

Holly Batchelor - 2221673

Module 4 – BMPF7013

Part 1 – Portfolio

Word Count: 4740

How can voice teachers understand and support adolescent females experiencing voice change?

Project Rationale

As a singing instructor pursuing a master's degree in voice pedagogy, I am deeply committed to enhancing my knowledge in specific domains directly related to my professional practice. I aim to improve my students' learning journeys by prioritising their needs. An analysis of my student body composition has revealed a significant demographic trend: approximately 70% of my students are adolescent females. Adolescence, the transitional phase from childhood to adulthood, encompasses individuals aged 10-19 (Sawyer, 2018). This developmental stage is characterised by physical, psychological, and social changes that mark the beginning of a new chapter in their lives (Dick and Ferguson, 2015; Melaku et al., 2015). One of the most noticeable changes during this time is the development of distinct male and female voices through adolescent voice change (Luchsinger and Arnold, 1965).

Extensive research has been conducted on the changes in the male voice during adolescence, while the female voice has been relatively neglected in this area (Alderson, 1979; Gackle, 2011, Sweet, 2015). However, studies have demonstrated the authenticity of female adolescent voice change and the need to advance efficient singing-voice pedagogy techniques for the female voice (Baker, Oti Rakena, and Purdy, 2022).

In my experience working with female adolescent students, I have observed consistent pedagogical patterns, including excessive breathiness, unpredictable vocal output, and difficulty switching between registers. These issues are also widely documented in related literature (Gackle, 1991; Huff-Gackle, 1985). As Barlow and Howard (2002) noted, these characteristics are attributed to the weakening of laryngeal muscles during adolescent voice

change, which occurs in both males and females. During this critical physiological and psychological growth period, female adolescent students require optimal guidance and support from their educators. It is essential to understand their unique voices and the most effective pedagogical methods available to provide such guidance (Gackle, 1991).

This proposed literature review will extensively analyse the available research on adolescent female voice change and the teaching techniques currently employed in this domain. The review aims to develop a comprehensive understanding of the subject, identify the most effective pedagogical strategies for instructing adolescent females, and underscore any gaps in the current body of literature to guide future research (MacLure, Paudyal, and Stewart, 2016). By thoroughly analysing existing literature, educators can acquire the knowledge and resources to offer essential guidance for nurturing their students' development during this pivotal stage.

Planned programme of study:

Aims:

- Conduct an in-depth literature review on adolescent vocal development, specifically focusing on singing and the vocal development of female adolescents.
- Assess the current teaching techniques utilised for female adolescent voices and identify gaps in the literature.
- Gain a thorough understanding of the process of FAVC and evaluate the impact of the research findings on teaching practices with respect to female adolescent voices.
- Determine this group's most effective learning strategies to enhance the voice studio experience.
- Assess the practical applications of the latest research in the voice studio.
- Enhance research capabilities by developing advanced research skills to conduct a comprehensive literature review.
- Unbiased appraisal of the body of evidence.

Objectives/Learning Outcomes:

- Foster teaching practices geared towards the research process to improve voice skills and learning outcomes.
- Continuously strive to advance the knowledge base and practices within the voice studio to optimise the student experience.
- Stay informed of the latest research developments and emerging practices to ensure the studio's teaching methods remain current and effective.

Identify areas for future study.

PROGRAMME OF STUDY PROCESS

Process	January/February				March				April				May			
Module Start 15th January 2024																
Topic to be agreed with tutor																
Aims and objectives to be agreed and written up.																
Methodological approach to literature review																
Journal and review																
Draft submission																
Re-writes																
Final submission 31st May 2024																

Literature Review Methodology 1300

This literature review aims to comprehensively understand current research on female adolescent voice change (FAVC) and explore how voice teachers can better adapt their pedagogical methods to support these transitions. According to Boote and Beile (2005), conducting significant research requires thoroughly comprehending the existing literature in the field. The choice to centre my attention on this subject is based on my firsthand insights and encounters while instructing female adolescents during singing lessons and the obstacles they encounter during this pivotal developmental stage. The most effective research often stems from addressing common problems, concerns, or interests (Machi and McEvoy, 2012).

As an insider researcher working with adolescent females during FAVC, I find it essential to approach the literature objectively to mitigate bias (Chavez, 2015). Researchers with inside knowledge of their subject matter must rigorously assess and challenge their subjectivity (Van Heugten, 2004). An effective method is using reflective journals throughout the research process (Creswell & Poth, 2018). This will allow for continuous reflection and journal of the process.

McClintock et al. (2003) emphasise that research should advance knowledge while providing personal growth opportunities for researchers. By selecting a topic that is familiar and relevant to my experiences, I can gain deeper insights and contribute meaningfully to the academic discourse on Female Adolescent Voice Change (FAVC) and professional practice (Saravanakumar, 2017). This approach aligns with the dual goals of enhancing professional practice and furthering scholarly comprehension in voice education through a comprehensive literature review (Laustsen et al., 2021). John Dewey's theory emphasises the importance of using human experience as a foundation for education and social reform (Thorburn, 2020). This framework encourages integrating practical experiences and academic research to develop a thorough understanding and effective teaching methods for addressing FAVC (Dewey, 1986). This underscores the necessity for my research to align with a pragmatic paradigm, focusing on the real-world experiences of female adolescents as they undergo voice change (Morgan, 2014).

The taxonomy of Literature Reviews will guide this study's focus, goals, perspective, coverage, organisation, historical context, and intended audience (Hart, 1998). Initially, the methodology for this study was to entail a systematic literature review as outlined by Xiao and Watson, 2019. This process involves the collection of comprehensive and reliable data sources to deeply understand the subject from both quantitative and qualitative perspectives, critically evaluating them, identifying themes, and concisely synthesising information to address research gaps (Antman, 1992; Aromataris and Pearson, 2014). A systematic literature review methodology is of significant value when examining intricate subjects such as female voice change. However, a primary concern is the potential oversight of crucial studies that do not

align with the strict predetermined criteria (Owens, 2021). Given the consistently reported limited research on FAVC, a semi-systematic literature search reported as a narrative literature review was deemed more appropriate to provide flexibility and encompass all available applicable studies (B. Sweet, 2015; Lynne Gackle, 1991; Sweet, 2018; Barham, 2001; Elorriaga, 2011). This approach seeks to integrate a narrative review's comprehensive process and rigour while not strictly adhering to systematic procedures but with some protocol in place (Sukhera, 2022). Nonetheless, efforts will be made to minimise bias during the search and selection process to ensure a thorough and balanced overview of the current literature (Rumrill and Fitzgerald, 2001).

Crafting a precisely framed research question is the first and most crucial step in a literature search (Cooke, Smith, & Booth, 2012). This question serves as the foundation for establishing the scope of the review, guiding the search for relevant studies, gathering comprehensive data from the selected studies, and presenting the findings coherently (Jahan et al., 2016). A well-defined research question ensures that the review remains focused and inclusive, capturing the full breadth of existing literature and synthesising it to highlight key themes and insights (Gough, Oliver, & Thomas, 2017). Brereton et al. (2007) suggested effectively employing a pre-review mapping technique to address complex research issues. This technique helps identify subtopics within the research question, narrowing the research focus and ensuring the question can be systematically and objectively analysed (Xiao & Watson, 2019).

PICO, which stands for Population, Intervention, Comparison, and Outcome, provides a structured framework for defining research questions (Schiavenato and Chu, 2021). In the context of adolescent females experiencing voice change, PICO helps to identify the specific population, interventions (including pedagogical tools and techniques used by voice teachers), potential comparisons or alternative techniques, and desired outcomes such as managing voice changes, improving vocal health, and enhancing singing performance (Stone, 2022; Fleming, 1999). Initially, the research question was framed as: "The impact of voice change on female adolescents." However, this formulation seemed too vague to guide the research process effectively. The question was refined using the PICO (Population, Intervention,

Comparison, Outcome) structure to enhance clarity and specificity (Schardt et al., 2007). The revised research question was: "How can voice teachers understand and support adolescent females experiencing voice change?" This structured question ensures a focused and comprehensive topic exploration, facilitating a thorough and semi-systematic literature review (Willis, 2023).

After formulating a well-defined research question, a search strategy was developed to create an effective search string and identify the appropriate databases for gathering relevant literature (Macfarlane, Russell-Rose and Shokrane, 2022). The search strategy comprised of the following steps:

- Identifying Key Concepts and Terms: Determining the primary concepts and relevant terminology related to the research topic.
- Selecting Relevant Databases and Resources: Choosing databases and resources recognised for their relevance and authority in the subject area. the University of Wales Trinity St David (UWTSD) university library, Google Scholar, and Journal of Voice were used to source literature, in addition to Mendeley for source storage, to help enhance the reliability of research (Manajemen, 2023)
- Combining Search Terms with Boolean Operators: Using Boolean operators (AND, OR NOT) to refine and expand search queries for optimal results.
- Executing Searches in Selected Resources: Running customised searches across the chosen databases and resources.
- Reviewing and Refining Search Results: Critically analysing initial search results to identify relevant studies, followed by iterative refinement of search terms and strategies to enhance accuracy and relevance.

The search's inclusion criteria will encompass peer-reviewed literature and pedagogical books with full text available, published within the last 25 years, and written in English. Inclusion criteria define the study population, while exclusion criteria determine ineligibility (Garg, 2016).

Literature identification:

An electronic literature search was conducted using the University of Wales Trinity St David, (UWTSD) online library, Google Scholar, Mendeley and The Journal of voice using the keywords "adolescent voices." This initial search produced 8672 results, which helped to identify and reaffirm commonly used keywords in this field that aligned with my research question. The search was then narrowed down to include only peer-reviewed articles and pedagogical books with full-text access, as they are generally considered the most reliable and credible sources of information in academic research (Ware, 2008).

To refine the search, I utilised Boolean filters (Bramer et al., 2018), specifically "female adolescent voices," resulting in 4569 matches. I further narrowed down the literature to the last 30 years to ensure modern relevance, which reduced the results to 816. Incorporating the Boolean filters 'and/or' with the keywords "singing" and "female adolescent voice change," the relevant results were further reduced to 49. I employed footnote-chasing and citation-searching techniques to ensure the research findings were highly pertinent and to identify the most established researchers in the field (Kacem and Mayr, 2017). This involved checking the references and related material of a work backwards in time and chaining works citing another one through a citation index, which allowed me to gather additional literature and enhance the quality of my research papers (Carevic and Mayr, 2016). After repeating this process and not finding any new papers, my final search yielded 56 papers.

The first step in evaluating the quality of the results was to review the research paper's topic's title and abstract to ensure alignment with the research objectives and population of interest (Okoli and Schabram, 2010). While conducting a literature search, it is important to recognise and acknowledge the contributions of leading researchers in the field (Bavdekar, 2016). Researchers L. Gackle and B. Sweet have emerged as notable and influential figures in this study area. Given the limited research specifically focused on female voices, expanding the study from 25 to 30 years was necessary to accumulate sufficient resources for a more comprehensive and nuanced analysis of the subject (Friar, 1999). The primary criteria for the study were centred around two specific aspects, namely, the relevance to practice and the specificity of female adolescent voice change-defining papers in the English language with

full-text access. After identifying relevant papers based on the article's abstract, a comprehensive review was conducted to assess their suitability to the research question. Out of 56 papers, 50 met all the criteria after a full read-through.

PRISMA reporting systems provide guidelines outlining the semi-systematic review reporting process, which includes three primary stages: identification, screening, eligibility, and inclusion (PRISMA statement, no date, Mengist, Soromessa and Legese, 2020). The initial stage involves identifying relevant literature through database and keyword selection. For this review, a literature search was conducted in May 2024, utilising the University of Wales Trinity St David (UWTSD) database, Google Scholar, and The Journal of Voice. Keywords are essential for researchers looking to find articles within a specific field or conducting surveys on topics (Corrin *et al.*, 2022). The study used specific keywords such as "adolescent voices," "singing," "female adolescent voices," and "female adolescent voice change," along with Boolean filters to improve the accuracy and relevance of the search results. These Keywords targeted the population required to answer the research question (Patino and Ferreira, 2018).

The criteria for inclusion/exclusion were papers guiding comprehension of FAVC and pedagogical approaches for instruction. The inclusion criteria encompassed English language studies published within the past 30 years and restricted to peer-reviewed articles to maintain the utilisation of high-quality published literature (Kelly, Sadeghieh and Adeli, 2014).

The quality assessment of the papers serves as a diligent filter for combing through the full-text articles, representing the last phase of preparing the studies for data extraction and synthesis (Ludvigsen *et al.*, 2016). The data extracted from each study aimed to explore two main areas: (1) understanding the physiological and psychological aspects of female adolescent voice change and (2) identifying effective pedagogical tools for managing this change.

According to Braun and Clarke (2006), thematic analysis involves systematically identifying and analysing recurring patterns or themes within the data. This method requires careful

attention to the data and flexibility in approach, making it well-suited for investigating complex phenomena such as Female Adolescent Voice Change (FAVC), which encompasses psychological, physiological, and social dimensions.

Narrative summaries will be systematically constructed for each pertinent research endeavour to facilitate comprehensive comprehension and comparison of various studies on FAVC (Campbell, Katikireddi and Sowden, 2018). These summaries will encompass elements such as the tested hypothesis, sample population, assessment tasks employed, and the research outcomes (Higgins *et al.*, 2022). This structured approach aims to comprehensively understand each study's contributions and limitations (King, 2004). Once the narrative summaries are complete, the data will be systematically coded, identifying key themes, concepts, and patterns within the data. These themes will be derived from the data, ensuring the analysis remains grounded in the participants' experiences. Thematic analysis is inherently iterative, involving an initial coding phase followed by a refinement process that allows for a deep and nuanced understanding of the data, reflecting the complexity of FAVC (Braun and Clarke, 2022).

Adopting a neutral perspective and allowing the data to speak for itself is essential to maintaining impartiality and producing accurate and unbiased results. As an insider researcher working with adolescent female voices, I find it crucial to maintain a balanced, unbiased approach. This involves being mindful of personal biases and preconceptions, ensuring that the unique experiences and perspectives of the participants are faithfully represented.

Maintaining impartiality is crucial throughout this process, requiring regular reflexivity to reflect on the position as an insider researcher and how it might influence the analysis (Carver and Scheier, 2014). Engaging with the data critically and transparently aims to produce a balanced and nuanced account of FAVC (MacDonald, 2014). Once the data has been themed and

coded, a comprehensive literature review will be compiled to synthesise the identified themes and provide an overview of the current state of research on FAVC, highlighting key findings, methodological approaches, and gaps in the literature (Snyder, 2019). The thematic analysis provides a robust framework for examining the complex phenomenon of Female Adolescent Voice Change, enabling a deep and nuanced understanding of the psychological, emotional, and social dimensions of FAVC (Joffe, 2011). Maintaining impartiality and allowing the data to speak for itself will be crucial in producing accurate and unbiased results that faithfully represent the experiences of adolescent female vocalists. The thematic analysis highlighted the themes as physiological changes, psychological impacts, teacher influence, challenges of female adolescent voice change, individual experiences, and pedagogical approaches; the findings of these themes will be discussed in the literature review.

Critical Reflection

Critical reflection is fundamental in transformative learning theory (Brookfield, 1995). It involves questioning and challenging beliefs to shift perspectives and foster personal growth and learning (Paprock, 1992). In this critical reflection, I have utilised Driscoll's (2007) Model, which comprises three essential reflective questions: "What?" "So what?" and "Now what?" I selected this model for its simplicity and wide-ranging applicability, making it especially suitable for analysing this research project. Driscoll's questions were integrated into the literature review process at five key stages highlighted below as pivotal junctures.

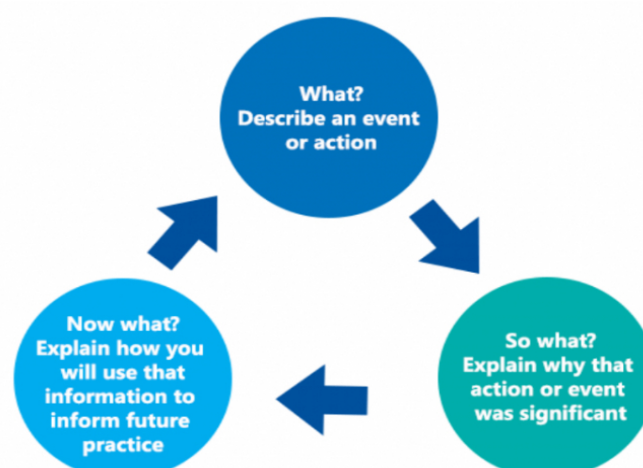


Figure 1. Driscoll reflective model (Driscoll, 2007b)

Pivotal Moment 1: Theoretical Framework

What?

Upon embarking on my research, I quickly recognised the importance of establishing a strong theoretical framework to guide the research (Schwandt, 2000). Faced with numerous choices, I carefully considered the most appropriate approach (Mertens, 1998). John Dewey's scholarly contributions to experiential learning, particularly his practical approach emphasising reflective thought and the interconnectedness of experiences, greatly influenced my research and educational strategies (Moon, 1999). This realisation occurred during an extensive review session as I evaluated various educational theories and their relevance to my study on FAVC.

So What?

Incorporating Dewey's experiential learning theory, Main (2023) emphasised the importance of connecting past experiences with current learning, aligning with vocal development observations in adolescent female students. Dewey's view of learning as a dynamic process involving interaction and continuity directly influences students' adaptation to changes in their voices. Reflective techniques, including keeping a reflective journal and providing continual feedback, were prioritised in the research methodology, following Dewey's principles (Onwuegbuzie and Leech, 2005). The theoretical alignment provided a comprehensive approach to understanding and addressing the pedagogical challenges female adolescents face during their vocal changes. Furthermore, Dewey's emphasis on an iterative process involving reflection and action became a cornerstone of the research methodology (Hirsch, Greenwood and Leven, 2000). The application of Dewey's experiential learning theory resulted in a dynamic and responsive research framework designed to consider the intricacies and subtleties of FAVC. Dewey's focus on democratic education and the significance of individual experiences highlighted the need for a comprehensive approach to vocal pedagogy (Dewey, 1916). This recognition led to the advocacy of educational methodologies grounded

in scientific rigour and empathy and tailored to the unique experiences of female adolescents considering physical changes and any psychological impacts that could arise.

Now What?

My ongoing research and educational approach are based on experiential learning principles to implement Dewey's theoretical insights. This includes regularly analysing the data within the Female Adolescent Voice Change (FAVC) subject and keeping a reflective journal of the research process. This method aligns with Dewey's idea of the continuity of experiences, promoting a more adaptable and responsive education. Encouraging a collaborative and inclusive learning environment foster sharing experiences and mutual support among students. This approach aims to build a sense of community and mutual learning, consistent with Dewey's democratic education principles. I aim to establish a comprehensive and adaptable approach to studying and managing Female Adolescent Voice Change by incorporating Dewey's experiential learning theory into my research and educational framework. This endeavour aims to improve scholarly understanding and enrich teaching methodologies with increased effectiveness and empathy, which are the central goals of this research process.

Pivotal Moment 2: Initial Exploration of the Field

What?

In my work with adolescent female students, I have consistently encountered pedagogical challenges related to their vocal production, including excessive breathiness, unpredictable vocal output, and difficulty transitioning between vocal registers, as supported by Lynne Gackle, 2019. Recognising these issues during this critical transitional phase has emphasised the need for a deeper understanding of FAVC, as outlined by B. Sweet in 2015. During the first month of my study, I conducted an in-depth review of peer-reviewed literature, resources, videos from The Voice Study Centre library, and pedagogical books to gain a comprehensive understanding of vocal development in both male and female individuals. Key sources

included literature works in the field and studies addressing physiological and pedagogical perspectives on vocal changes during adolescence.

So What?

In conducting a preliminary review, it became apparent that there is a significant disparity in research focus on FAVC (Gackle, 2011b). Specifically, while an extensive body of literature exists on the voice changes experienced by male adolescents, there is a conspicuous paucity of research on the voice changes experienced by female adolescents (May and Williams, 1989). Identifying this discrepancy was pivotal as it demarcated my research's boundaries and critical nature, emphasising an area that demands urgent scholarly attention.

The underrepresentation of research on FAVC is disheartening, as it not only highlights broader issues within the field but also perpetuates a gender bias in vocal pedagogy and research. This bias has significant implications for educational practices and the support provided to female adolescents during their vocal development. Encountering the works of esteemed scholars such as Bridget Sweet and Lynne Gackle was particularly reassuring. Both are renowned proponents of FAVC and have substantially contributed to our comprehension of this domain.

For example, Bridget Sweet's comprehensive exploration of the vocal transformations in female adolescents, detailed in her book *Growing Musicians: Teaching Music in Middle School and Beyond*, provides critical insights into the pedagogical approaches suitable for this demographic (Sweet, 2016). Similarly, Lynne Gackle's seminal research on the physiological and psychological aspects of FAVC, as outlined in her publications such as *Finding Ophelia's Voice, Opening Ophelia's Heart: Nurturing the Adolescent Female Voice** (Gackle, 2011) and her studies on the characteristics of adolescent female voice changes (Gackle, 2006), laid a robust groundwork for my study. Their endeavours underscore the significance of addressing the distinctive hurdles female adolescents encounter during their vocal maturation.

Now What?

To address the knowledge gap, I have investigated the specific challenges and requirements associated with FAVC. My approach involves thoroughly reviewing existing research and identifying key experts and influential publications to establish a solid foundation for my literature review. This includes not only the works of Bridget Sweet and Lynne Gackle but also other studies that are addressing this critical issue. Furthermore, I intend to incorporate the latest methodological advancements in vocal development research to ensure a comprehensive and up-to-date understanding of FAVC.

By critically engaging with these resources, I could pinpoint the significant gaps in the existing literature and reaffirm the necessity of my research (Kraus et al,2021). This foundational understanding is crucial for developing effective interventions and pedagogical strategies tailored to female adolescents, contributing to a more balanced and inclusive body of knowledge in vocal studies.

Pivotal Moment 3: Establishing Methodology, Data Collection, and Coding

What?

I ensured the robustness and validity of my research findings by establishing a comprehensive methodology (Cai et al. 2019). This methodology involved a combination of qualitative and quantitative literature, starting with a precise research question using the PICO framework (Schardt et al, 2007). I opted for a semi-systematic literature search to maintain flexibility while upholding a structured approach (Wichor M. Bramer *et al.*, 2018). In addition, I conducted a thematic analysis to identify recurring patterns within the data and highlight any gaps that required further research (Braun and Clarke, 2006). The inclusion of peer-reviewed literature

and pedagogical books published within the last 30 years was ensured using Boolean filters to refine search results and enhance relevance and credibility (Bramer et al, 2018).

So What?

In my research, I applied a methodological framework that effectively captured the existing literature in the field. The methodological decisions I made significantly influenced the quality and relevance of my research findings (Boote and Beile, 2005). To ensure the flexibility and inclusion of all relevant papers in the field, I utilised a semi-systematic literature search (Elorriaga, 2011). This approach allowed for a more comprehensive understanding of the physiological, psychological, and pedagogical challenges associated with FAVC. I developed a precise research question using the PICO framework, facilitating a focused and structured exploration of the topic, enabling a thorough and systematic literature review (Schardt et al., 2007). The use of thematic analysis provided a deep and nuanced understanding of the data, reflecting the complex and multifaceted nature of FAVC (Braun and Clarke, 2022). By combining qualitative and quantitative data through mixed-methods research, I corroborated findings across different data sources, enhancing the study's credibility (Creswell & Plano Clark, 2018). It was crucial that the methodology aligned with best practices in research design (Patton, 2015).

Now What?

The methodology outlined in this review establishes a precedent for future research on FAVC and related subjects. Researchers can utilise a semi-systematic literature review approach and thematic analysis to investigate other under-researched areas in voice pedagogy. This adaptable approach can be modified to encompass a broader range of databases and incorporate more diverse study populations, such as those focused on education in adolescence and psychology studies, while also addressing the limitations identified in this review. This methodological process enables the use of literature as data, facilitating the

comparison and contrast of existing studies which has expanded skills in research protocols to enhance educational practices further.

Pivotal Moment 4: Using Boolean Filters for the First Time

What?

In a recent literature review, I applied Boolean filters for the first time to enhance the precision of my search for academic sources (Boole, 2016). These filters involve the use of logical operators, such as AND and OR, to combine search terms and effectively refine the search result. For instance, I used combinations like "female adolescent voices" AND "singing" NOT "male voices" to narrow down the search results.

So What?

Using Boolean filters significantly improved the efficiency and accuracy of my literature search. It allowed me to quickly identify the most relevant studies and exclude those not pertinent to my research focus. This enhanced the quality of the literature review by ensuring that the sources included were directly aligned with my research objectives.

Boolean logic in database searches helps narrow the search results to those most relevant to the research topic, which is essential for a focused literature review (Booth, Sutton, & Papaioannou, 2016). Using these filters, I could streamline the search process, making it more efficient and effective. The precision offered by Boolean filters ensured that the studies selected for the review were directly relevant to understanding FAVC.

Now What?

In my future research projects, I will continue to utilize Boolean filters and advanced search techniques. The recent experience has underscored the significance of employing precise search strategies to manage large volumes of academic literature efficiently. Furthermore, I

aim to disseminate these techniques among peers and students to augment their research capabilities. By imparting these strategies, individuals can enhance their proficiency in conducting more effective and targeted literature reviews, a core skill in academic research (Fink, 2020). Moving ahead, I plan to meticulously document my search strategies and evaluate their effectiveness in a research journal. This practice will aid in consistently refining my approach and sharing best practices within the academic community (Creswell & Poth, 2018).

Pivotal Moment 5: Keeping My First Reflective Journal

What?

I maintained a reflective journal for the first time throughout my research process. This journal included entries on my thoughts, challenges, insights, and progress at various project stages.

So What?

Keeping a reflective journal proved invaluable in promoting self-awareness and critical thinking. It allowed me to document my learning journey, track my evolving understanding of FAVC, and identify areas for improvement. Reflective journaling also facilitated a deeper understanding of the research process, enabling me to connect theory with practice more effectively. It also helped to highlight where research was lacking and what developments are needed for the future.

Reflective journaling is a powerful tool for fostering metacognition and continuous learning. It helps researchers systematically reflect on their experiences, promoting deeper understanding and personal growth while revealing biases (Schön, 1983).

Now What?

I will continue to use reflective journals in my research and professional practice. This tool has proven to be an effective means of fostering continuous improvement, organising my projects, and maintaining a critical perspective. I will encourage my students to adopt reflective journaling in their research and educational journeys.

Encouraging students to maintain reflective journals can help them develop critical thinking and reflective skills essential for academic and professional success (Boud, Keogh, & Walker, 1985).

Part 2 – Literature Review

Word count 4762

How can voice teachers understand and support adolescent females experiencing voice change?

Introduction:

Adolescence is a significant developmental stage marking the transition from childhood to adulthood (Jaworska and MacQueen, 2015). This period usually spans from ages 12 to 18 and is initiated by puberty (Dahl, 2004). Puberty triggers substantial physical and hormonal transformations driven by the intricate interplay of growth hormones (Abbott, 2013; Plant, 2015). The changes encompass intricate neural and endocrine mechanisms that transpire over a prolonged period (Natsuaki, Samuels and Leve, 2014).

During adolescence, the process of voice change is multifaceted and encompasses physical and psychological dimensions (Sweet, 2018). The process of vocal transformation is significantly impacted by hormonal activity, specifically by the impact of progesterone and oestrogen released during puberty. This is due to hormonal receptors in the vocal folds and associated anatomical structures, rendering them highly sensitive to hormonal fluctuations. (Newman et al., 2000). For voice teachers, managing these changes while maintaining high-

quality and meaningful education is a formidable challenge (Baker, Oti Rakena, & Purdy, 2022).

Historically, research on adolescent voice change has predominantly focused on the male voice, with comparatively less attention given to female adolescent voice change (FAVC) (Cooksey, 1999; Decoster, Ghesquiere and Van Steenberge, 2008). Most of the research is dated because of the lack of research on this subject (B. Sweet, 2015). Male adolescents experience what is described as more pronounced and distinct vocal changes, including the characteristic "voice break" (Phillips, Williams, & Edwin, 2012). However, it is equally important to recognise that female voices undergo significant anatomical changes during adolescence, even though these changes might be perceived as less dramatic (Weiss, 1950; Skelton, 2007). During puberty, both males and females experience similar changes, including the weakening of laryngeal muscles due to sudden growth, however FAVC is often described as a "hormonal earthquake." (Abitbol, Abitbol and Abitbol, 1999, Lă *et al.*, 2012). The gender imbalance within the research has resulted in a considerable gap in understanding and supporting FAVC despite evidence suggesting a higher ratio of female to male singers in many singing groups (Bell, 2004; Clift *et al.*, 2008; Clift & Hancox, 2010).

Before puberty (pre-pubertal stage), male and female individuals exhibit similar vocal physiology. The changes in female voices occur as they approach menstruation (menarche), where the hormonal changes they experience affect vocal tissue. The symptoms experienced during pre-menstruation and menstruation are called premenstrual vocal syndrome (Kadakia *et al.* 2013; B. Sweet, 2020). This leads to significant modifications in vocal physiology (Plant, 2015; Styne & Grumbach, 2016). This process involves the development of intrinsic and extrinsic laryngeal muscles during adolescent voice change (Leborgne, 2016). The extrinsic laryngeal muscles control the movement of the hyoid bone and the vertical movement of the larynx (Ludlow, 2005). Meanwhile, the larynx's intrinsic muscles close, open, lengthen, and contract the vocal folds (Jones and Last, 2023). For females, these changes involve a notable increase in vocal fold mass and length, contributing to a drop in the lowest terminal pitch by up to one-third (Markova *et al.*, 2016; Xue *et al.*, 2010). In contrast, male laryngeal

development is characterised by horizontal growth, the formation of the “Adam's apple” and a pitch drop of up to one octave (Abitbol, Abitbol, & Abitbol, 1999; Gackle, 2014; Sweet, 2020). Female adolescents often face difficulties with phonation onset, vocal unpredictability, reduced vocal strength, limited range, and transitioning through vocal registers (Sweet, 2015; Gackle, 1991, 2006, 2011).

The literature review utilises a semi-systematic literature review search (SSLR) methodology to explore and analyse current research on FAVC using predefined criteria presented in a narrative literature review format (Cumpston et al., 2023). The primary objective is to comprehensively understand FAVC and provide technical insights for practical applications (Karas, 2017). Practitioner-led research is crucial as it allows practitioners to expand their knowledge base and advance individual practices and organisational progress (Costley, 2006). Additionally, this review aims to identify gaps in the existing literature, highlighting areas that require further investigation to advance the field of FAVC (Sylvester, Tate and Johnstone, 2013). The key themes identified within the literature are discussed below and categorised into four main areas: physical changes, emotional and psychological changes, the influence of voice teachers, and pedagogical tools for voice teachers. The review aims to offer a holistic view of FAVC by addressing these themes, contributing valuable insights for researchers and practitioners in music education.

Physical Changes: Examining the anatomical and physiological changes during FAVC, exploring how these changes impact vocal performance and development.

During the process of FAVC there are notable structural and functional changes (Gackle, 2000). This stage is characterised by the weakening of laryngeal muscles because of rapid growth, requiring ongoing reinforcement of muscle control skills crucial for speech and singing. (Barlow and Howard, 2002). Typical challenges adolescent females face include increased breathiness, lowered speaking pitch, fluctuating vocal range, changes in timbre, voice breaks, difficulty transitioning through vocal registers, pitch insecurity, and initial phonation difficulties (Sweet, 2018). Additionally, a myriad of other physical changes such as physical growth

(height and weight), skeletal and muscular expansion, the appearance of secondary sexual characteristics including body hair, breast development (thelarche), and the onset of menstruation (menarche) can be observed as precursors to adolescent voice change (Andrews, 1991). According to Schiff (1999), hormonal influence on the female larynx increases its size and weight, with the length of the vocal folds increasing by 24.03 per cent, albeit to a lesser extent than in males, which are reported as 66.69 per cent (Gackle, 2014, Welch, 2000). Elevated levels of oestrogen and progesterone in the bloodstream lower the female voice pitch by three or four semitones, thereby impacting the resonance characteristics of the voice (Titze, 1994). In 1991, Lynne Gackle (2006) first published her stages of adolescent female voice change, providing a comprehensive framework to understand these changes. As shown below in Figure 1.

1. Prepubertal Phase: - Clear, flute-like vocal quality without noticeable register breaks. - Voice is flexible and agile, like a boy's voice at this age.
2. Pre-menarcheal Phase (Beginning of Mutation): - Increased breathiness and the emergence of register lift points around F4-A#4. - Loss of upper range and fluctuating tessitura.
3. Post-menarcheal Phase (High Point of Mutation): - Noticeable huskiness throughout the range with decreased range and prominent register changes. - Phonation difficulties and variable tessitura, accompanied by voice cracking and breathiness.
4. Young Adult Female Phase: Timbre approximates young adult quality with increased richness and consistency in vocal quality. There are also increased range and volume capabilities and the potential appearance of natural vibrato.

Figure 1. Adolescent voice change stages (Gackle, 2006).

Gackle (2011) later developed this framework to underscore the significance of these changes as phases rather than stages due to the gradual voice transition over time. Her subsequent work expanded to include the emotional and psychological implications of vocal change in

female singers (Gackle 2014). While this framework consolidates existing research, further studies are imperative to comprehensively elucidate these changes underlying causes, mechanisms, timing, and other biological factors influencing voice transformation in adolescent females. The age ranges are generalisations and should be considered a vocal development guideline rather than a strict benchmark. (Collins, 1999). This framework provides detailed guidance on the changes during FAVC but should be tailored to the individual in practice.

When the arytenoid muscles weaken, they form a gap at the back of the vocal folds, known as the "mutational triangle." This causes the common breathy sound characteristic of FAVC (Abitbol and Abitbol, 2014; Abitbol, Abitbol and Abitbol, 1999). The arytenoid muscles, crucial for vocal sound production, are paired pyramid-shaped structures located in the larynx (Andaloro, Sharma and La Mantia, 2023). This leads to the glottis being unable to close fully, allowing air to escape through the unclosed portion of the glottis. The incomplete closure of the posterior glottis can create difficulties in singing certain notes and transitioning between vocal registers. This lack of closure inhibits vibration in specific areas of the vocal folds, leading to challenges in achieving proper vocal fold closure. Consequently, this can cause breaks or cracks in the voice and reduced vocal power (Abitbol and Abitbol, 2014; Abitbol, Abitbol and Abitbol, 1999, Kahane, 1982; Luchsinger & Arnold).

A study by Bottoms in 1995 examined Vennard's Light Mechanism theory, with a primary focus on the challenges faced by female adolescents when producing sounds with prominent upper partials due to the need for sufficient glottal closure. This theory is important in vocal pedagogy as it offers a systematic framework for comprehending and instructing voice production's physiological and acoustical elements. Ninety-seven students were involved in the study and were instructed to produce three vowels (/a/; /o/; /u/) sung on C5. As confirmed by spectral analysis, the results indicated that only 14% of the participants could produce sounds containing strong upper partials. Research by Barlow and Howard (2002, 2005) (Howard & Welch, 2002; Sergeant & Welch, 2008, 2009) has observed that both male and female voices

undergo decreased vocal-fold closure during puberty. In females, this change may be linked to the lateral growth of the thyroid cartilage, which could result in incomplete glottal adduction and a decrease in the closed-phase duration of the glottal waveform. These changes are associated with breathy vocal production (Childers & Lee, 1991; Gauffin & Sundberg, 1989; Hammarberg et al., 1980; Sundberg, 2022). Acknowledging the psychological impacts accompanying the physical changes experienced during FAVC is crucial in addressing the complexities of FAVC.

Emotional and Psychological Changes: Delving into the psychological and emotional challenges associated with FAVC, including self-esteem issues, anxiety, and the impact on personal identity.

The singing and vocal learning process is deeply intertwined with intricate emotional and psychological dynamics, leading to highly personalised experiences for both the student and the instructor (Baker, Oti Rakena and Purdy, 2022). The psychological and emotional impact of FAVC is significant, particularly for young females (Phillips, 2004; Gackle, 2011b; Willis & Kenny, 2011). The physical changes related to FAVC have been extensively researched, but scholarly literature has largely overlooked the psychological impact of these changes on females (Sweet, 2018).

The voice plays a crucial role in developing personal and social identity, especially during adolescence when individuals use their voices to express themselves and establish their social position (Lynne Gackle, 2006). Vocal changes during this period can disrupt this process, leading to feelings of insecurity and confusion (Arnett, 1999). Individual's voices convey emotion and personal identity through their public and physical manifestation of sound, both internally and externally (Welch, 2005).

Research indicates that adolescents often encounter increased self-awareness, anxiety, and fluctuations in self-esteem during this transitional phase, marked by self-perception of vocal changes (Williams, 2013; Bandura, 1993; Sweet, 2020). This heightened self-consciousness

can result in significant emotional challenges, particularly among female adolescents who may feel that their evolving voices do not align with societal expectations of femininity (Elorriaga, 2011). Studies have highlighted that adolescent females tend to experience more negative emotions than positive ones when it comes to singing (Sweet, 2018)

Sipley's (1994) groundbreaking research delves into the convergence of physiological changes, self-perception, and the affective aspects of student voice modification. Sipley's work was instrumental in shedding light on the emotional dimension of voice change, emphasising the significant impact of individual experience development. The study revealed the intricate link between vocalisation, the acquisition of vocal skills, and the complex emotional and psychological dynamics involved. Due to the distinctiveness of each human voice, learners process and apply information in highly personalised ways, resulting in unique experiences for both learners and instructors (Baker, Oti Rakena, & Purdy, 2022).

Building on this foundation, Monks (2003) conducted a longitudinal study involving thirty male and female students aged eleven to eighteen. These students recorded their voices at two-month intervals, allowing for a comprehensive analysis of their vocal changes and self-assessments over time. Monks' findings revealed a strong correlation between vocal identity and self-perception, demonstrating that students were acutely aware of their vocal changes. This awareness was critical in shaping their self-image and emotional responses to their evolving voices.

In her study "The Adolescent Female Changing Voice: A Phenomenological Investigation," Sweet, 2015 explores this issue in depth. The research was conducted to investigate the experiences of female voice change as perceived by female middle and high school choral students. The focus was on understanding the students' perceptions of voice change and its significance. The study involved 14 female students in Grades 6 through 12 from the Durham School of the Arts in Durham, North Carolina, who exhibited diverse voice change characteristics. Findings from the study revealed that female adolescents encounter notable physical, emotional, and psychological difficulties during their voice change. Female participants reported issues such as breathiness, vocal unpredictability, and challenges

transitioning across registers, leading to feelings of vulnerability and fear of embarrassment, as discussed by Gackle (1991, 2000, 2006, 2011). Words such as frustration, embarrassment, and pride illustrate the participants' emotions, the exact descriptive words reported to be used by male singers (Kennedy, 2004). Notably, both genders share similar emotional experiences during this transitional phase.

A recent study by Baker et al. (2022) delved into the perceptions and experiences of FAVC among secondary school-aged female singers. The study revealed that the journey of female adolescent singers often involves emotional and self-identifying narratives regarding their vocal transition. For example, a 16-year-old participant reflected on the significant changes in her voice over time. At 13, she described her voice as high-pitched, but at 14, she experienced a loss of control. Subsequently, she noted a deepening, enriching, and opening of her voice, allowing her to sing lower notes and enhancing her confidence in using her chest voice. This marked a notable departure from her previous light and breathy vocal quality. Another participant, aged 18, reported challenges in sustaining notes and producing quality sound, particularly at the top of her vocal range, which resonates with common concerns during the adolescent voice change.

Self-efficacy refers to an individual's belief in their capacity to execute specific tasks successfully. It is a significant factor in shaping self-perception (O'Bryan, 2015). In the case of adolescent female vocalists, their perception of their voice and their learning encounters can significantly impact their self-efficacy (Monks, 2003). Several study participants noted that their confidence and proficiency as they influenced singers

The emotional impact of FAVC can significantly influence participation and interaction in group singing. Studies have shown that fear and embarrassment during voice changes can greatly impact singers' involvement, enjoyment, and confidence in group settings, particularly compared to those in group lessons. This suggests that personalised attention may be more effective in supporting the psycho-emotional development of female adolescent singers during FAVC. The role of voice teachers is crucial in confidently navigating these changes. These emotional aspects underscore the importance of music educators intentionally addressing the

experiences of female adolescent singers (Sweet, 2015). The influence of voice teachers is significant in shaping students' self-esteem and confidence, particularly in vocal development (Gackle, 2014; Decoster, Ghesquiere, and Van Steenberge, 2008).

The expansion of vocal range during the process of voice change is often emphasised as a notable advantage for female students. (Owen, 2017).

The Influence of Voice Teachers: Investigating the crucial role of voice teachers in supporting students through FAVC, emphasising the importance of mentorship and tailored vocal training.

Research indicates that music educators substantially influence emerging adults' musical identities (Abeles, Goffi, & Levasseur, 1992; Burland & Davidson, 2002). In a 2011 publication, Gackle highlighted the essential need for vocal instructors and conductors to thoroughly grasp voice physiology, acoustics, development, maintenance, and training (Gackle, 2011a). Music educators must exercise caution and understanding when working with the adolescent singing voice (Gebhardt, 2016). Educators working with adolescent singers may encounter challenges in guiding vocal development if they lack a comprehensive understanding of the physiological changes that impact young singers. This may hinder their ability to provide effective and healthy instruction to their students (Hall, 2010). They are instrumental in moulding students' self-esteem and confidence, especially in vocal development (Gackle, 2014; Decoster, Ghesquiere and Van Steenberge, 2008). This highlights the importance of profoundly understanding students' lived experiences and personal realities during FAVC (Van Manen, 1997). Students often view their teachers as role models for learning musicianship and professional skills. According to Burland & Davidson (2002), teachers demonstrate what it means to be a musician. Abeles et al. (1992) found that applied teachers who establish rapport with their students are perceived as effective instructors. Additionally, Gaunt (2010) suggests that instructors who provide long-term support can help students stay motivated.

Creating a supportive environment and providing personalised attention is essential for guiding students through the emotional aspects of adolescence, which directly impact vocal development (Gackle, 2018). It has been suggested that practical application and technical instruction have significantly enhanced female adolescents' engagement with vocal material (McRoy, 2011). Additionally, the effectiveness of voice training is heavily influenced by the instructor's understanding of FAVC; educators who can articulate the benefits of vocal exercises and possess technical expertise are instrumental in helping students navigate vocal changes and encourage developing healthier vocal practices (Purdy et al., 2018, Cooksey, 2000). Adolescence can bring changes in vocal attributes that substantially impact self-identity and emotional welfare. Voice instructors must acknowledge and understand this connection (Gackle, 2007). Research findings indicate that collegiate and high school students perceive singing as a catalyst for enhancing their self-perception and enabling the outward expression of their internal emotions. Additionally, proper guidance and comprehension of vocal adjustments have been identified as influential factors in fostering students' confidence in their vocal abilities (Yarnell, 2006).

Understanding and mastering breath management, resonance, and phonation is crucial for enhancing singing performance (Fett, 1994). Implementing specific vocal exercises and gaining insight into vocal development can improve tone quality and self-perception of the singing voice in adolescent females, ultimately fostering more positive attitudes toward their vocal abilities (Mcroy, 2011). Instructors must recognise the psychological challenges that coincide with voice change in adolescent females, such as diminished confidence and self-esteem (Gackle, 2007a). Establishing a supportive environment is essential for sustaining students' engagement and passion for singing. Teachers must select a repertoire that aligns with the vocal abilities of adolescent girls. This means choosing music that promotes positive attitudes and avoids perpetuating negative stereotypes.

Understanding the various stages of vocal development enables teachers to select music that fits their students' current vocal range and capabilities, ultimately fostering vocal health and growth (Purdy et al., 2018; Sweet & Parker, 2018). It is important to understand that the physical and vocal change and development process varies significantly for each child (Cooksey and Welch, 1998, Manning, 2002).

It is recommended that teachers avoid prematurely classifying young singers into specific voice types, as this could impede the development of their vocal registers (Sweet, 2018). Instead, the focus should be on fostering individual vocal development and maintaining flexibility in assigning vocal parts. Gackle has stressed the significance of choosing repertoire for adolescents, allowing educators to support each student's unique developmental capacities in a choral rehearsal (Thurman and Welch, 2000). Moreover, the selection of music that highlights the singers' optimal vocal ranges enables the performers to showcase their best singing tone (Gackle, 2011a, Gackle, 2019b).

Educators should conduct individual or small group assessments with students to determine the stage of the voice change process they are currently undergoing (May, 2013). Regular assessment of vocal range, speaking pitch, and voice quality is crucial for monitoring progress and adapting teaching methods effectively (Sweet & Parker, 2018). This personalised approach is critical during adolescence. Teachers should provide tailored feedback and assistance to address the specific needs of each student, promoting a positive self-perception and effective vocal methods (Kempfer, 2014).

(Gackle, 2018; Sweet, 2015). The research conducted by Baker et al. (2022) emphasised the significance of customised voice lessons in managing FAVC. Participants who received individualised instruction reported experiencing an easier vocal function than those who were part of group lessons. Proficient use of pedagogical tools by educators is instrumental in steering students toward the desired learning outcomes. Well-informed vocal pedagogy is

crucial in helping students manage the substantial vocal changes that accompany adolescent development. These changes can affect students' sense of accomplishment, personal development, and emotional contentment (Gackle, 2011c, Sweet, 2018).

Pedagogical Tools for Voice Teachers: Practical strategies and tools that voice teachers can employ to support female adolescents during their voice change effectively.

Understanding Lynne Gackle's (1991) model for classifying the voices of adolescent girls can provide valuable insights for developing appropriate pedagogical tools. This model draws from John Cooksey's model for boys, focusing on vocal characteristics, range, and tessitura. The duration of these vocal changes varies from individual to individual and can persist for several weeks or even months. Fett (1994) found that vocal skills instruction improved singing performance, breath management, and efficient use of the developing voice. Sipley's (1994) study examined the effects of vocal exercises and knowledge of vocal development during FAVC and vocal self-image. While no significant differences were found in tone quality, the group that received both vocal exercises and knowledge about the voice recorded significant improvements in attitudes towards their singing voice. The study's findings provide valuable insights for educators and practitioners working with adolescent females experiencing voice change (Welch, Howard and Nix, 2014).

Numerous studies have suggested vocal and breathing warmup exercises can significantly improve intonation, tone, breath control, and consistent tone production. Among the methods that have shown effectiveness are Semi-Occluded Vocal Tract Exercises (SOVTES), which entail partially closing the vocal tract to create back pressure above and below the vocal folds. Examples of such exercises include lip trills, humming, and straw phonation. These exercises are advantageous in achieving enhanced glottal closure and minimising breathiness during FAVC (Titze, 2006). Furthermore, these warmups have been shown to bolster the self-efficacy

of singers during the voice change process. Therefore, it is highly recommended that these warmup exercises be integrated into regular practice routines (Sweet, 2015; Owen, 2017). At the outset of every vocal lesson, a voice instructor may initiate the session with SOVTEs (semi-occluded vocal tract exercises) to facilitate vocal warm-up and ensure proper execution for optimal efficacy. By integrating these exercises into daily practice regimens, students can achieve greater consistency in vocal output.

Understanding and mapping the body is crucial for effective vocal warm-ups as it involves introspective analysis and observation to cultivate an internal comprehension of bodily functions. The Alexander Technique is a widely used method that enhances ease, movement freedom, balance, support, flexibility, and coordination. It is often applied to align with the voice (Conable, 2000). This technique provides a practical way to map the body to promote healthy voice usage, improve posture, alignment, and overall coordination during vocal production, and reduce tension. Recent studies have linked body mapping to effective vocal techniques and healthy phonation (Denison & Denison, 2019).

The passaggio, the transition zones between different vocal registers, can present a significant challenge for even experienced singers. The process of voice change in adolescents can worsen this challenge by introducing shifting passaggios, leading to a lack of confidence and fear of singing in this area of their voice. To prevent the development of such negative emotions, teachers must help their students develop flexibility in the passaggio. One effective technique involves stepwise motion through the passaggio as it encourages connectivity and builds confidence in this area of the voice (Caldretti, 2017). Lynne Gackle (2017) suggests investigating register changes using a major descending scale and asking the student to sing starting at A below middle C and listen to the audible difference in timbre so that the students can allocate where the register now starts. Remember, this may be difficult to hear in singers with previous training.

According to Chapman (2006), not classifying vocal ranges during adolescence is advised. Instead, singers should use the range they find most comfortable during lessons. It has been

suggested that efficiently determining the average pitch of the speech register can help allocate vocal parts and avoid premature voice type categorisation (Williams 2019). The lowest comfortable sung pitch can then be estimated as approximately a third lower than the average pitch of the speech register. Teachers and choir directors can utilise this approach to allocate parts and prevent strain whilst building confidence in their singing abilities (Gackle, L. 2006).

Teachers must address the emotional and psychological impacts of FAVC by creating a supportive environment that allows students to discuss their vocal changes and express their concerns openly. This helps alleviate anxiety and build confidence. Regular check-ins with students to discuss their experiences and feelings about their voice changes can provide valuable insights. Encouraging a positive and open dialogue about the challenges and progress can help students feel more supported and less self-conscious about their evolving voices.

Conclusion

The existing literature emphasises the critical necessity for a more thorough comprehension of female adolescent voice change (FAVC) in voice instruction. Most research endeavours have primarily concentrated on male voice change, resulting in a significant knowledge deficit concerning FAVC. This knowledge gap must acknowledge the distinct physiological, emotional, and psychological obstacles young female vocalists confront during the pubertal transition.

Lynne Gackle's framework on FAVC provides a comprehensive understanding of female adolescent voice change. Gackle (2014) delineated four distinct phases of voice change, spanning from the prepubertal phase, characterised by a clear and agile vocal quality to the young adult female phase, marked by increased richness and consistency in vocal quality. This framework is substantiated by research highlighting physiological changes in the

laryngeal muscles, hormonal influences, and the development of vocal folds (Barlow and Howard, 2002; Andrews, 1991; Schiff, 1999; Titze, 1994).

However, the literature also points to the need for further research to fully elucidate the underlying causes, mechanisms, timing, and other biological factors influencing FAVC. For instance, while the weakening of the arytenoid muscles and the formation of the "mutational triangle" have been identified as contributing to breathy vocal quality (Abitbol and Abitbol, 2014; Kahane, 1982), there is a lack of comprehensive studies examining these changes in diverse populations. Moreover, understanding the impact of these physiological changes on vocal performance and development requires more in-depth investigation (Leborgne, 2016; Jones and Last, 2023).

Emotional and psychological changes accompanying FAVC are significant yet often overlooked with most of the research focusing on the physiological changes in FAVC. The voice plays a crucial role in developing personal and social identity, and vocal changes can disrupt this process, leading to feelings of insecurity and confusion (Lynne Gackle, 2006; Arnett, 1999). Research indicates that adolescents often encounter increased self-awareness, anxiety, and fluctuations in self-esteem during this transitional phase (Williams, 2013; Sweet, 2020). Studies by Sweet (2015) and Baker et al. (2022) highlight the importance of effectively addressing these emotional aspects to support female adolescents. However, further studies are needed to assist female adolescents and support emotional and psychological aspects.

Voice instructors play a vital role in guiding students through FAVC. Their knowledge of voice physiology, development, and effective pedagogical strategies can significantly impact students' self-assurance and confidence (Gackle, 2011a; Gebhardt, 2016). Educators should offer individualised attention, cultivate supportive environments, and choose appropriate repertoires matching students' vocal abilities (Purdy et al., 2018; Sweet & Parker, 2018). Techniques such as Semi-Occluded Vocal Tract Exercises (SOVTEs), the Alexander

Technique, and the arpeggio method have effectively promoted vocal health and development during FAVC (Titze, 2006; Conable, 2000).

Forthcoming studies should focus on longitudinally tracking the progression of FAVC to analyse its long-term impact on vocal health and self-esteem. Additionally, existing research needs more ethnicity, socioeconomic status, and cultural background diversity. Therefore, there is a need for more inclusive research that considers how these factors influence FAVC. Moreover, developing teaching methods explicitly tailored to female adolescents' unique needs during voice change is essential. This includes addressing emotional and psychological impacts and creating interventions to support the well-being of adolescent singers.

Areas for additional research include carrying out extensive longitudinal studies, as Gackle (2019) recommended: "Hopefully, there will be more longitudinal studies in the future that use the knowledge of interdisciplinary investigator groups. With the combined expertise of these professionals, a more comprehensive understanding of the adolescent female perspective can be attained." Expanding research to encompass a more diverse population, developing specific teaching tools, implementing interventions to support the well-being of adolescent singers, and providing training programs for voice teachers for better practical applications are crucial steps forward.

Addressing these research gaps will improve support and guidance for young singers undergoing FAVC, ultimately contributing to their overall well-being and long-term success in singing. By focusing on the unique experiences of female adolescents and tailoring educational approaches to their needs, the field of voice instruction can ensure that these young singers are well-supported during this critical period of their development.

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