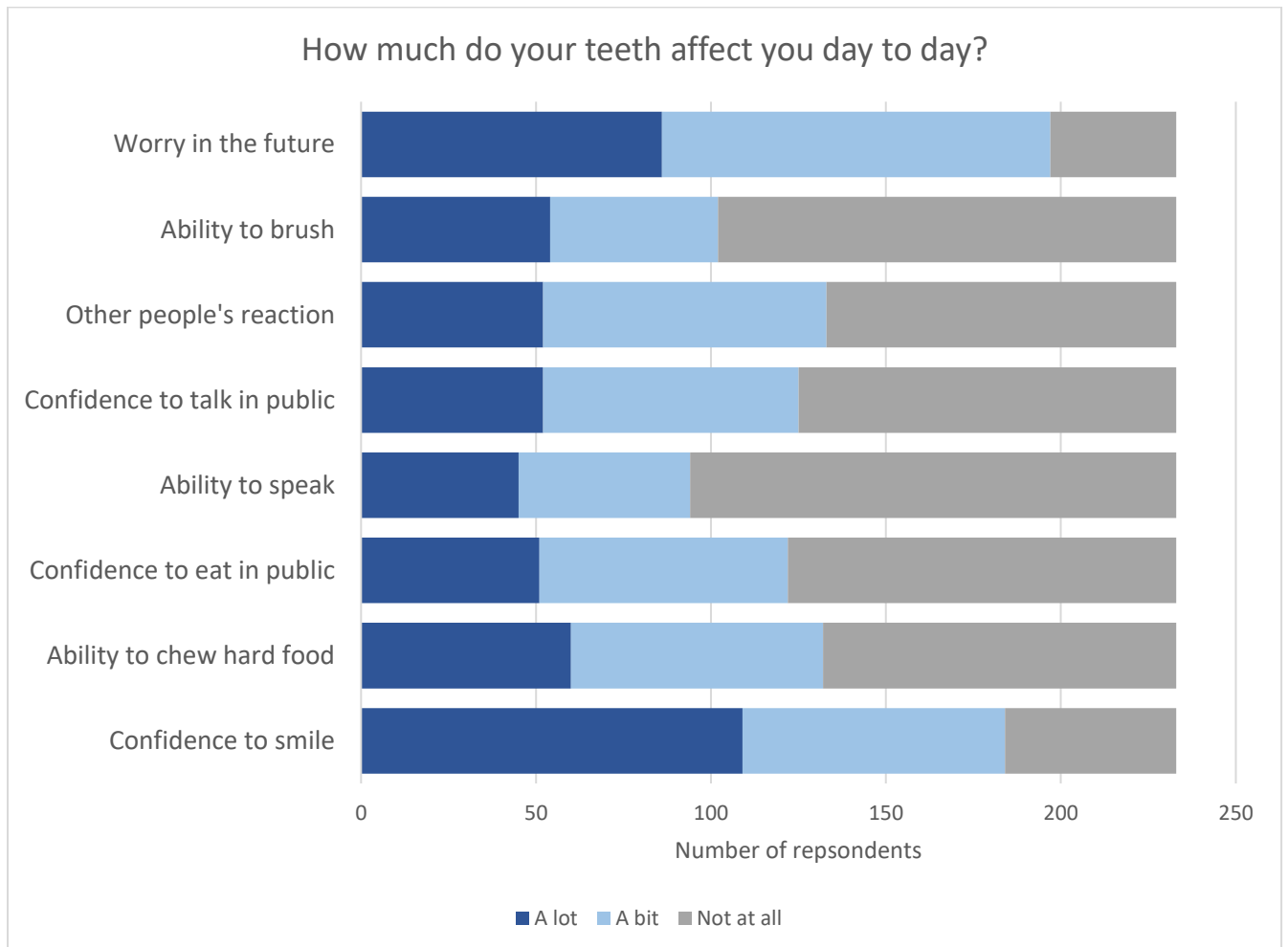


## Adolescent & parent preferences for hypodontia: discrete choice experiment

**Appendix Figure 3: Adolescent and parent ratings of anxiety about dental treatment and hypodontia treatment**



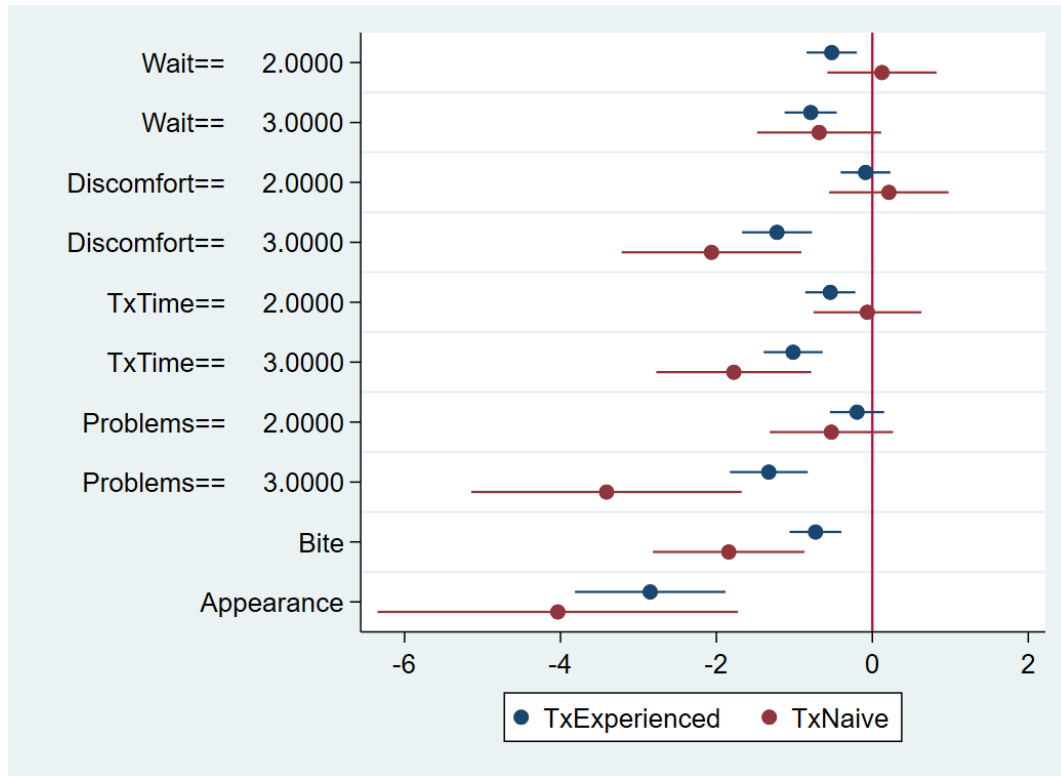
**Appendix Figure 4: Quality of Life impact of hypodontia on the adolescent, as reported by the adolescent or parent**





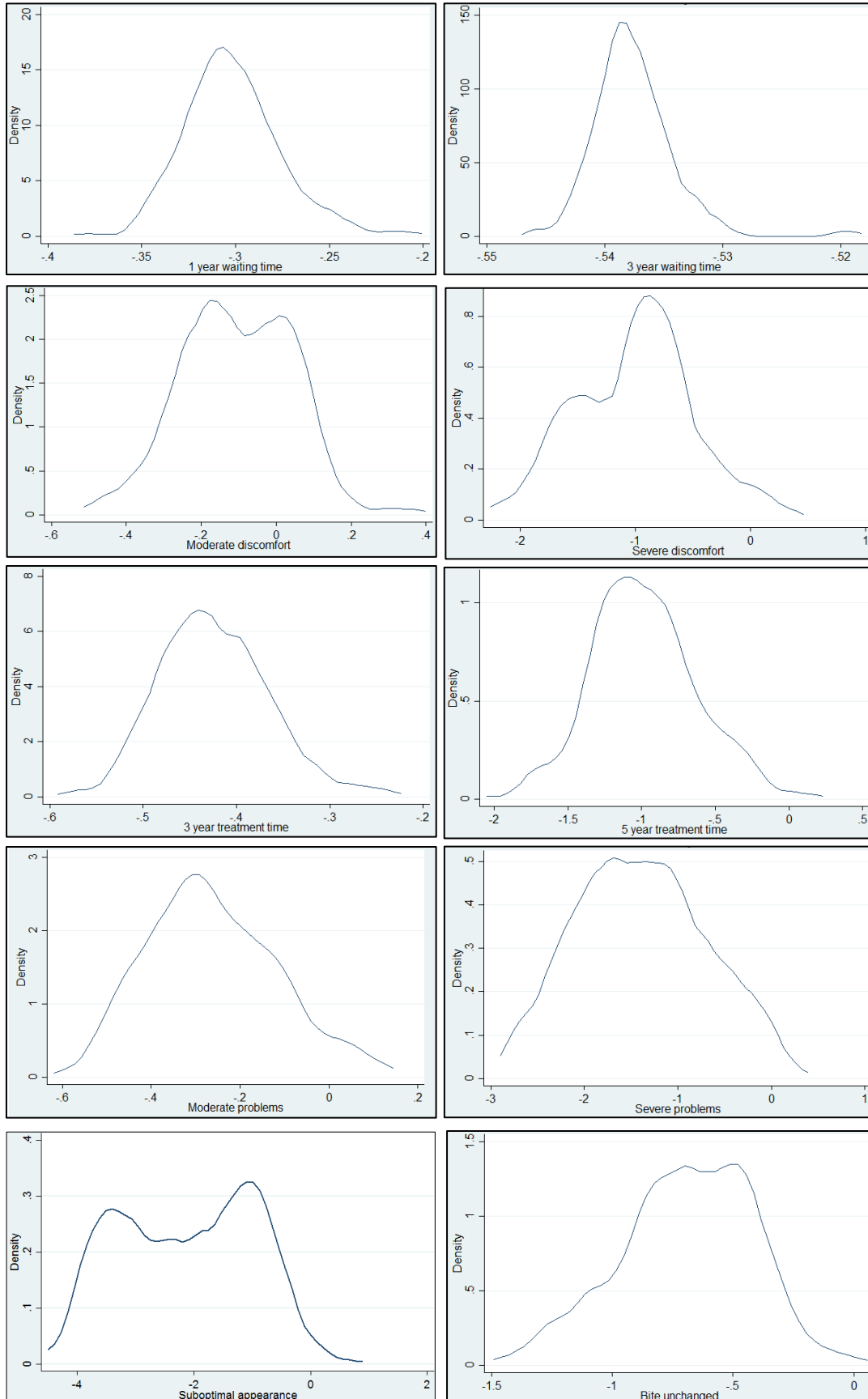
## Adolescent & parent preferences for hypodontia: discrete choice experiment

Appendix Figure 5: Segmented analysis to examine preferences of respondents who are pre-treatment (TxNaive, n=69) and those with experience of treatment (TxExperienced, n=147).



## Adolescent & parent preferences for hypodontia: discrete choice experiment

**Appendix Figure 6: Distribution of individual-level coefficients for attributes estimated using the method proposed by Revelt and Train (2000). Results show heterogeneity, particularly for discomfort, appearance and bite.**



### Discrete Choice Experiment Questionnaire – Adolescent version

#### Page 1. Information about the survey

This survey is for people with hypodontia and their families. Hypodontia is a dental condition that stops tooth development. This causes teeth to be missing.

We would like to know what you think is important about your dental treatment for your missing teeth. This survey is part of a research study at the University of Leeds. The results will be used to help make dental care better for people with missing teeth in the future.

If you live in the UK and are:

- 12-16 years old with missing teeth (hypodontia)  
OR

- A parent / guardian of someone with missing teeth  
and would be happy to answer some questions please continue.

If you do not have missing teeth this survey will not be relevant to you, but thank you for taking the time to check.

The survey will take approximately half an hour to complete. A £5 e-voucher for Amazon will be given to each person who completes the survey.

If you would like more information, please watch this video about the research.

**\*\*LINK TO VIDEO\*\***

#### Page 2. Screening questions

Are your teeth / your child's teeth developmentally missing (hypodontia)?

Yes	Continue
No	Exit point 1: Thank you for reading about my research. The answers you have provided mean you are not eligible to complete the survey at this time.

Do you live in the UK?

Yes	Continue
No	Exit point 1: Thank you for reading about my research. The answers you have provided mean you are not eligible to complete the survey at this time.

#### Page 3. Consent

## Adolescent & parent preferences for hypodontia: discrete choice experiment

The survey will take about half an hour to complete. It asks you what is important to you when you are thinking about dental treatment for your hypodontia.

Important information:

- It is up to you if you want to take part
- If you are under 16, you need your parent/guardian's consent
- Your answers will not be linked to your name or email address. No-one except the research team will see your answers.
- You can stop answering questions at any time. Any answers that you have given may be used.
- You need to answer all questions to complete the survey and receive the £5 e-voucher
- There are no right or wrong answers
- You can only answer the survey once but other people in your family can also answer it.

Do you want to take part in this survey?

Yes	Continue
No	Exit point 2: Thank you for taking the time to read the information. You have indicated that you do not wish to complete the survey at this time. You can now exit the survey and no answers will be recorded for you.

If you are 16 years old or younger and answering on your own, is your parent / guardian happy for you to take part in this survey?

Yes	Continue
Not applicable	Continue
I am not sure	Please ask your parent / guardian for their permission to complete the survey.
No	Exit point 3: Thank you for taking the time to read the information. You have indicated that your parent/guardian does not want you to complete the survey at this time. You can now exit the survey and no answers will be recorded for you.

I have asked for your email address so I can send your £5 shopping voucher to you. I will not use your email address for any other reason and I will not share it with anyone else. Please write your email address below.

Page 4. Version of survey

I am...

Aged 12-16 years old and I have missing teeth (hypodontia). I am completing this survey on my own.	Continue to adolescent version
Aged 12-16 years old and I have missing teeth (hypodontia). I am completing this survey with my parent / guardian.	Continue to adolescent version
A parent or guardian of someone with missing teeth. I am completing this survey on my own.	Continue to parent version
A parent or guardian of someone with missing teeth. I am completing this survey with my child.	Continue to parent version

Page 5. Demographic information

How old are you (in years)?	Free text
How would you describe your gender?	<input type="checkbox"/> Male <input type="checkbox"/> Female <input type="checkbox"/> Other <input type="checkbox"/> I don't want to say
How would you describe your ethnic group?	<input type="checkbox"/> White <input type="checkbox"/> White Mixed <input type="checkbox"/> Asian / Asian British <input type="checkbox"/> Black / Black British <input type="checkbox"/> Chinese <input type="checkbox"/> Other Ethnic group
How many adult teeth are you missing? (This does not include wisdom teeth)	<input type="checkbox"/> 1-2 <input type="checkbox"/> 3-6 <input type="checkbox"/> More than 6 <input type="checkbox"/> I'm not sure
Which teeth are you missing? <i>(Please tick all that apply)</i>	Diagram to show areas of mouth: <ul style="list-style-type: none"> <li>▪ Maxillary anterior teeth</li> <li>▪ Maxillary posterior teeth</li> <li>▪ Mandibular anterior teeth</li> <li>▪ Mandibular posterior teeth</li> </ul> <input type="checkbox"/> I'm not sure
Stage of treatment	<input type="checkbox"/> I have not yet had any treatment <input type="checkbox"/> I am currently having treatment <input type="checkbox"/> I have finished all treatment

### Page 6. Introduction to choice tasks

We would like to know what you think is important about dental treatment.

Next are some questions where we ask you to pick from two different options (Treatment A or Treatment B). These are not real dental treatments.

There are no right wrong answers.

An example (using pizza!) is given on the next page.

Pretend we want to find out what type of pizza people like.

- Two made-up pizzas are given (Pizza 1 and Pizza 2)
- For each pizza there are three features we are interested in: topping, base and price
- People answering the survey pick which they like best by thinking about the three features
- There is no right or wrong answer

	Pizza 1	Pizza 2
Topping	Pepperoni	Vegetable
Base	Thick crust	Thin crust
Price	£4	£3
<b>Which do you like best?</b>	<input type="checkbox"/>	<input type="checkbox"/>

In our survey we are asking about imaginary dental treatments for missing teeth.

There are six features in each option to think about:

- Waiting time
- Discomfort during treatment
- How long treatment takes in total
- Problems that you might have during your dental treatment
- How your teeth feel and bite after treatment
- The appearance of your teeth after treatment

**\*\* Interactive animation to introduce attributes and levels \*\***

**There are six things to think about**

The diagram shows six interconnected circles representing factors for dental treatment: Discomfort (purple), Waiting time (green), Treatment time (yellow), Problems during treatment (pink), Appearance after treatment (teal), and Bite after treatment (orange). Lines connect Discomfort to Waiting time, Waiting time to Treatment time, Treatment time to Problems during treatment, Problems during treatment to Appearance after treatment, and Appearance after treatment to Bite after treatment.

The diagram shows a scale for Discomfort with levels: No/Little, Moderate, and Severe. An arrow points from the 'Severe' level to a text box describing the severity: "Severe Discomfort during treatment will be severe and may stop you seeing friends".

**How to answer the questions**

1. Read through the two options
2. Compare the options using the six features. If you want more information about what something means you can click on the ⓘ
3. Pick which option you like best
4. Please tell us how easy it was to pick
5. After this, if you don't like either option, you can pick No Treatment. This means you would prefer to have NO dental treatment at all and keep your teeth how they are naturally

**\*\* Annotated example \*\***

**Here is an example**

	Treatment A	Treatment B
<b>Waiting time</b> ⓘ	1 year	1 year
<b>Discomfort during treatment</b> ⓘ	No / little discomfort	Moderate discomfort needing painkillers
<b>How long treatment takes</b> ⓘ	2 months	3 years
<b>Problems during treatment</b> ⓘ	Moderate e.g. infection needing a filling	Severe e.g. loss of a front adult tooth
<b>Bite after treatment</b> ⓘ	Teeth & bite feel much better	Teeth & bite feel the same
<b>Appearance after treatment</b> ⓘ	Small gaps or some teeth might look slightly grey or yellow	Teeth are straight with no gaps. Colour match of teeth is good.
<b>Which do you like best?</b>	<input type="checkbox"/> Treatment A	<input type="checkbox"/> Treatment B

*Callout boxes:*  
 - Top left: Click here to find out more about what this means  
 - Top center: You need to read about the two treatments  
 - Bottom left: You need to pick which you like best – there is no right or wrong answer

### Option for No Treatment

You will also be asked if you like the treatment you picked or if you would prefer no treatment at all.

This would mean your teeth would stay how they are naturally. The dentist would not do anything to change your teeth.



**Page 15. Making choices about dental treatment**

We would like you to tell us about making decisions about dental treatment for your missing teeth.

Please answer the questions below.

	Yes	No
The following people help me choose treatment for my missing teeth		
Parents / guardian and family	<input type="checkbox"/>	<input type="checkbox"/>
Dentist	<input type="checkbox"/>	<input type="checkbox"/>
Friends	<input type="checkbox"/>	<input type="checkbox"/>
Other people with missing teeth	<input type="checkbox"/>	<input type="checkbox"/>
I feel sure about the best choice for me	<input type="checkbox"/>	<input type="checkbox"/>
I know the benefits and risks of each option	<input type="checkbox"/>	<input type="checkbox"/>
I am clear about which benefits and risks matter the most to me	<input type="checkbox"/>	<input type="checkbox"/>
I have enough support and advice to make a choice	<input type="checkbox"/>	<input type="checkbox"/>

**Page 16. How you feel about dental treatment**

We would like to know how you feel about dental treatment.

Please answer the questions below.

	Strongly agree	Agree	Neither	Disagree	Strongly disagree
I feel anxious about having any dental treatment with my normal dentist					
I feel anxious about having dental treatment for my missing teeth					

**Page 17. How you feel about your missing teeth**

Please mark how much you think your teeth affect you day to day based on:

	A lot	A bit	Not at all
Confidence to smile			
Ability to chew hard food			
Confidence to eat in front of other people			
Ability to speak – for example without a lisp			
Confidence to talk in front of other people			

Other people's reaction to my missing teeth			
Ability to cleaning my teeth			
Worry about my teeth in the future			

Page 18. End of survey

Thank you for taking part in this survey. You will receive your £5 e-voucher for Amazon in the next few days via email. All your answers will be kept confidential and your email will not be shared with anyone else.

If your parent/guardian has not yet completed this survey, please could you invite them to look at it. We would be very grateful for their opinion too.

### **Sources of support**

If this survey has raised any issues that you would to talk about, Childline offers free advice and support to young people for all areas of concern. You can contact Childline free on 0800 1111.

If you have any concerns or questions about missing teeth or this research you can contact [REDACTED]

[REDACTED] is part of the research team and also has experience of treating people with dental problems. She can provide general advice about any issues that arise from the survey and signpost to further sources of information and support. She is not able to give specific advice relating to your individual treatment or care – for this you are advised to contact your own dentist.