

Voice Change and the Professional Girl Chorister

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Abstract

Much research has been conducted regarding the male adolescent changing voice. By comparison, however, very few studies exist which investigate voice change in the female adolescent. Although this disparity is beginning to be addressed, there are still gaps in the literature, as well as shared experiences which need exploring. This article begins with a review of relevant literature, which delves into the ideology surrounding the issues. The second section of the article studies a group of elite young teenage girl choristers in an English cathedral, and considers how their lived experiences may differ from the suggested results of research thus far. Finally, the third section sets out a protocol for research, some of which is currently being undertaken by the authors.

We are grateful to Martin Ashley for inviting us to contribute to this important subject, and we would like to express our thanks to Lynne Gackle and Graham Welch for their ongoing support and advice.

PART 1

Introduction

Historically, there has been more research conducted regarding voice change in boys than in girls (Gackle, 2019; Sweet, 2016, Owens and Welch 2017). In 1885, *The Child's Voice* (Benhke and Browne, 1885) was the first book to focus entirely on adolescent vocal development. The work was based on survey results from both male and female participants and, although there was some focus on the changes experienced by female adolescents, the book was not primarily focussed on the singing voice in general. In 1965, Cooper and Kuersteiner briefly discuss adolescent female voice change in *Teaching Junior High School Music*, and advocate that the singing voices of girls should not be permanently classified as soprano or alto during adolescence. Also in 1965, Luchsinger and Arnold had their book *Voice-speech-language* translated from German into English, and choral education publications frequently cite it as it references the female changing voice directly: "It is less known that girls also undergo vocal mutation" (1965, 134). Apart from these scant examples, there is not a huge amount of historical literature regarding female adolescent voice change until much more recently.

Literature Review

Voice change, especially in boys, is a ‘complex phenomenon’ (Cooksey, 1999: 5) and has historically caused disagreement amongst practitioners. Some argue that the change should be the culmination of singing for a boy, while others maintain it is better to continue to sing through the change. In some historical recordings, it is apparent that male trebles were encouraged to keep singing in their high treble register long after the onset of puberty into their late teens, thus potentially damaging the larynx as it struggled to maintain the higher frequencies as the speaking voice changed gradually (Williams 2019). The issue is one which still creates disagreement amongst experts with regard the practical application of knowledge (Cooksey, 1999). Two systems which are commonly used to classify these changing voices, particularly in the United States, are those of Cooper and Cooksey. Cooper created what has become known as the *Cambiata Plan* (*cambiata* meaning ‘changing’) (Thurman, 2012). Cooksey studied with Cooper and subsequently researched voice change in adolescents further, recognising more stages within the process of voice change (Ashley, 2015; Thurman, 2012; Williams 2019) (see Table 1).

Table 1
Cooksey’s stages for male adolescent voices (adapted from Ashley, 2015: 97)

Stage	Mean speaking note	Most common year group	Range	Comments
0	259	Y7	A3-F5	Full, rich soprano voice
1	226	Y7	A3-D5	Breathy, strained upper range
2	210	Y8	E3-C5	Loss of agility, falsetto emerges
3	186	Y8-9	D3-A4	Evolution into baritone register
4	151	Y9	A2-D2	Light and husky mid-baritone
5	120	Y9	A2-D4	Adult qualities emerge

More recently, there has been an increase in the amount of information available regarding female adolescent voice change (Gackle, 2019). Gackle suggests that the lack of research to date may be because ‘one widely accepted assumption was that female voices do not really change, but instead, merely develop during the adolescent period’ (Gackle, 2006: 29). Her research has found evidence suggesting that the changes which girls experience are more than just a development of their voices: that they too go through clear stages, influenced by the growth and changes to their larynx and vocal apparatus. Another possible reason for the paucity of research may be linked with the social position of female singers within the hierarchy of choral singing in the UK, with specific reference to singing in a religious setting such as a cathedral, abbey, or chapel. ‘Cathedral music has been all male in performance since its inception in Canterbury’ until Salisbury Cathedral welcomed its first female choristers in 1991 (Welch, 2010: 227). Salisbury’s move heralded a fundamental change in the sector and currently, thirty-nine of the forty-two Anglican cathedrals have girl choristers (Stewart, 2021). Analyses of empirical data suggest that there has been no negative impact on provision for boy choristers, with

overwhelming positive response to the inclusion of girls (Stewart, 2021: 4). Alongside the increase in numbers of girls singing in such institutions in the UK, there is a larger body of research developing into the vocal changes experienced by female adolescents (Howard and Welch, 2002; DeCoster *et al.* 2008; Sweet, 2015).

Vocal production: the larynx and vocal folds

Although a detailed analysis of the structure of the larynx is not necessary here, it is important to outline the basic functions of the apparatus, as growth during adolescence affects the larynx greatly, and results in the changes heard in singing and speaking voices.

The larynx (also called the voice-box) is made of cartilage, muscle, and ligaments, and is situated below the pharynx at the top of the trachea. The primary purpose of the larynx is not to produce sound, but rather to protect the airway, to aid in respiration, and to act as a pressure valve (Sweet, 2020; Kayes, 2019; Thurman and Welch, 2000; Hollien *et al.* 1999). However, it is fundamental also in producing vocalised sounds, and is found where the ligaments commonly referred to as vocal cords, or vocal folds, are housed. Vocal folds are located in the thyroid cartilage, and are made of a pair of muscles which contract and slacken, thus allowing for alterations in pitch (Hollien *et al.* 1999).

Physical Growth

'Puberty is the beginning of adolescence' (Thurman and Klitzke, 2000: 700), and is usually recognised as beginning with the appearance of secondary sex characteristics. Adolescence lasts from then until body growth is complete, which is usually between ages ten to eighteen for females and twelve to twenty for males. There is often a dramatic growth spurt between the ages of eleven to fifteen for both sexes. Before this time, in pre-pubescence, the vocal apparatus of males and females is largely the same. During this growth spurt, the 'laryngeal cartilages become significantly larger and heavier, remarkably so in males' (Thurman and Klitzke, 2000: 700).

The physical growth of singing apparatus occurs during puberty in both girls and boys. Vocal folds of girls grow between three and four millimetres (34% growth), and those in boys grow up to one centimetre (63% growth) (Sweet, 2020), with full adult sizes being achieved by around age 20/21 (Thurman and Klitzke, 2000). The male larynx increases more in the anterior-posterior position (hence the development of the so-called 'Adam's Apple') (Fett, 1993; Gackle, 2019; Howard and Welch, 2002). As a result of this growth, the speaking voice lowers and the singing range and register transitions will fluctuate.

Hormones

These physiological changes are kick-started by the influx of hormones which herald the onset of puberty in adolescence, begin the process of voice change, and have a direct impact on the vocal harmonics for male and female alike (Sweet, 2020). The hormones which affect teenagers have always been present in the brain, but as children reach

adolescence, their brains begin to process and recognise them in new ways, and it is *this* which causes the maelstrom associated with teen-angst (Jensen, 2016). 'In the Western world, the average age of puberty is around eight to thirteen years for a girl and nine to fourteen years for a boy' (Abitbol *et al.* 1999: 433), and it is the changes in levels of oestrogen and progesterone which are responsible for the physical changes experienced at this age. In the female voice, oestrogen and progesterone lower the voice by up to a third in pitch. In the male voice, androgens are responsible for the octave lowering in vocal pitch (Abitbol *et al.* 1999).

Menarche and Pre-Menstrual Vocal Syndrome

Changes in girls' voices can be linked with the onset of menarche (the start of menstruation). As adolescent girls approach puberty, the hormonal changes they experience affect vocal tissue. The symptoms experienced during pre-menstruation and menstruation are collectively called *premenstrual vocal syndrome* (PVS) (Kadokia *et al.* 2013; Sweet, 2020). This vocal disorder has been widely recognised for centuries, and indeed, at La Scala de Milano, there used to be a custom whereby female singers were given *Grace Days* when they were not asked to sing but were still paid around the *time of the moon* (Abitol and Abitol, 2014). Perhaps this custom should be reconsidered for, even though this area is been documented for centuries, it is not a topic which is widely addressed in the choral world (Oberlander, 2010; Sweet, 2020).

Female adolescent voice change

Across several papers (1991, 2006, 2019), Gackle has identified eight key features which can be found in female changing voices:

- 1) Increased breathiness in tone
- 2) Lowering of speaking voice
- 3) Fluctuating tessitura/range
- 4) Changes in timbre
- 5) Cracks/breaks in the voice
- 6) Transition notes/appearance of *passaggi* and register changes
- 7) Insecure pitch
- 8) Initial phonation difficulties
(Gackle, 2019: 553)

Gackle identifies three overarching, main phases through which girls move. These echo the changes experienced by their male counterparts (see Table 2). Phase two has two sub-phases to aid realisation that the *beginnings* of change and the *high point* of change are closely related, rather than being entirely separate. Gackle characterises changes in terms of colour, likening vocal change in a girl to a shift from one shade of blue to another (e.g. azure to navy) and that of a boy to a transition from blue to another colour entirely. (Gackle, 2019).

Table 2
Gackle's phases for female adolescent voices. (adapted from Gackle, 2019: 558)

Phase No.	Phase Name	Age	Range	Comments
I	Pre-pubertal	8–10	A3-F4	Similar to male voice of the same age
Ia	Pubescence/Pre-menarcheal	11–12 (13)	A#3-D4	Breathiness of tone Discomfort singing
Ib	Puberty/Post-menarcheal	13–14 (15)	G3-D4	Huskiness and hoarseness Moving tessituras
III	Young adult/Post-menarcheal	14–15 (16)	F#3-C4	Richer tone Volume and agility increase

Range, register, and timbre

During adolescent female voice change, the speaking voice very gradually lowers in pitch, both with age and the beginning of menarche. The vocal range also alters, with the lower limit falling by around a third and the upper limit rising slightly (Gackle, 2019).

Another key feature of female vocal change is the change in vocal registers or transitional pitches (*passaggio* or lift point). The upper transition is usually higher in 14- to 15-year-olds than in ten- to eleven-year-olds (Cyrier, 1981; Gackle, 2006). In addition to age and puberty, studies have suggested that weight – and fluctuations (gain or loss) of weight – may also have an effect on pitch-breaks in 13-year-old girls (Willis and Kenny, 2011), with breaks occurring most obviously among girls weighing 56-62 kg.

Gackle describes how the breathiness and huskiness girls experience is due to the vocal folds not closing fully because of growth to the larynx, thus leading to vocal 'chinks' (Gackle, 1991). As the muscles within the vocal apparatus grow, they can initially lack strength. The front of the glottis closes properly, but weakness in the inner-arytenoid muscles prevents the back of the glottis from closing securely. This can lead to quieter singing which affects intonation and lacks tone quality (Gackle, 1991, 2019). At this stage, it is vital that girls continue to sing across the whole vocal range without strain so that the 'light and pure' sound may develop to replace the previous 'loud and full' sound in this head voice, thus preventing improper classification of girls as altos as they progress through voice change (Gackle, 1985: 15).

Girls are often reluctant to use the full extent of their singing voice (Ashley, 2015). They appear to believe that they can only sing in the middle, or modal, range of their voice as do popular music models by whom they are easily influenced. It is tempting as directors therefore, to choose material which covers this lower, smaller range of tessitura as girls progress through the critical time of Gackle's IIB phase, but Gackle confirms that if too much singing is done in the chest voice at this age, it can be detrimental and cause injury (Gackle, 1991). The opposite, whilst less common, can also be true, and may also be detrimental to ongoing vocal production: puberphonia is a recognised disorder 'in which child-like patterns are retained even though the physical development of puberty has been completed' (Samuelson, 1999). Vowel and consonant sounds may be different from

those produced by males as an impact of socio-cultural experiences and expectations (Owen, 2017) and this can alter the overall choral blend. To achieve a good choral blend, critical listening skills need to be developed, especially at the time of voice change as sounds are changing more rapidly (Howard and Welch, 2017). Exercises and repertoire choice seem to be as important for adolescent girls as they are for boys. All children progressing through puberty need to be educated about their changing voices so that they can continue to take part in singing and choirs and so that they can use their voices safely, ensuring that they will be able to continue singing successfully into adult life.

PART 2

Introduction

The second section of this paper deals with adolescent girls' voice change from a more practical point of view. I am indebted to Lucy Poole for her comprehensive and concise review of the existing literature, which forms important background to what you are about to read. In this section, I will consider my own experience working with so-called "professional choristers", all of whom are in the critical age group, namely 11 to 15 (UK school years 7 to 11). I will discuss vocal exercises, range, tessitura, singing lessons, and issues to consider when choosing repertoire, with particular focus on young teenage cathedral girl choristers.

As you will have surmised from the literature review above, many of the existing studies focus on girls who sing in large (often school) choirs which rehearse once or twice a week at most, who have not received individual vocal training, and whom we are encouraged not to overestimate: we must understand the limitations of the young voice (Gackle 2011). My own personal experience with voice change as a teenager, as well as having been an amateur singer in a choir which rehearsed only once a week, and having not had individual singing lessons before or during adolescence, meant that much of this literature (and Gackle in particular) resonated with me when I first read it.

However, over twelve years as director of the girl choristers at Ely Cathedral, I have more often than not found many of the oft-quoted characteristic symptoms of female voice change (Gackle 1991, 2006, 2019) to be irrelevant in relation to professional choristers. These observations are backed up by the small number of studies on this issue which have been conducted in the UK thus far, in particular Welch 2009. On the other hand, when I have directed residential summer courses for girls in this age range (for example, those run by the Royal School of Church Music, both in the States and in the UK), where the girls have come from a wide variety of amateur choral backgrounds, many of Gackle's observed features of voice change are much more apparent.

In my experience at Ely, rehearsing daily, and working weekly with expert singing teachers in individual lessons to develop solid technique, girls are able to overcome—or at least work around—the difficulties associated with voice change. Because they sing fully for an hour nearly every morning before school, the vocal apparatus is conditioned and toned, and changes are less obstructive to them. Professional choristers expect to sing in a significantly more flexible and wide range than those in provincial middle school

choirs, just as (for example) an elite teenage gymnast would expect to be working at a very different level from those who participate as amateurs in an informal after-school club.

The Girl Choristers of Ely Cathedral

Since the ensuing paragraphs will draw upon my experience as the director of Ely Cathedral's Girl Choristers (ECGC), some brief background is in order. ECGC sang their first service in 2006, under the direction of Louise Reid, the founding conductor of the choir. I directed them for the calendar year 2008, and have been permanently in charge since 2010. For the first 12 years, the choir consisted of 18 girls in Years 9 to 13 (ages 13 to 17), in the senior section of the King's School, Ely. In September 2018, the move was made to lower the age range of the choir, primarily in response to changes in the UK education system, but also due to emotional and vocal concerns. There are now 20 choristers in Years 7 to 11 (ages 11 to 15). (For further details on the rationale of this change, see MacDonald 2018.)

The girls rehearse together for an hour before school, four times each week (Monday, Tuesday, Wednesday, and Friday). They sing Evensong on Mondays and Wednesdays (with a short rehearsal before each service), and they share weekend duties (four services over Friday, Saturday, and Sunday) with the boy choristers. The majority of them are boarders. All girls receive a substantial fee reduction as well as free weekly individual singing tuition. We have two specialist singing teachers dedicated to the girl choristers, both of whom are acclaimed professional soloists in their own right (one a soprano, the other a mezzo), as well as being highly experienced in the training of young developing voices, both boys and girls.

Vocal exercises and warmups

It will not surprise readers to know that one of the most important ways to keep adolescent girls' voices healthy as they navigate the changes of their teenage years is through regular—preferably daily—warmup and vocalisation exercises (the elite sporting analogy continues to apply here). This is stressed in all of the existing literature, and indeed Gackle 2011 devotes the best part of an entire chapter to it. Although the intent is laudable, the exercises suggested tend to be rather limited in their ambition. Either they do not explore range fully (“most girls at this age are Mezzo-[i.e., second] sopranos”¹), or (perhaps ironically) they are too complicated musically. I prefer not to spend warmup time singing in parts, or chanting complicated rhythms, or rehearsing tension-inducing tongue-twisters, particularly early in the morning with teenagers navigating voice change. These sorts of activities are better suited to an after-school rehearsal, when the vocal apparatus is already awake and warmed up, and in the sort of ensemble where the need to engage, entertain, and retain amateur singers is a priority.

¹ Gackle 2011, 61.

The issue of range is particularly relevant to teenage girls, so many of whom suffer from a lack of self-confidence, and for whom the changing and unpredictable body can be a barrier to performance. I recall as a teenager myself having an irrational fear of the ledger lines above the treble clef. Unfortunately at the time, none of my conductors understood the need to challenge that, and we rarely warmed up beyond g" (using Helmholtz pitch notation)². Since many choral soprano lines climax on a", warming up a tone lower than that meant that whether or not one could sing those high notes well was a matter of luck (or possibly of genetics). I was under the impression that some people could sing high, but that I was not one of those people. Since I had no individual singing training, no-one disabused me of that fallacy until many years later, and when, as a teenager, I did manage to sing those climactic moments, my production was inevitably unhealthy.

When I was appointed to my post at Ely, I was determined that the girl choristers (at that point, all teenagers) would not suffer as I had done. Every morning, we vocalise well above the staff, so that those climactic a"s are right in the middle of their comfortable, well-oiled range—a runner does not practise running 23 miles a day in order to prepare for a marathon. Having said that, I also teach every girl to be responsible for vocal well-being, assessing her own voice on a day-to-day basis, in order that none of them pushes beyond healthy limits. "Stop when you need to" is a regular mantra, and the girls understand that voice change, monthly hormonal fluctuations, mood, the weather, and even what they had for breakfast might impact their range and production on any given day. They learn to understand and accept that some vocal inconsistency through their years in the choir is inevitable. Working as a team helps—on some days, some girls will have reliable top notes, and on other days it will be other girls, and this is the great benefit of singing in an ensemble. It is also the case that after an extended break (the summer vacation, or Half Term, or a national lockdown³), it is important to re-build gradually and gently, increasing the girls' collective range, building from a conservative a" by a semitone or so each day over the first week or ten days back.

Our morning warmup routine looks something like this:

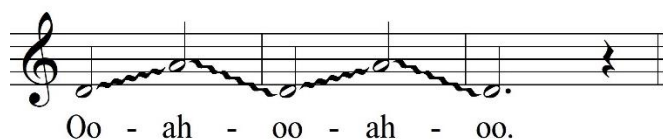
1. breathe and stretch (especially neck, shoulders, upper body);
2. hum descending scales on voiced nasals and fricatives (/m/, /n/, /ŋ/, /v/, /z/), relaxing into the chest voice down to f (the pre-teens tend not to go much below a, but some of the older girls can hum as low as d on some days);

² Helmholtz pitch notation:

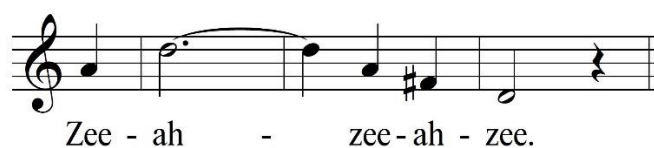


³ It should be noted that the 2020-21 Covid-19 lockdowns have had a noticeable effect on the current cohort of ECGC members. All of them have noticed that their range and their vocal stamina have suffered significantly through extended periods of school closure.

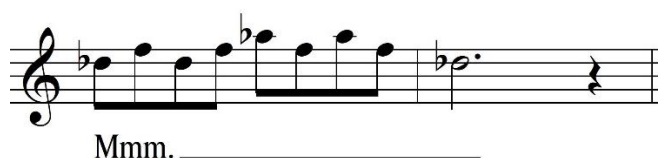
3. sing a combination of the various exercises below, taking them up as high as they can go on any given day (the majority of them are comfortable up to c''', several can sing up another minor third, and sometimes higher); crucially, it is not a competition, but rather a frame of mind.



Start low in the voice as notated here, and gradually move up by semitone until the top note is about c'''.



Start in the middle of the voice as notated here, and gradually move up by semitone until the top note is about e flat'''.



Start high in the voice, as notated here, and gradually move up by semitone until the top note is about g'''. This humming exercise (which can be done on /n/ or /ŋ/ as well of course) is particularly good for extending the range upwards, and accessing the quasi-falsetto resonance at the back of the head.

We then move on to one of the girls' favourites, which develops articulation and coloratura, as well as being fun and energetic, but without causing the tension of tongue-twisters.

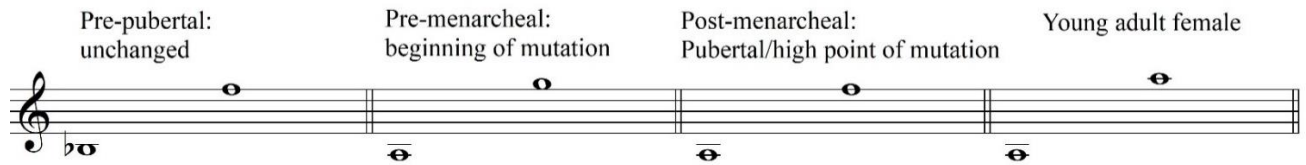


There are, of course, as many ways to warm up voices as there are voices and conductors, so this is just an illustration of one possible way to vocalise with elite choristers.

Range, tessitura, and timbre

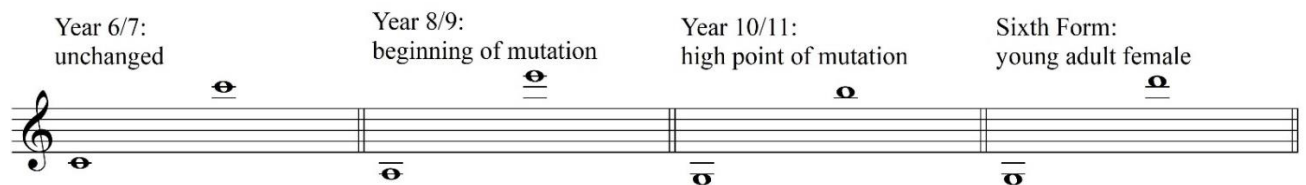
As a direct result of the warmup regime described above, and especially because of the "frame of mind" which I try to instil in the girls, the range, tessitura, and tonal quality of my particular cohort of professional choristers differs rather significantly from the expectation of part-time members of amateur or school choirs.

The range and tessitura of girls before, during, and after adolescence given in Gackle 1991 are as follows:



These were tested against girls in Antwerp Cathedral Choir (Decoster 2008), and ranges were increased slightly for these choristers who sing more frequently.

In my own experience, with conscious encouragement and work expanding range in both directions every day, and in non-pandemic-interrupted times, ECGC's comfortable (collective) range is more like the following:



It is a well-attested feature of a cathedral chorister education that young singers learn by imitation and osmosis, as much as from the specific direction of their choir trainers (Armstrong 2016, Clark 2016, Dong 2018, Dunnett 2008). This is the case for vocal technique as much as it is for repertoire, so maintaining healthy vocal production is crucial not only for the individual choristers, but also for the future of the choir. In Ely, my goal for the girls is to achieve consistently relaxed, healthy, free, legato singing, with a released jaw, well supported and on the breath at all times. Even on a “bad voice day”, there is rarely any hint of the breathiness that Gackle identifies as a characteristic of voice change, nor of phonation difficulties or insecurity of pitch (Gackle 2019). It is certainly the case with the older girls (age 15/16) that *passaggi* and register changes develop, though, and a discernible natural vibrato emerges in some of them.

Singing lessons and voice change awareness

The vast majority of UK cathedral choristers now receive weekly specialist individual singing tuition, although this is a relatively recent development (Ashley 2013; Stewart 2021). ECGC's teachers are open about the effects of hormones, adolescence, and growth on the voice, and the girls are able to talk about voice change with their teachers. In particular, although the girls are at first surprised by the substantial effects that their monthly cycle has on their voices, once they are made aware of the physical effects of the cycle on their vocal folds, as well as on the rest of their singing apparatus, they know not to be mystified by it. It is important for the girls to know that their voices will be

unpredictable on a monthly basis, as well as over their teenage years, and this awareness helps them not to be concerned about the changes.

It will not surprise readers to hear that the conclusive judgement on this subject is that the most important “fix” for vocal issues from voice change and the menstrual cycle, through hay fever and the occasional head cold, is to develop a secure singing technique as early as possible. Solid technique will aid the girls as they negotiate shifts in transitional places (*passaggi*), fluctuations in range, and changes of fluency of phonation, and this is a fundamental focus of their weekly lessons. Of course they also learn repertoire, and prepare for ABRSM exams and suchlike, but the development of secure vocal technique is paramount.⁴

Repertoire

In this section I will briefly consider some of the issues to reflect on when choosing music for girls whose voices are changing. In my own case, I have to think about music for the girls to sing on their own (for upper voices services), and also for services with the Lay Clerks, when the girl choristers form the treble section of an SATB cathedral choir.

When selecting repertoire, it is important to remember that girls this age are not a children’s choir. They need well-written, sophisticated repertoire that will challenge them both intellectually and musically. Even the most stropky teenager is capable of developing a love for Johannes Brahms or Cecilia McDowall, and it is critical that we teach them to appreciate great music.

On the other hand, it is also crucial to remember that they are not a women’s choir. They should not be singing music with contralto parts, even if some of them have good low notes in warmup exercises. Chapter 2 of Gackle 2011 is particularly detailed and convincing on the issue of voice classification for teenage girls:⁵

“a young singer may be able to sing a G below middle C, but that does not necessarily mean that she is an Alto.”

Repertoire with too much divisi and low-lying alto parts is not conducive to the healthy legato singing that will help girls negotiate voice change. In addition, in my experience I find that even in three-part music where the S3/A part is not too low, but is acting as a ‘bass’ part, younger teenagers find it difficult to sing consistently in tune in that register and that role: learning to hear themselves in the functional bass part can increase tension in vocal production, quite apart from the range. Although I am aware that in large secular youth choirs, it is possible for a group of girls to sing true alto parts, this tends to be in situations where there is significantly more rehearsal time and a larger numbers of singers.

Choose repertoire with two or three roughly equal treble parts, with an accompaniment—ideally the organ rather than the piano, as the former is by nature a

⁴ I am grateful to Tara Bungard and Lucy Taylor for their contribution to this section.

⁵ Gackle 2011: 25

breathing, legato instrument—providing the harmony. This is something that non-cathedral-educated contemporary composers do not always understand, so be careful and precise when commissioning, and be selective when perusing new works.

It is not within the remit of this paper to suggest specific repertoire, and at any rate, each reader will have a variety of different parameters which need to be addressed when choosing music for their own specific choirs—my main priority is liturgical of course, and I readily admit that I have little need for secular repertoire. When choosing (and indeed composing) repertoire, I look especially at the range and average tessitura of the vocal parts. Ideally, the former should be between c' and b flat'', and the latter from about g' to g''. I also carefully consider the number of parts. ECGC generally sings in a maximum of three parts, with about six girls from across the different year groups on each part. This allows them to sing freely and confidently throughout a performance, without becoming self-conscious, tentative, or tense about holding their own. Of course, my choice of repertoire changes from time to time, as I take into account the vocal and musical strengths and weaknesses of any particularly cohort of choristers. I prefer the girls to sing in two parts most of the time, and crucially, there must never be any shame in unison singing—there is no better tool for encouraging healthy, legato singing, before, during, and after voice change, than a well-written unison tune.

PART 3

A Protocol for Future Research

Both Gackle and Sweet have identified that there are still key areas requiring research in the field of female adolescent voice change:

Hopefully, there are more longitudinal studies on the horizon which utilize the expertise of interdisciplinary investigator groups. [...] With the collective abilities of such professionals, a more thorough understanding of the adolescent female voice can be achieved (Gackle, 2019: 565).

I worry that new research is not being conducted and new ways of thinking about voice change or re-examinations of existing ideas about it are not being explored in the wider choral profession (Sweet, 2020: 158).

One notable current longitudinal project is that of Howard and Welch, which follows three female choristers at Wells Cathedral, in which 'Case-study data from three choristers are presented relating to the changing female voice during puberty as part of a longitudinal study of female choristers' (Howard and Welch *et al.* 2002: 1). Their conclusions show that the choristers' ability to control their voices is greatly improved and they suggest that the:

highly stimulating musical setting in which they find themselves is very conducive to encouraging a high degree of versatility in pitch and timbre control of their sung outputs. (Howard & Welch *et al.* 2002: 17).

My own research stems from these gaps in the literature. There is a need for more longitudinal research projects and research in countries other than America. My research

project is split into two parts: one interviewing adult participants and the other interviewing and carrying out voice checks with female choristers and school choir members.

Adult participants have been chosen following a pilot study using open-ended questions to ascertain singing experiences throughout childhood and adolescence. In all instances, the participants are active singers in adulthood too. All participants also identify as female; whilst there is clearly a gap in literature and research regarding transgender singers, this research does not cover this aspect of singing identity and the issues it brings to the table. Following the written questionnaire, participants are invited to take part in an online interview which is recorded and transcribed. The text will be placed into NVivo software database for coding and analysis. Whilst the interviews are semi-structured and guided by the singing experiences of participants, interviewees are generally asked about the following key areas:

- Consider how your singing experiences through childhood can help to shape singing experiences throughout adolescence and into adulthood;
- Reflect back over your singing life with a particular focus on any times when you feel your voice has gone through changes. Tell me as much as you feel able to about these changes and difficulties;
- Tell me about your knowledge of the voice and of voice change.

It is hoped that the analysis of these interviews will provide greater appreciation and awareness of the lived experiences of female singers as they progress through childhood and adolescence.

The second part of the research project will focus on girls who are currently about to, or who have just begun, their journey through adolescence. Two separate groups of participants will be examined: one from a professional cathedral choir setting and the other from a less formal school choir setting. Interviews will be carried out to explore the experiences and vocal lives of the participants. In addition to this, they will undergo several voice checks over a period of twelve to eighteen months to provide information about their voices changing longitudinally.

The synthesis of the two parts of the research project will provide a comparison of the lived experiences of the adult participants with the voice science provided through the longitudinal research with the younger participants. This research could potentially be the first of its kind in the UK, and would seek to ascertain whether patterns of development suggested by Gackle in the USA are reflected in British adolescent female singing as well. Whilst the results of the research will not be able to be generalised across all female singers, it is anticipated that the adolescent participants may experience voice transformation differently according to the level of their engagement in singing; in a similar way to how a professional adolescent gymnast may experience growth changes differently from an amateur adolescent gymnast.

As a result of this research, adolescent girls could gain a deeper knowledge and understanding of voice change which could empower them and encourage them to continue singing, reducing feelings of isolation, and validating their vocal experiences.

The research could be useful to music teachers and choral directors as a way of educating and supporting them, so that they can provide a better experience for adolescent female singers. It seeks to provide understanding of how the voices of girls change, and what impact this can have on repertoire choices and how voice labelling can be better managed.

Conclusions and implications for policy and practice

This paper began by summarising the existing literature on adolescent girls' voice change. Much of this work has taken place in the States, with amateur middle- and high-school choral singers. Although what has been done to date is crucial in our developing understanding of this important field, it is not always relevant to the elite girl chorister, particularly those in Britain, and especially those in the critical age bracket 11 to 15, of which the girls choristers of Ely Cathedral are one of a limited number of examples. My practical experience at Ely has shown that for children in elite choristerships, as for children in elite sports, professional, targeted, and ambitious regimes can overcome the adverse effects of adolescence, puberty, and specifically voice change.

Cathedral choristerships for girls in the UK vary greatly in their structures (Doyle 2020). In some places, girls sing from age seven to 13, in others the girls are age 10 to 15, and in yet others, they are age 13 to 18. A fascinating topic for research would be a longitudinal study to discover the effects of voice change on girl choristers across this spectrum. Howard and Welch's important study (Welch 2002) looked at the effects of professional training on girl choristers' vocal production up to the age of 14, but a thorough study of the professional girl chorister from childhood through to upper sixth form remains to be undertaken.

We have also endeavoured to show how important it is that girls themselves are taught to expect changes in their voices, both on a monthly basis, and over their teenage years. Boy choristers know from an early age that voice change will affect their singing careers; girls need to be aware of this too, even though—or indeed precisely because—they can sing through those changes. The effects of voice change are felt well into adulthood. The more aware teachers and conductors are of ways to enable their choristers to negotiate adolescence in vocally healthy and positive ways, the more likely they are to continue singing.

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