

# Comparing four removable orthodontic devices and no orthodontic treatment in children with excessive overjet

<b>Submission date</b> 14/03/2020	<b>Recruitment status</b> No longer recruiting	<input checked="" type="checkbox"/> Prospectively registered <input type="checkbox"/> Protocol
<b>Registration date</b> 30/04/2020	<b>Overall study status</b> Completed	<input type="checkbox"/> Statistical analysis plan <input type="checkbox"/> Results
<b>Last Edited</b> 10/07/2023	<b>Condition category</b> Oral Health	<input type="checkbox"/> Individual participant data <input type="checkbox"/> Record updated in last year

## Plain English summary of protocol

### Background and study aims

Malocclusion means that the upper and lower teeth do not fit together well. This can cause problems with chewing and dental hygiene. Class II malocclusion (overjet) is where the upper jaw teeth are further forward than the lower jaw teeth. This is commonly caused by the lower jaw being underdeveloped or being positioned too far back. Class II malocclusion can be treated in growing children by wearing braces that encourage the lower jaw to grow or move forward. This study aims to compare three braces to each other and to no treatment in correcting class II malocclusion in children before and during puberty.

### Who can participate?

Children aged 17 years or under who need orthodontic treatment for class II malocclusion.

### What does the study involve?

Participants who choose to delay wearing a brace will have X-rays at the start of the study and at 18 months. Those who choose to start treatment immediately will be randomly allocated to wear one of three braces. They will have X-rays at the start of the study and at the end of treatment.

### What are the possible benefits and risks of participating?

Participants will benefit from correction of their malocclusion. There are no risks expected for those taking part in the study. The braces might be uncomfortable at the start.

### Where is the study run from?

University of Turin Dental School (Italy)

### When is the study starting and how long is it expected to run for?

June 2019 to December 2023

### Who is funding the study?

University of Turin (Italy)

Who is the main contact?

Dr Serena Ravera, serenaravera@unito.it

## Contact information

### Type(s)

Public

### Contact name

Dr Serena Ravera

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## Additional identifiers

### Clinical Trials Information System (CTIS)

Nil known

### ClinicalTrials.gov (NCT)

Nil known

### Protocol serial number

0019079

## Study information

### Scientific Title

Dento-skeletal effects of removable functional appliances in class II growing patients: a randomized controlled trial

### Acronym

TERFAC2

### Study objectives

The aim of this study is to compare dento-skeletal effects of functional removable appliances in skeletal Class II malocclusion in growing patients at different stages of growth, according to cervical vertebral maturation method (CVM2 and CVM3), compared to untreated subjects.

## **Ethics approval required**

Old ethics approval format

## **Ethics approval(s)**

Approved 21/02/2020, Ethics Board of the City of Health And Science of Turin [Comitato Etico Interaziendale A.O.U. Città della Salute e della Scienza di Torino] (Corso Bramante 88/90, 10126 Turin, Italy; +39 011 6331633; comitatoetico@cittadellasalute.to.it ), ref: 000127/2019

## **Study design**

Single-centre randomized controlled trial

## **Primary study design**

Interventional

## **Study type(s)**

Treatment

## **Health condition(s) or problem(s) studied**

Malocclusion

## **Interventions**

Current interventions as of 19/01/2023:

In this randomized controlled trial, the sample will be composed of 4 arms: no treatment (patients that autonomously choose to delay the treatment), and 3 randomly assigned treatment arms (EF myofunctional device, Invisalign with mandibular advancement feature, Function Generating Bite arm, Twin Block arm) comprising 15 Caucasian growing class II subjects for each arm. The randomization will be generated using Randomizer software.

Previous interventions:

In this randomized controlled trial, the sample will be composed of 4 arms: no treatment (patients that autonomously choose to delay the treatment), and 3 randomly assigned treatment arms (EF myofunctional device, Invisalign with mandibular advancement feature, Function Generating Bite arm) comprising 15 Caucasian growing class II subjects for each arm. The randomization will be generated using Randomizer software.

Within the group treated, there will be two subgroups according to the cervical vertebrae maturation (CVM) stage of growth at the beginning of treatment (T0): 8 patients at CVM2 stage of growth (pre-pubertal) and 8 patients at CVM3 stage of growth (pubertal). The same criteria will be adopted for the control group.

The average duration of treatment will be 18 months. The participants will use the devices until the malocclusion is corrected. All the devices are removable, i.e. they can be taken out of the mouth.

## **Cephalometric analysis**

For each patient included in the study, lateral radiographs will be collected both at the beginning (T0) and at the end of the treatment (T1). If the X-rays will be performed with different machines, it will be necessary to calibrate the images before starting the cephalometric tracings.

An orthodontic software (Dolphin Imaging & Management Solutions, at Patterson Technology, Verona, Italy) will be used to standardize the X-rays and perform the cephalometric tracings at

T0 and T1.

From a skeletal point of view the cephalometric values analyzed will be:  $SN^{GoGn}$ ,  $SpP^{GoGn}$ , SNA, SNB, ANB, A Downs, B Downs, A:Po, Wits Index,  $ArGo^{Gn}$  together with the linear mandibular measurement Go:Co, Gn:Co, Gn:Go.

From the dental point of view the attention will be focused on the incisor sector level and therefore  $11^{SpP}$ ,  $41^{GoGn}$  and  $11^{41}$ .

## **Intervention Type**

Device

## **Phase**

Not Applicable

## **Drug/device/biological/vaccine name(s)**

1. FGB (Function Generating Bite) 2. Invisalign® Mandibular Advancement Feature (MAF; Align Technology, Santa Clara, CA, USA) 3. EF Educatore Funzionale (OrthoPlus, Igny, France) 4. TWIN BLOCK (added 19/01/2023)

## **Primary outcome(s)**

1.  $SN^{GoGn}$
2.  $SpP^{GoGn}$
3. SNA
4. SNB
5. ANB
6. A Downs
7. B Downs
8. A:Po
9. Wits Index
10.  $ArGo^{Gn}$
11. Go:Co
12. Gn:Co
13. Gn:Go
14.  $11^{SpP}$
15.  $41^{GoGn}$
16.  $11^{41}$

All parameters will be calculated by analysing lateral radiographs taken before treatment and at the end of treatment.

## **Key secondary outcome(s)**

Puberty stage of participant

## **Completion date**

06/12/2023

# **Eligibility**

## **Key inclusion criteria**

1. Divergence between cranial base and mandibular plane within normal limits ( $SN^{GoGn} < 37^\circ$ )
2. Moderate crowding in the upper arch ( $\leq 4$  mm)
3. Good patient compliance (18-22 h per day)

4. Excellent radiographic record quality, with adequate cephalometric point display and head rotation control

5. Aged 8-17 years

**Participant type(s)**

Patient

**Healthy volunteers allowed**

No

**Age group**

Child

**Lower age limit**

8 years

**Upper age limit**

17 years

**Sex**

All

**Key exclusion criteria**

1. Severe transverse dental or skeletal discrepancies
2. Severe vertical dental or skeletal discrepancies
3. Extraction treatments
4. Temporomandibular disorders (TMDs)
5. Periodontal disease

**Date of first enrolment**

06/07/2020

**Date of final enrolment**

06/07/2023

**Locations**

**Countries of recruitment**

Italy

**Study participating centre**

University of Turin Dental School

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10126

# Sponsor information

## Organisation

University of Turin

## ROR

<https://ror.org/048tbm396>

# Funder(s)

## Funder type

University/education

## Funder Name

Università degli Studi di Torino

## Alternative Name(s)

University of Turin in Italy, University of Turin, Italy, Università di Torino, , University of Turin, UNITO

## Funding Body Type

Government organisation

## Funding Body Subtype

Universities (academic only)

## Location

Italy

# Results and Publications

## Individual participant data (IPD) sharing plan

Current IPD sharing statement as of 23/01/2023:

The datasets generated during and/or analysed during the current study will be stored in a publically repository (Azienda Ospedaliero-Universitaria Città della Salute e della Scienza di Torino, Torino Corso Bramante 88/90 and C.I.R. DENTAL SCHOOL. The Responsible for Data Protection or "Data Protection Officer" ("DPO") is available at [dpo@cittadellasalute.to.it](mailto:dpo@cittadellasalute.to.it)). The datasets generated and/or analysed during the current study will be published as a supplement to the results publication.

Previous IPD sharing statement:

The datasets generated and/or analysed during this study will be included in the subsequent results publication

## IPD sharing plan summary

Stored in publicly available repository, Published as a supplement to the results publication

### Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
<a href="#">Participant information sheet</a>		19/03/2020	30/04/2020	No	Yes
<a href="#">Participant information sheet</a>	Participant information sheet	11/11/2025	11/11/2025	No	Yes