

Teaching the Hypermobile voice student - What do singing teachers need to know?

**A pilot study of exercises to aid in the vocal
health and strength of Hypermobile singers.**

Background

- Developed a passion for evidence-based vocal techniques during Musical Theatre training.
- 11 years of experience as a private singing teacher.
- 7 years experience teaching at level 4-6 as a one-to-one technique teacher in Musical Theatre.
- Emphasises practical application of research findings in pedagogy and advocate for evidence-based teaching methods. (Titler, 2008).

Justification

- I observed a high prevalence of hypermobility amongst my Musical theatre undergraduates.
- I had insufficient knowledge of hypermobilities affect on the voice.
- Similar vocal and technique complaints observed among these students were;
 - Vocal instability
 - Breaks and cracks in phonation
 - Vocal fatigue
 - Poor alignment
 - TMJ discomfort

Aims of Research Activity

- Access the challenges faced by musical theatre undergraduates with hypermobility.
- Create, propose and trial vocal training techniques targeting the unique needs of the hypermobile singer.
- To collaborate with other professionals to strengthen the interdisciplinary approaches developed within the research.

Objectives of Research Activity

- Collate first-hand experiences on vocal challenges faced by the hypermobile singer through surveys and interviews
- To gain the knowledge to develop an evidence-informed resource to aid hypermobile singers and educators.
- To help to foster a supportive community by raising awareness of the needs of the hypermobile singer.
- To explore the literature concerning hypermobility and the voice.

Previous research by the author

- Warden, G. (2022) 'A study into interventions for post-pubescent singers presenting with joint hypermobility.' Voice Study Centre.
- Warden, G. (2024) 'An in-depth study into whether hypermobility poses a risk to the structures used for phonation in the post-pubescent human body.' Voice Study Centre.

What is hypermobility?

- Hypermobility is an term used to describe a joint moving beyond the normal range of movement. (Marfiat et al., 2006)
- Hypermobility is a Heritable Connective Tissue Disorder (HCTD).
- This study concerned Generalised Joint Hypermobility.

Is there a need for hypermobile focused pedagogy?

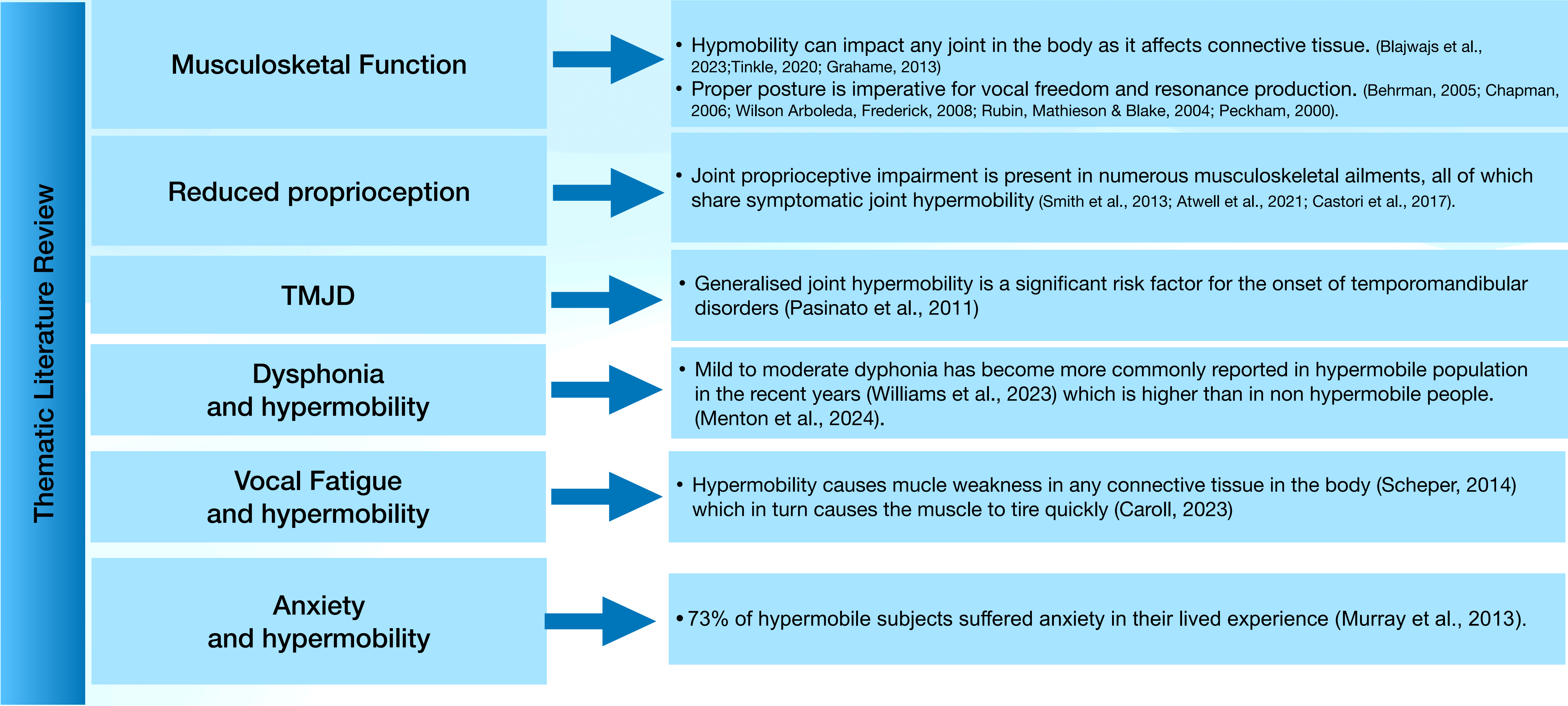
- 57% of the population have some degree of joint hypermobility. (Eccles, 2019; Blajwajs et al., 2023)
- 10% experience further physical or physiological symptoms. (Timmins et al., 2023)
- Women are more greatly impacted than men. (Jeffery, 2021; Janssin et al., 2004; Tinkle, 2020; Clinch et al., 2011)
- Prevalent within the Performing Arts. (Bridges, Smith & Reid 1992; Nicholson & Chan 2018; Clinch et al 2011; Juul-Kristensen et al., 2017; NHS, 2020)
- 'I Have Had to Stop Singing Because I Can't Take the Pain' Experiences of Voice, Ability, and Loss in Singers With Hypermobility Spectrum Disorders. (Jeffery, et al. 2021)

Literature Review - Methodology



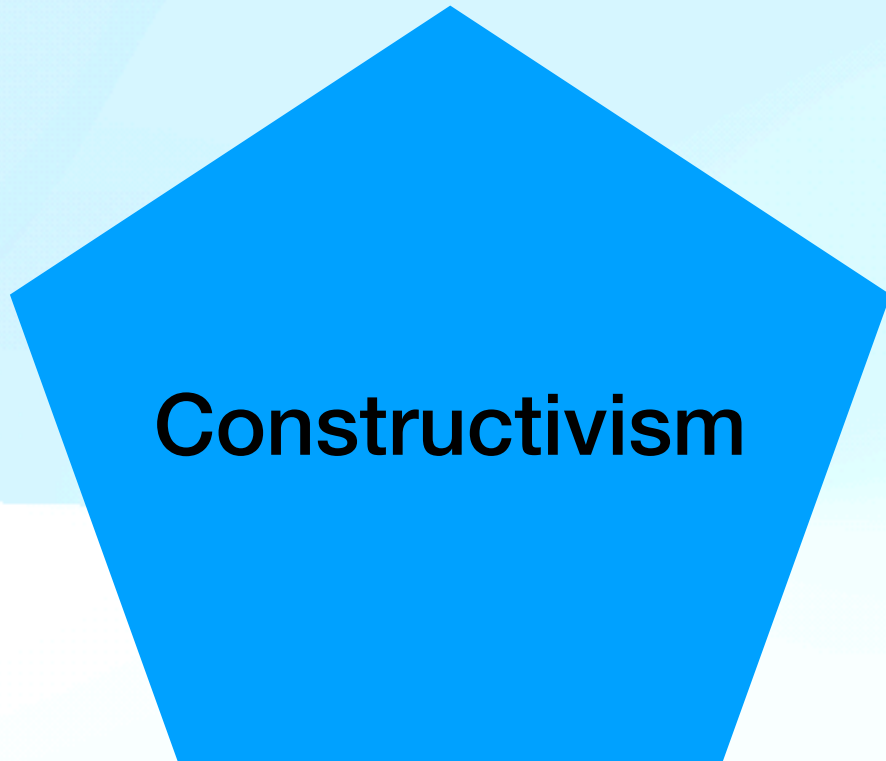
Selection Criteria • hEDS, HSD and or gJH in research sample. • Research must be Published within the last ten years. • All genders and ethnicities. • Populations must be 18 years of age or older.	Thematic Literature Review	Musculoskeletal function and hypermobility	Reduced proprioception
			TMJD
		Voice and hypermobility	Dysphonia and hypermobility
			Vocal Fatigue and hypermobility
		Comorbidities of hypermobility	Anxiety and hypermobility

Literature Review - Key Findings

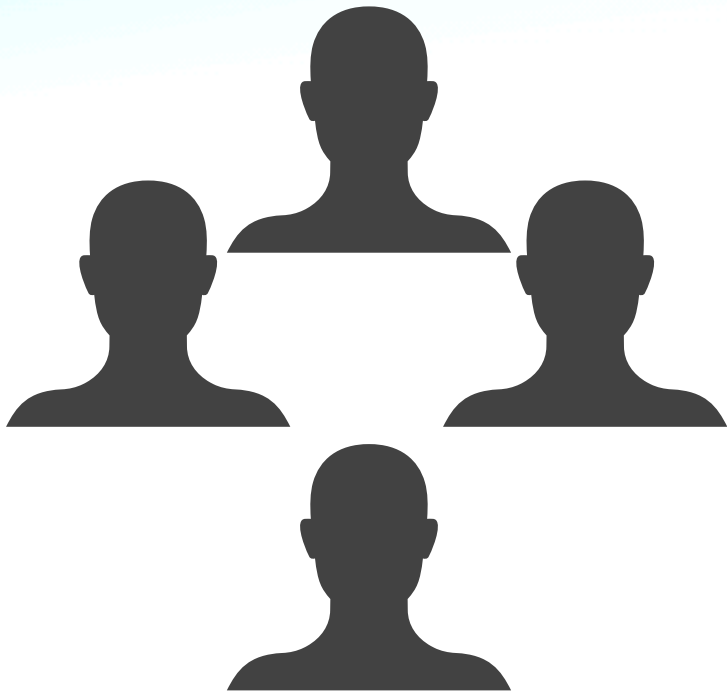


Research Methodology

Qualitative Methods



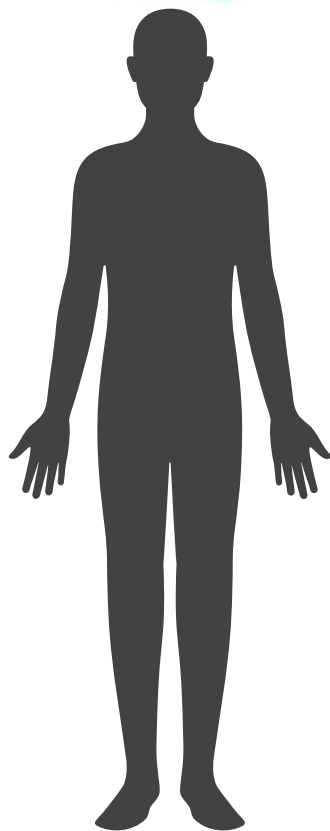
Surveys



Interviews



Observation



‘truth lies in the human experience’

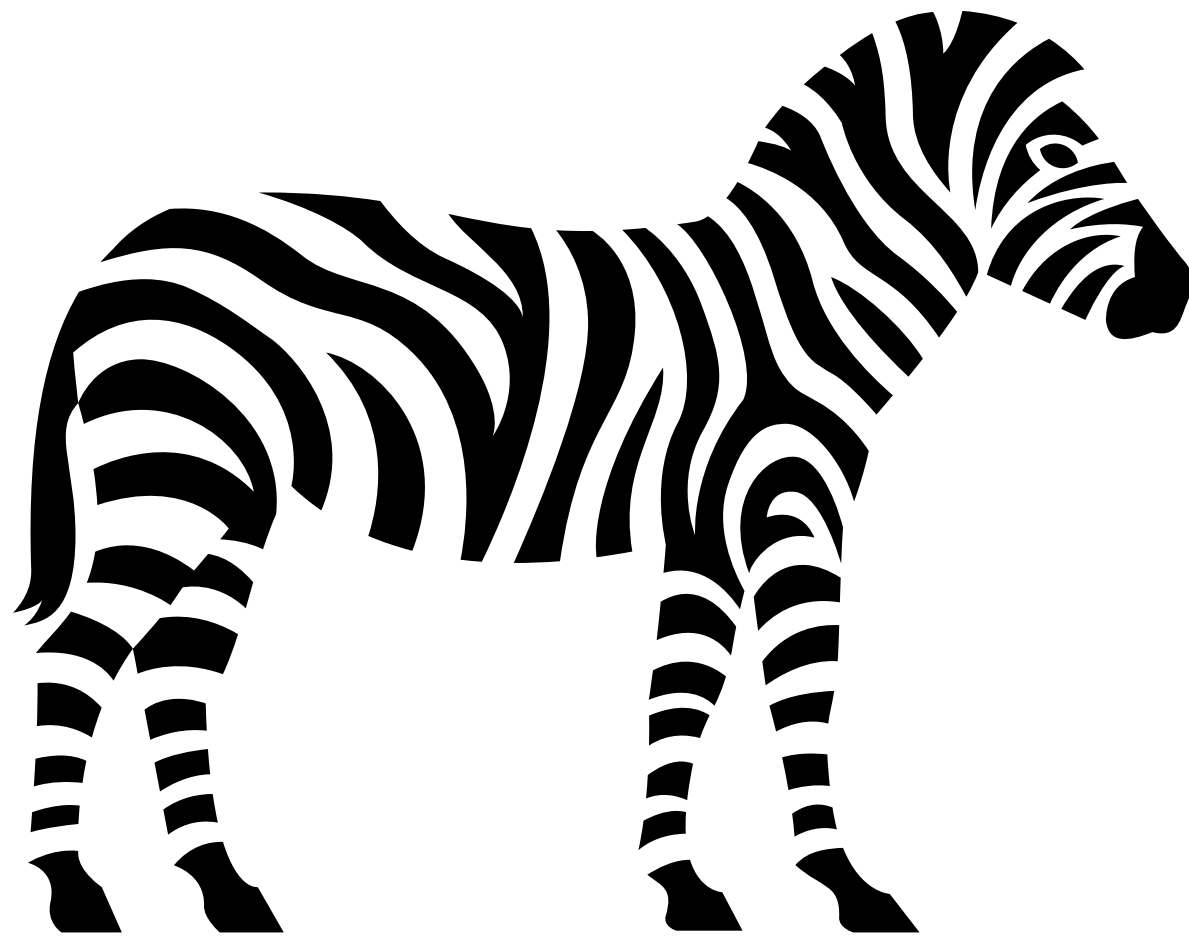
(Wagner, 2012, p10)

Insider- researcher

Benifits	Risks
Inside knowledge of the demands on the participants	Prestablished familiarity may cause conversation to drift away from research topic.
Educative to for myself, participants, student body and faculty.	Participants may seek to give the ‘correct’ answer
Pre-established rapport and trustworthiness.	Participants may falsify data to get access to extra one to one session.

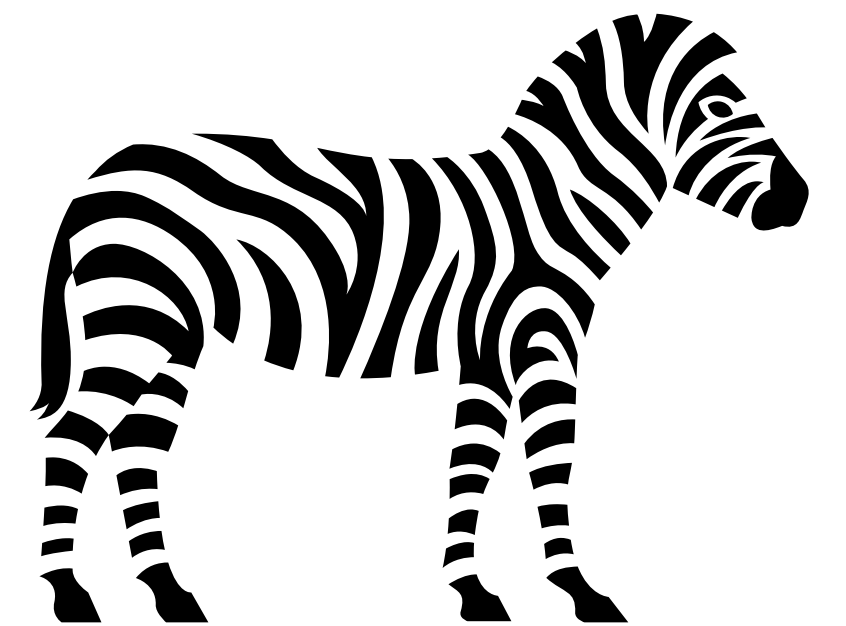
Researchers position as a hypermobile singer

- Transparency noticiably put participants at ease through shared experience.



Ethical considerations

- Anonymity
- Written consent
- Right to withdraw
- Access to support
- Data protection



Study Protocol

An emergent design

Questionnaire

Hypermobility and the Voice

Selection Criteria

A student of The Brighton Academy of performing arts

Who receives one to one vocal tuition.

18 years of age or older.

Questionnaire

Hypermobility and the Voice

- PART ONE
 - Participants were asked to self assess their hypermobile.
- PART TWO
 - A series of questions concerning their musculoskeletal injuries. (Grahame et al., 2000)
- PART THREE
 - A series of statements concerning vocal manifestations of hypermobility; (Jeffert et al., 2021)

Part One



THE BEIGHTON SCORING SYSTEM

Measuring joint hypermobility

A. 5th FINGER / 'PINKIES'

Test **both sides**: Rest palm of the hand and forearm a **flat surface** with palm side down and fingers out straight.

Can the **fifth finger** be bent/lifted upwards at the knuckle to go back **beyond 90 degrees**?

If yes, add **one point** for each hand.



B. THUMBS

Test **both sides**: With the arm out straight, the palm facing down, and the wrist then fully bent downward, can the thumb be pushed back to touch the forearm?

If yes, add **one point** for each thumb.



C. ELBOWS

Test **both sides**: With arms outstretched and palms facing upwards, does the elbow extend (bend too far) upwards **more than an extra 10 degrees** beyond a normal outstretched position?

If yes, add **one point** for each side.



D. KNEES

Test **both sides**: While standing, with knees locked (bent backwards as far as possible), does the lower part of either leg extend **more than 10 degrees forward**?

If yes, add **one point** for each side.



E. SPINE

Bend forward, can you place the palms of your hands **flat on the floor in front of your feet** without bending your knees?

If yes, add **one point**.

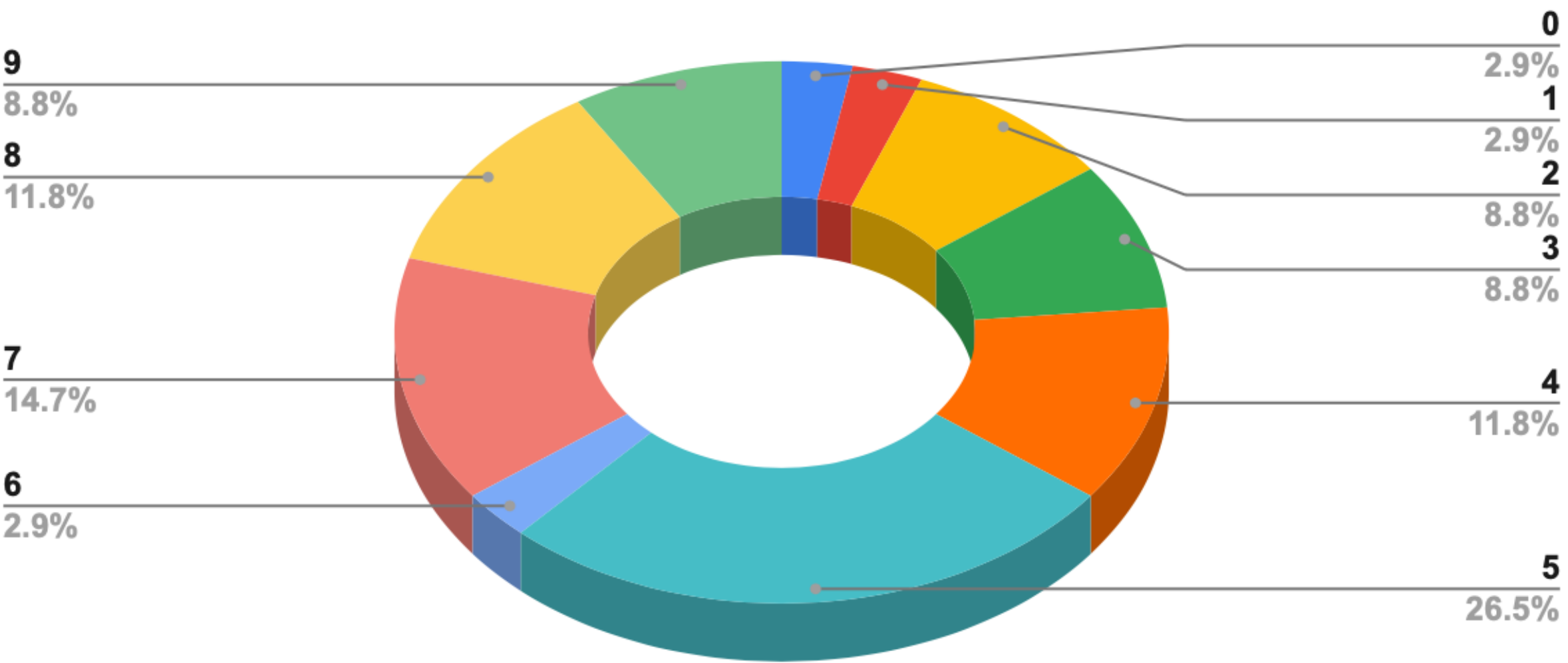


Questionnaire responses

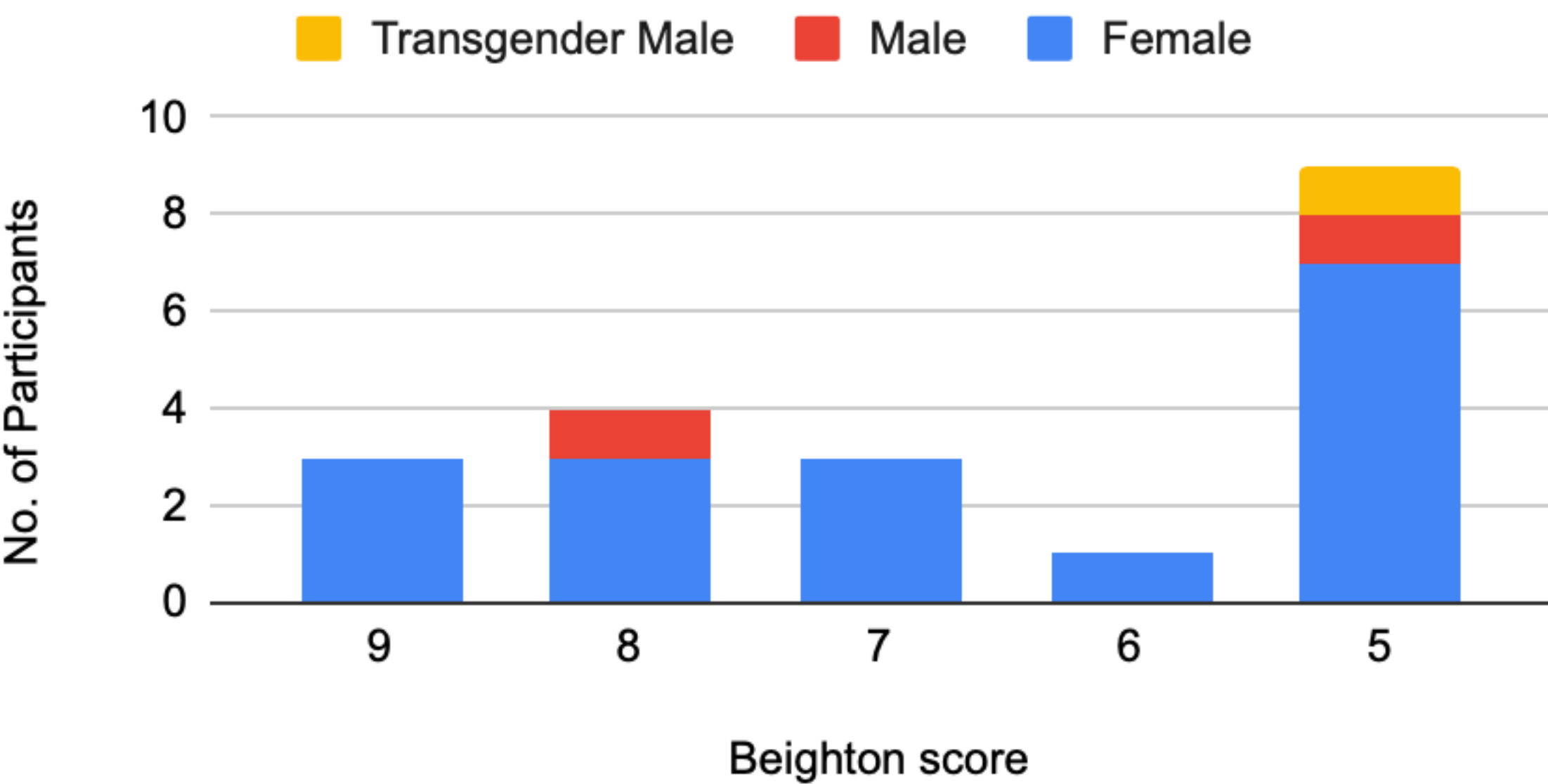
The questionnaire gained 35 responses

Part One Findings - participant demographics

Distribution of Beighton Score in sample



Distribution of Beighton Scores for GJH and Sex



Questionnaire responses

The questionnaire gained 35 responses

Part One Findings - participant demographics

points of testing	Participants																																					Total (%)
Participants no.	1	2	3	4	5	6	7	9	10	11	12	13	14	15	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37			
Sex	F	M	n.a	M	F	F	F	F	F	F	F	M	F	F	F	F	F	F	F	TM	M	F	M	F	F	F	F	F	F	F	F	F	F	M	F	27F/6M/1TM/1n.a		
Right Little Finger	H	Y	Y	Y	Y	H	Y	N	H	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	H	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	N	26/35 (74.3)		
Left Little Finger	Y	Y	Y	Y	Y	H	Y	N	H	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	N	Y	Y	Y	Y	Y	H	Y	N	N	Y	Y	Y	N	25/35 (71.4)		
Right Thumb	Y	N	Y	Y	Y	H	H	N	H	Y	Y	Y	Y	Y	Y	Y	Y	N	N	H	Y	N	N	Y	N	N	N	Y	N	N	N	Y	N	N	N	16/35 (45.7)		
Left Thumb	Y	N	Y	Y	Y	H	Y	N	H	Y	Y	Y	Y	Y	Y	Y	N	N	N	H	N	N	N	Y	N	N	N	Y	N	Y	Y	Y	N	H	N	17/35 (48.6)		
Right Elbow	Y	N	N	Y	Y	Y	N	N	Y	N	-	N	N	Y	Y	Y	Y	N	Y	H	N	N	-	N	Y	Y	Y	Y	Y	N	Y	N	N	N	N	16/35 (45.7)		
Left Elbow	Y	N	N	Y	N	Y	N	N	Y	N	-	N	N	Y	Y	Y	N	N	Y	H	N	N	H	N	Y	Y	Y	Y	Y	N	Y	N	Y	N	N	15/35 (42.9)		
Right Knee	Y	N	N	Y	Y	Y	N	N	N	Y	Y	N	Y	Y	Y	Y	N	-	Y	Y	-	Y	Y	N	Y	N	Y	Y	Y	Y	N	Y	N	N	N	20/35 (57.1)		
Left Knee	Y	N	N	Y	Y	Y	N	N	N	Y	Y	N	Y	Y	Y	Y	N	-	Y	Y	-	Y	Y	N	Y	N	Y	Y	Y	Y	N	Y	N	N	N	20/35 (57.1)		
Spine	Y	H	Y	H	Y	Y	Y	Y	N	Y	Y	Y	H	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	H	N	27/35 (77.1)		
Beighton Score (BS)	8	2	5	8	8	5	4	1	2	7	7	5	6	9	9	9	5	3	5	5	3	4	4	5	7	5	7	8	5	4	5	7	3	2	0			
positive or negative BS	+	-	+	+	+	+	-	-	-	+	+	+	+	+	+	+	+	-	+	+	-	-	-	+	+	+	+	+	+	-	+	+	-	-	-			
F, female; M, male; n.a, 'I do not wish to say' ; TM, Transgender male																																						
Y, positive test; N, negative test; -, 'I don't know'; H, 'no, but I could as a child'																																						

Part Two Findings - musculoskeletal injury

[illegible]

Questionnaire responses

Hypermobility and the Voice

Anxiety and Hypermobility

Hypermobile people are up to sixteen times more likely than the general population to suffer anxiety or panic disorders. (Eccles et al., 2012)

Only 1 in 35

Of the responses stated they do not experience performance anxiety.

Proprioception deficit

Clumsiness is a manifestation of hypermobility as poor proprioception (Clark & Whitehall, 2011), warps the brain's ability to sense where the body is in space.

83%

Of +BS responses describe themselves as clumsy.

Questionnaire responses

Vocal manifestations of hypermobility

21 participants had a +BS
and were 18yo or older

- 1.I experience ‘breaks and cracks’ in my voice regularly whilst singing.
- 2.I have a wide vocal range.
- 3.I have at times lost my voice without the presence of illness
- 4.I have a distinct breaking in my vocal range.
- 5.I experience jaw tension.
- 6.I experience vocal fatigue after prolonged periods of talking
- 7.I experience vocal fatigue after prolonged periods of singing.

Figure 9.								
Vocal function and health statements	Reactions to statements regarding vocal function from participants with a positive Beighton score. (≥5)							
	Strongly Disagree	Disagree	Somewhat Disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree	
	1	0%	5%	24%	24%	29%	10%	10%
	2	0%	5%	14%	14%	38%	29%	0%
	3	5%	19%	0%	10%	29%	33%	5%
	4	5%	5%	10%	14%	29%	19%	19%
	5	0%	0%	0%	5%	10%	43%	43%
	6	5%	0%	10%	14%	29%	33%	10%
	7	0%	0%	0%	5%	24%	43%	29%

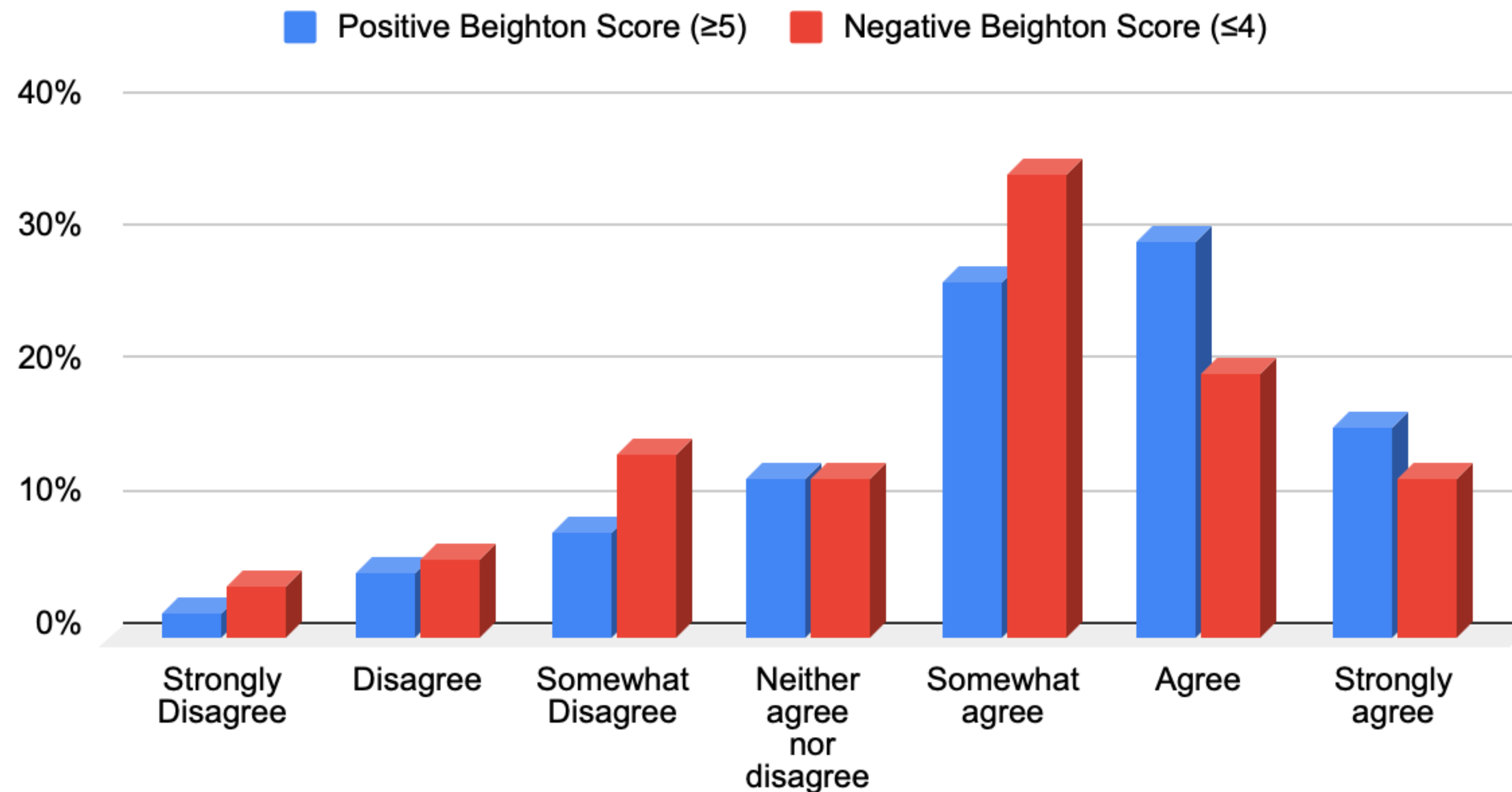
Questionnaire responses

Vocal manifestations of hypermobility

21 participants had a +BS
and were 18yo or older

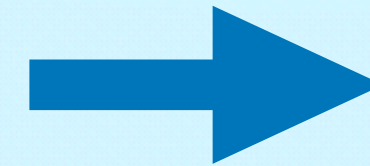
Figure 11.

Average % of opinion responses across vocal manifestations statements of +&- BSs



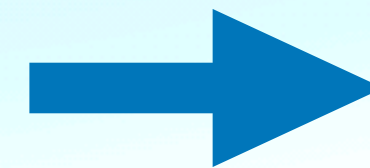
Summary of Quantative finding

64.7% of participants tested positive for generalised joint hypermobilty



Of which 85.8% were female

+BS participants experiences a mean of 1.6 out of 3 possible injuries



In comparision to 1 out of 3 to -BS

There was no significant difference between +BS and -BS in terms of Performance anxiety

+ BS experience vocal issues more greatly

Hypermobile Focused Pedagogy

- Six participants with the highest BS underwent the weekly sessions
- of thirty minutes for eight weeks.
- All six participants were female,
- had a mean age of 19.6 years of age
- the overall attendance for the course was 97%

Hypermobile Focused Pedagogy

Qualitative Themes

Musculoskeletal complaints

<i>Subcategories:</i>
<i>Instability</i>
<i>Physical Trauma</i>
<i>Alignment Maladaptations</i>
<i>Pain</i>
<i>Jaw Tension</i>
<i>Pre Existing strategies to counter hypermobility</i>

Vocal Manifestations

<i>Subcategories</i>
<i>Voice</i>
<i>Vocal Fatigue</i>

Further Implications of Hypermobility

<i>Subcategories</i>
<i>Genetic Factors</i>
<i>Comorbidities</i>
<i>Proprioception</i>
<i>Awareness</i>

Hypermobile focused vocal pedagogy pilot study scheme of work

Session one 30mins	Interview • Each participant is given the opportunity to expand on their responses to the Questionnaire • Beighton Scores were checked.
Session Two 30mins	Body Mapping • Participants were taught how to body map • Participants were encouraged to identify where their body map was incorrect • Participants were coached through exercises to correct each point of balance
Session Three 30mins	Jaw Tension - Ten minute interview concerning body mapping experience so far. • Participants were coached through the anatomy of Jaw. • Participants were coached through a series of exercises to alleviate jaw tension.
Session Four 30mins	Vocal Stamina and Strengthening - Ten minute interview concerning body mapping and jaw tension experience so far. • Participants were coached through strengthening exercises for the Thyroarytenoid muscle and the cricothyroid muscle.
Session Five - Eight 30mins/pw	Weekly practice session - Ten minute interview concerning body mapping, jaw tension and vocal stamina and strengthening exercises so far. • Participants alignment was checked each week and each exercise was performed.
Four week break	To allow for self directed practice
Final Interview 30mins	An interview was conducted with each participant to gain their perspectives of the course, exercises and experience.

Hypermobile Focused Pedagogy

Theme one - Musculoskeletal complaints

- 5 out of six participants had suffered serious injury that affected their alignment.
- 4 out of six participants had experienced subluxations or dislocation of the knee.
- 50% of participants reported pain from prolonged standing and 67% experienced regular knee pain.
- I observed that 100% of participants when relaxed and talking about their experiences at with an anterior thrust of the head and shoulders.

‘I wasn't aware that my standing pain wasn't normal’ (*P5*)

‘I have a lot of pain and tension;
It’s so painful’ (*P11*)

Hypermobile Focused Pedagogy

Theme two - Vocal manifestations

- 50% of participants described their voice as unstable.
- Participants reported having a wide vocal range.
- All participants felt they had a distinct break in their vocal range
- All participants regularly struggle with vocal fatigue
- One participant had found the only way to combat this was to take regular vocal breaks

‘I’d wake up and I just couldn’t
talk’ (*P17*)

‘I always have a fear that I'm gonna crack when I'm singing. It never feels stable, and I know what I'm trying to sing but it just doesn't come out that way.’ (*P5*).

‘It's not because I'm using the wrong technique. It's just not there. It just goes. P1’

Hypermobile Focused Pedagogy

Theme Three - Further Implications of Hypermobility

- 100% of participants experienced proprioception deficit.
- 100% of participants experienced performance anxiety.

‘my legs would be uncontrollably shaking’ (P11)

‘I was so nervous I used to be like literally convulsing’ (*P17*)

Hypermobile Focused Pedagogy

Session two - Body Mapping

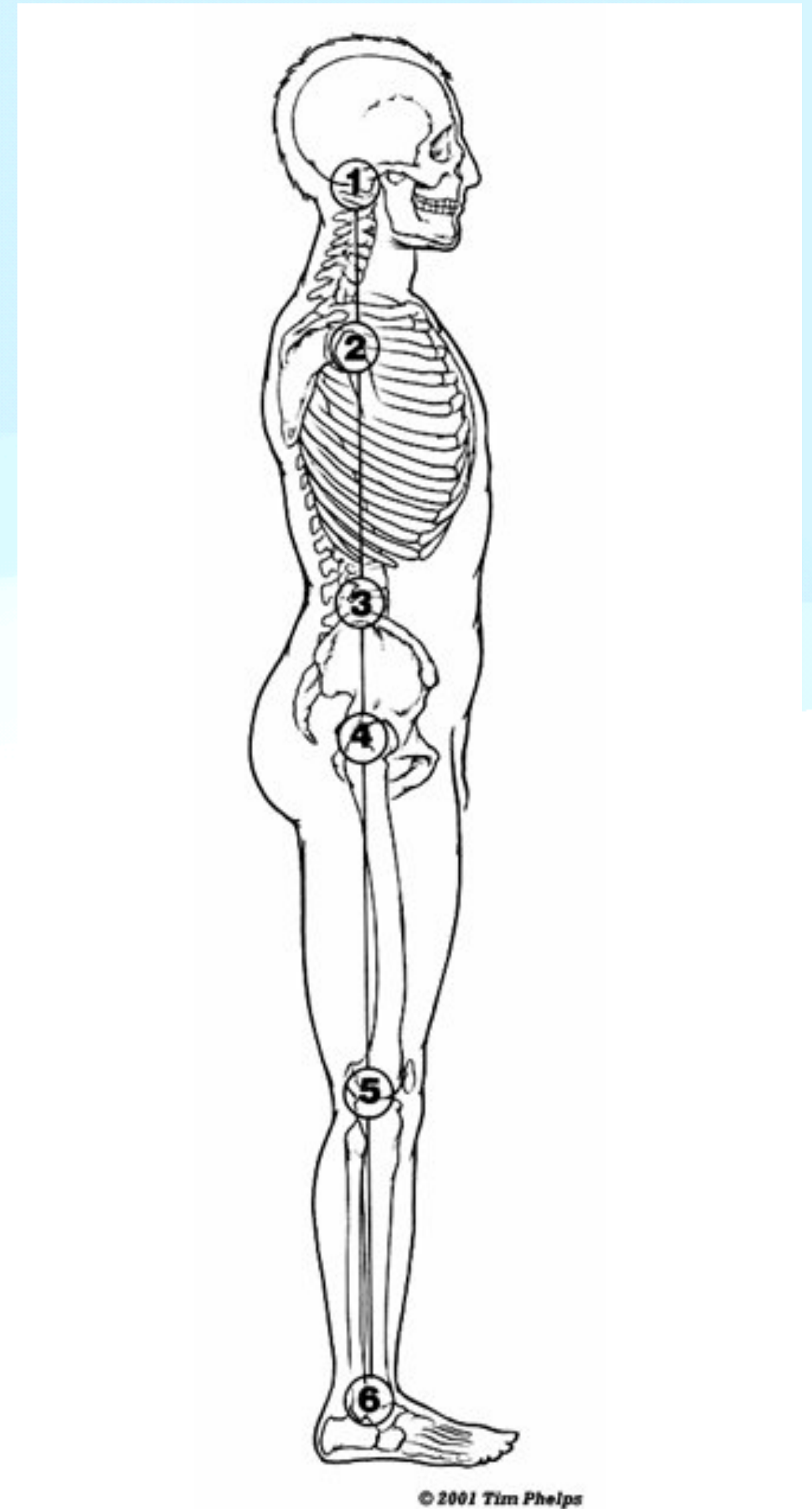
Body mapping is a technique that focuses on six body points, which stack directly on top of each other to achieve dynamic balance and correct musculoskeletal alignment in the body. (Conable, 1992)

Hypermobile Focused Pedagogy

Session two - Body Mapping

The Six points of balance are;

- 1.The Atlanto-Occipital joint (AO)
- 2.The Shoulder Joint
- 3.The Lumbar Spine
- 4.The Hip Joints
- 5.The Knees
- 6.The Ankles



Hypermobile Focused Pedagogy

Session two - Body Mapping

Figure. 14

Correct mapping of points of balance in participants

Participants no	AO Joint	Shoulders	Lumbar	Hips	Knees	Ankles
11	No	Yes	Yes	No	Yes	No
30	No	Yes	Yes	Yes	Yes	Yes
17	No	Yes	No	No	Yes	Yes
5	No	No	No	Yes	Yes	Yes
18	No	No	No	Yes	Yes	No
1	No	Yes	No	Yes	Yes	No

After two weeks of body mapping

'I understand so much more
where my head is supposed to
be now.' (*P30*)

After two weeks of body mapping

‘Its so hard! I'm noticing it now whilst I'm just out and about and walking, so I have been trying to change it but It's really uncomfortable.’ (P11)

After two weeks of body mapping

'Yeah, and now that I'm aware, if I can't hold a note now, I think, oh, maybe it's this or that, rather than just getting annoyed.' (P11)

Hypermobile Focused Pedagogy

Session two - Body Mapping

After just two weeks of body mapping participants showed a heightened awareness of how their hypermobility affects their alignment and had begun implementing the correction exercises regularly. Some began to notice a change to their vocal production.

'It's much clearer and smoother' (P18)

Hypermobile Focused Pedagogy

Session Three - Jaw tension

In session three participants were coached through two breathing exercises;

- Exercise 1 focused on relaxing compensatory breathing muscles in the neck
- Exercise 2 focused on a slow meditative thoracic breath to calm the nervous system for performance anxiety and again take work away from the neck.

And four tongue stretches developed by Walt Fritz (2022) for jaw tension.

Hypermobile Focused Pedagogy

Session Three - Jaw tension

During the fourth week of interviews, it was observed that participants had difficulty understanding the use of proactive exercises to prevent jaw tension.

'That's really good when I'm on the floor because I can focus on my breathing but I can't get it into my singing yet.' (P11.)

Hypermobile Focused Pedagogy

Session Four - Vocal Stamina and Strength

During session four participants were taught exercises to strengthen the TA and CT muscle.

Pepectives after two weeks of TA and CT exercises

‘I have noticed my mix is
smoother and bolder on the way
up ‘(P1)

Pepectives after two weeks of TA and CT exercises

‘It’s giving me stability.’ (P11)

Perspective after on course after 3 weeks of employment

I feel like that's actually really helped my voice.' (P11)

Hypermobile Focused Pedagogy

Sessions 5-8

Across the 4 weeks of practice there was a notable change in participants alignment.

The number of alignment corrections by researcher during Body Mapping, sessions 5-8

Participants no.	Session No.			
	5	6	7	8
1	3	2	n/a	2
5	5	3	2	1
11	4	2	2	n/a
17	3	3	3	1
18	4	3	1	1
30	3	1	4	1

The number of alignment adjustments performed by participants during vocal exercises sessions 5-8

Participants no.	Session Numbers			
	5	6	7	8
1	5	3	4	2
5	4	2	3	0
11	3	2	2	n/a
17	3	4	n/a	1
18	3	2	4	0
30	4	3	1	1

Hypermobile Focused Pedagogy

Sessions 5-8, notable findings

- By week six only 17% of participants still experience jaw tension
- All participants struggled with the neck relaxation exercise, finding it tensed the core and by week 5 had ceased to perform the exercise.
- By week seven results were negatively impacted due to high fatigue from high especially high work load in training. Two participants needed to perform exercises seated or in semi-supine.
- By week 8 50% of participants reported a there proprioception had increased.

Hypermobile Focused Pedagogy

Final interview, notable findings

5 out of 6 participants felt their voice was more reliable than it had been at the start of the course and reported;

- a stronger mix
- an ability to move more smoothly through the passaggio
- accessing mix for the first time
- being able to access belt
- having more vocal stamina
- experiencing less frequency in breaks in their singing voice.
- having more confidence in their singing voice.

Hypermobile Focused Pedagogy

Course feedback

- 100% of participants felt the length of each session and the course was correct for them to gain and practice the skills and techniques.
- All participants felt their performance anxiety had lessened but wanted a dedicated session on performance anxiety.
- Participants found, extended tones, plosives and body mapping the most useful.
- Two participants also stated elements they would have liked to explore in the course, such as implementing the strategies in situ or having a piece of repertoire to revisit every session.

Study Limitations

Sample Size

- The sample size was too low for rigorous data and would benefit from replication on a larger scale.

Lack of Clinical Assessment

- There was no way to scientifically evaluate participants' voices and findings as findings were self-reported and self-assessed.

Lack of sample diversity

- All participants were female and this study negates to explore the male experience of hypermobility.

Conclusion

- Each participant saw a positive impact from the exercises.
- Vocal improvement was seen in 5 out of 6 participants.
- Awareness for hypermobility within the college was heightened due to the study and increase dialogue on hypermobility.
- Participants found exercises helpful to varying degrees, showing the need for diversity in hypermobile pedagogy.
- Despite positive impacts of exercises participants still needed reasonable adjustments to teaching spaces, such as singing seated.
- This framework show promise but needs further testing and exploration for validity.

Recommendations

- Consider further study into performance anxiety
 - Consider using assessment tools such as the K-MPAI
- Further independant study of jaw tension release.
- Find a way to clinically assess hypermobilty in the voice

Personal Reflection

- I wish to continue my study of hypermobility
- I wish to like my research with other practitioners and test
- Test this pedagogy further.

References

- Atwell. K, Michael. W, Dubey. J, James.S, Martonffy. A, Anderson. S, Rudin.N, Schrager. S, (2021) Diagnosis and Management of Hypermobility Spectrum Disorders in Primary Care. *The Journal of the American Board of Family Medicine*, 34(4) pp:838-848; DOI: <https://doi.org/10.3122/jabfm.2021.04.200374>
- Aubry-Rozier, B. , Schwitzguebel, A. , Valerio, F. , Tanniger, J. , Paquier, C. , Berna, C. , Hügler, T. , & Benaim, C. (2021). Are patients with hypermobile Ehlers–Danlos syndrome or hypermobility spectrum disorder so different?*Rheumatology International*, 41(10), 1785–1794. 10.1007/s00296-021-04968-3
- Beighton, P.H., Horan, F. (1969) Orthopedic aspects of the Ehlers-Danlos syndrome. *J Bone Joint Surg* 51: pp444-453
- Behrman A. (2005) Common practices of voice therapists in the evaluation of patients. *JVoice*.19, pp 454–469
- Blajwajs, L., Williams, J., Timmons, W., & Sproule, J. (2023). Hypermobility prevalence, measurements, and outcomes in childhood, adolescence, and emerging adulthood: a systematic review. *Rheumatology international*, 43(8), pp1423–1444. <https://doi.org/10.1007/s00296-023-05338-x>
- Boyer, E. (1990). Scholarship reconsidered: Priorities of the professoriate. Princeton, NJ: Carnegie
- Bühler, R.B., Sennes, L.U., Tsuji, D.H., Mauad, T., Ferraz da Silva, L., Saldiva, P.N. (2011) Collagen Type I, Collagen Type III, and Versican in Vocal Fold Lamina Propria. *Arch Otolaryngol Head Neck Surg*. 137(6), pp604–608. doi:10.1001/archoto.2011.88
- Carroll. M.B (2023) Hypermobility spectrum disorders: A review. *Rheumatology and immunology research*. 4(2)pp60-68
- Castori, M., Tinkle, B., Levy, H., Grahame, R., Malfait, F., & Hakim, A. (2017). A framework for the classification of joint hypermobility and related conditions. *American journal of medical genetics. Part C, Seminars in medical genetics*, 175(1),pp148-157. <https://doi.org/10.1002/ajmg.c.31539>
- Clinch. J, Deere. K, Sayer.s A, Palmer. S, Riddoch. C, Tobias. JH, Clark. EM. (2011) Epidemiology of generalized joint laxity (hypermobility) in fourteen-year-old children from the UK: a population-based evaluation. *Arthritis Rheum*. 63(9): pp. 2819-27. DOI: 10.1002/art.30435.
- Clark, J.E., Whittall, J. (2011) Developmental Coordination Disorder: Function, participation, and assessment, Research in Developmental Disabilities, 32 (4), pp1243-1244 <https://doi.org/10.1016/j.ridd.2011.02.017>.De Vries. J, Verbunt. J, Stubbe. J, Visser. B, Ramaekers. S, Calders. P, Engelbert. R. (2021) Generalized Joint Hypermobility and Anxiety in Adolescents and Young Adults, the Impact on Physical and Psychosocial Functioning. *Healthcare*. (9)525: pp2-11. doi: 10.3390/healthcare9050525.
- Costley, C., Elliott, G., & Gibbs, P. (2010). Doing work based research: Approaches to enquiry for insider-researchers. SAGE Publications Ltd, <https://doi.org/10.4135/9781446287880>
- Eccles, J. A., Beacher, F. D., Gray, M. A., Jones, C. L., Minati, L., Harrison, N. A., & Critchley, H. D. (2012). Brain structure and joint hypermobility: relevance to the expression of psychiatric symptoms. *The British journal of psychiatry : the journal of mental science*, 200(6), pp508–509. <https://doi.org/10.1192/bjp.bp.111.092460>
- Eccles, J.(2019) Hypermobility and autonomic dysfunction: insights from bench to bedside
- Journal of Neurology, neurosurgery and Psychiatry, 8, pp90
- Fikree.A, Aziz. Q, Grahame. R (2013) Joint hypermobility syndrome. *Rheum Dis Clin Norh Am* 39: pp 419-430
- Grahame, R. (2013) Joint hypermobility: emerging disease or illness behaviour? *Clinical Medicine* 13 (6)pp50-52
- Jansson A, Saartok T, Werner S, Renstrom P. (2004) General joint laxity in 1845 Swedish school children of different ages: age- and gender-specific distributions. *Acta Paediatr*.93: pp. 1202–6.
- Jeffery T, Postavaru GI, Matei R, Meizel K. (2021) 'I Have Had to Stop Singing Because I Can't Take the Pain': Experiences of Voice, Ability, and Loss in Singers With Hypermobility Spectrum Disorders. *J Voice*(21)00407-0. doi: 10.1016/j.jvoice.2021.11.017.
- Jensen, B. R., Olesen, A. T., Pedersen, M. T., Kristensen, J. H., Remvig, L., Simonsen, E. B., & Juul-Kristensen, B. (2013). Effect of generalized joint hypermobility on knee function and muscle activation in children and adults. *Muscle & nerve*, 48(5), pp762–769. <https://doi.org/10.1002/mus.23802>
- Jindal P, Narayan A, Ganesan S, MacDermid JC. (2016) Muscle strength differences in healthy young adults with and without generalized joint hypermobility: a cross-sectional study. *BMC Sports Sci Med Rehabil*. 25(8)pp1-9 doi: 10.1186/s13102-016-0037-x.
- Johannessen, E.C., Reiten, H.S., Løvaas, H., Maeland, S., Juul-Kristensen, B. (2016) Shoulder function, pain and health related quality of life in adults with Joint Hypermobility Syndrome/Ehlers-Danlos Syndrome-Hypermobility Type. *Disabil Rehabil* (epub ahead of print). 29(9).
- Malfait, A. J. Hakim, A. De Paepe, R. Grahame, (2006) The genetic basis of the joint hypermobility syndromes, *Rheumatology*, 45(5), pp502–507, <https://doi.org/10.1093/rheumatology/kei268>
- Menton, S. M., Fairweather, D., Bruno, K.A., Thompson, C.C., Candelo, E., Darakjian, A.A., Gehin, J. M., Jain, A., Kotha, A., Whelan, E.R., Li, Z., Knight, D.R.T., & Rutt, A.L. (2024). Laryngological Complaint Prevalence in Hypermobile Ehlers-Danlos or Hypermobility Spectrum Disorders. *The Laryngoscope*, 134(2), pp773–778.
- Morlino. S, Castori. M, (2023) Placing joint hypermobility in context: traits, disorders and syndromes, *British Medical Bulletin*, 147(1) pp 90–107, <https://doi.org/10.1093/bmb/ldad01>
- Nicholas JA. (1970) Injuries to knee ligaments. Relationship to looseness and tightness in football players. *JAMA*;212: pp.2236–9.
- Pasinato F., Souza J.A., Corrêa E.C.R., Da Silva A.M.T. (2011)Temporomandibular disorder and generalized joint hypermobility: Application of diagnostic criteria. *Braz. J. Otorhinolaryngol*. 77:pp418–425. doi:10.1590/S1808-86942011000400003.
- Peckham A. (2000) The Contemporary Singer: Elements of Vocal Technique. Boston, MA: Berklee PressSahin, N., Baskent, A., Ugurlu, H. *et al.* (2008) Isokinetic evaluation of knee extensor/flexor muscle strength in patients with hypermobility syndrome. *Rheumatol Int* 28, pp643–648. <https://doi.org/10.1007/s00296-007-0493-4>
- Rubin, J.S., Mathieson, L., Blake, E. (2004) Posture and voice. *J Singing*. 60, pp 271–275.
- Rubin, J.S., Blake, E., Mathieson, L. (2005) Musculoskeletal patterns in patients with voice disorders. *Journal of Voice*. 21(4) pp447- 484
- Scheper, M., de Vries, J., Beelen, A., de Vos, R., Nollet, F., & Engelbert, R. (2014). Generalized joint hypermobility, muscle strength and physical function in healthy adolescents and young adults. *Current rheumatology reviews*, 10(2), pp.117–125. <https://doi.org/10.2174/15733971111666150120112925>
- Shannon-Baker, P, (2023)Philosophical underpinnings of mixed methods research in education: International Encyclopedia of Education (Fourth Edition), *Elsevier*, pp380-389
- Smith, T. O., Jerman, E., Easton, V., Bacon, H., Armon, K., Poland, F., & Macgregor, A. J. (2013). Do people with benign joint hypermobility syndrome (BJHS) have reduced joint proprioception? A systematic review and meta-analysis. *Rheumatology international*, 33(11), pp2709–2716. <https://doi.org/10.1007/s00296-013-2790-4>
- Söderman, K., Alfredson, H., Pietilä, T., Werner, S. (2001) Risk factors for leg injuries in female soccer players: A prospective investigation during one out-door season. *Knee Surg Sports Traumatol Arthrosc* 9(5) pp313-321.
- Stillman, B., Tully, E., McMeeken, J. (2002) Knee joint mobility and position sense in healthy young adults. *Physiotherapy* ;8(9):pp553–60.
- Taber, K. S. (2011). Constructivism as educational theory: Contingency in learning, and optimally guided instruction. In J. Hassaskhah (Ed.), *Educational Theory*. New York: Nova, pp39-61.
- Timmons, W, Sproule, J, Williams, JM & Blajwajs, L 2023, 'Hypermobility prevalence, measurements, and outcomes in childhood, adolescence and emerging adulthood: A systematic review ', *Rheumatology International*, 43(8), pp.1423-1444. <https://doi.org/10.1007/s00296-023-05338-x>
- Tinkle, B. T, (2020) ‘Symptomatic Joint Hypermobility’, *Best Practice & Research Clinical Rheumatology*, 34(3), <https://doi.org/10.1016/j.berh.2020.101508>
- Titler. M,G (2008) ‘The Evidence for Evidence-Based Implementation’ in Huges. R, *Patient Safety and Quality: An Evidence-based Handbook for Nurses*. United States: Agency for Healthcare Research and Quality. pp 113-163
- Williams, H.R, Wood, G., Hakim, A.J., Birchall, M., Hirani, S.P. (2023) Self-reported throat symptoms in Ehlers-Danlos syndromes and hypermobility spectrum disorders: A cross-sectional survey study. *Laryngoscope Investig Otolaryngol*. 18;8(5):1259-1264. doi: 10.1002/lio2.1120.
- Wilson Arboleda BM, Frederick AL. (2008) Considerations for maintenance of postural alignment for voice production. *Journal of Voice* .22 (1):pp90-9. doi: 10.1016/j.jvoice.2006.08.001.
- Wagner, C., Kawulich, M., Garner, M, (2012) *Doing social research: A global context*. McGraw Hill
- Warden, G. (2022) ‘A study into interventions for post-pubescent singers presenting with joint hypermobility.’ Voice Study Centre.
- Warden, G. (2024) ‘An in-depth study into whether hypermobility poses a risk to the structures used for phonation in the post-pubescent human body.’ Voice Study Centre.