

# BMPF: 7010

## Module 6

### Anxiety and Effects on Singers' Pitch-Matching Ability

Student 2244755: Alli Mae Carnes

March 5, 2026

# Why does pitch-matching matter?

## Pitch-Matching in Adolescent Voice Pedagogy & Stakes

- Widely treated as a foundational vocal skill, and functions as an early gatekeeping mechanism in music education
- Frequently used as an early indicator of musical aptitude
- Inaccuracy often framed as technical deficit  
→ shapes self-concept
- Corrective, repetition-based pedagogical responses
- Influences access to ensembles and roles, which could also determine continuation in music

★ **Implicit assumption: pitch accuracy reflects stable ability.**

★ **If pitch-matching functions as a gatekeeping skill, and if anxiety influences pitch access, then pedagogical framing does more than shape accuracy; it shapes belonging.**

# Why does adolescence matter?

## Adolescence, Voice, and Vulnerability

- Pubertal vocal change
- Heightened self-consciousness
- Peer comparison & social evaluation
- Identity formation
- Increased sensitivity to feedback

# Clinical Observation from Practice

## Patterns Observed in Anxious Adolescent Singers

Pitch difficulty  
frequently co-occurs  
with:



Pitch inaccuracy may be  
affectively mediated  
rather than perceptually  
deficient.

- Delayed vocal onset
- Guarded posture
- Shallow or interrupted breathing
- Verbal expressions of self-doubt (“I’m not sure”)
- Reduced willingness to attempt

# Conceptual Tension

## Deficit Model vs Contextual–Affective Model

### Deficit-Based Interpretation

- Limited auditory discrimination
- Poor motor coordination
- Stable trait-like limitation
- Remediate through repetition
- Fixed ability language

### Contextual–Affective Interpretation

- State-dependent access to skill
- Anxiety-mediated motor disruption
- Relationally constructed vocal response
- Regulate before correcting

*Is pitch difficulty an inability or an inhibited access to capacity?*

# State vs. Trait Anxiety

## State Anxiety

- Temporary, situation-specific emotional response
- Triggered by context (evaluation, uncertainty, social exposure)
- Fluctuates moment-to-moment
- Potentially modifiable through pedagogy

## Trait Anxiety

- Stable predisposition toward anxious responses
- Personality-linked tendency
- Present across many contexts
- Often examined in clinical or performance anxiety research

***Instruction can influence state anxiety, even when trait anxiety remains constant.***

# Anxiety in Low-Stakes Contexts

- Most research: auditions & recitals
- Limited research: routine learning tasks
- Educational psychology shows state anxiety disrupts cognition in everyday tasks

# Embodiment & Audiomotor Coupling

- Pitch as sensorimotor behavior
- Gesture externalizes pitch height
- Reduces cognitive load
- Shifts attentional focus outward

# Theoretical Concepts

## Music Performance Anxiety

- Disrupts respiration and laryngeal coordination
- Increases muscular tension
- Narrows attentional focus
- Reduces working memory capacity (Kenny, 2011)

## Embodiment Theory

- Cognition grounded in bodily experience
- Movement supports perception-action coupling
- Gesture externalizes pitch relationships (Sheets-Johnstone, 2015)

## Music Education

- Emotional climate influences engagement
- Self-efficacy shapes persistence in singing
- Musical skills develop through supportive contexts (McPherson & Welch, 2018)

## Polyvagal Theory

- Ventral vagal state → breath regulation, social engagement
- Defensive states → tension, restricted airflow
- Vocalization linked to perceived safety

**Vocal learning occurs within physiological, emotional, and relational systems.**

# Research Question

**How does state anxiety influence pitch-matching accuracy in adolescent singers, and which instructional strategies reduce anxiety while supporting vocal access?**

# Research Design

## Methodological Positioning

### Research Paradigm

- Interpretivist
- Context-sensitive, meaning-centered inquiry

### Framework

- Practitioner research
- Insider positionality acknowledged and reflexively managed

### Design

- Mixed-methods
- Within-subject repeated measures
- Single-session comparative design

### Purpose

- Explore affective mediation of vocal skill in authentic teaching context

### Why within-subject design?

- **Controls for individual variability**
- **Maximizes insight with small sample**
- **Allows observation of real-time shifts**

# Participants and Ethical Safeguards

## Participants

- 5 adolescent singers (ages 11-17)
- Current students experiencing singing-related anxiety

## Insider Tensions

### Benefits:

- Contextual depth
- Trust

### Risks:

- Power imbalance
- Confirmation bias
- Role duality

## Ethical Safeguards

- Parental consent + participant assent
- Explicit voluntariness
- Separation of research from lesson evaluation
- Safeguarding protocols for emotional distress
- Reflexive audit trail to address insider bias

*Relational safety prioritized over experimental control.*

# Pedagogical Manipulation of Affective Support

## Condition A:

Neutral Instruction

- ★ Verbal pitch prompt only
- ★ No embodied or affective scaffolding

## Condition B:

Embodied Solfège

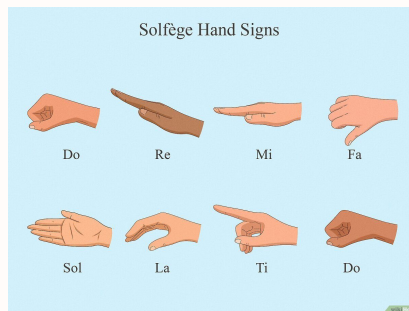
- ★ Curwen hand signs
- ★ Spatial representation of pitch
- ★ Kinesthetic engagement

## Condition C:

Co-Regulated Movement  
+ Supportive Framing

- ★ Gentle swaying/stepping
- ★ Slow breathing cues
- ★ Non-evaluative language
- ★ Encouragement of audiation

- Students were given 5 notes per condition (all single tones).



- Conditions were structured to progressively increase embodied and affective support.

# Data Collection and Triangulation

## Pitch Accuracy

- Binary: match/no match

## State Anxiety

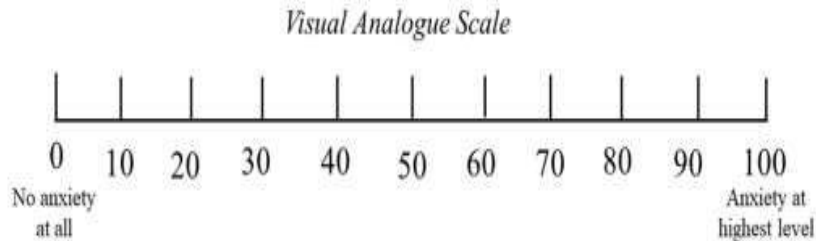
- Visual Analogue Scale (0-100)
- Pre- and post-condition ratings

## Qualitative Data

- Structured observational field notes
- Brief participant reflections

## Triangulation

- Acoustic
- Affective
- Behavioral



# Findings: Anxiety and Pitch Accuracy Across Conditions

## Neutral Condition:

- Highest anxiety
- Lowest pitch-match rate

## Embodied Condition:

- Moderate anxiety reduction
- Improved pitch accuracy

## Co-Regulated Condition:

- Lowest anxiety
- Highest pitch-match rate

**Across all participants, anxiety decreased as pitch accuracy increased.**

# Findings: Pitch-Match Outcomes by Participant

| Participant | Neutral | Embodied | Co-Regulated | Total Correct |
|-------------|---------|----------|--------------|---------------|
| A           | 2/5     | 3/5      | 5/5          | 10/15         |
| B           | 2/5     | 4/5      | 4/5          | 10/15         |
| C           | 1/5     | 3/5      | 4/5          | 8/15          |
| D           | 1/5     | 2/5      | 4/5          | 7/15          |
| E           | 2/5     | 3/5      | 3/5          | 8/15          |

## Aggregated Condition Totals

### Neutral

- Total correct: 8/25
- Mean per participant: 1.6/5
- Success rate: 32%

### Embodied Solfege

- Total correct: 15/25
- Mean per participant: 3%
- Success rate: 60%

### Co-Regulated

- Total correct: 20/25
- Mean per participant: 4%
- Success rate: 80%

# Findings: Participant VAS Anxiety Scores (Pre and Post Condition)

| Participant | Pre-Neutral | Post-Neutral | Pre-Solfège | Post-Solfège | Pre-Co Regulated | Post-Co Regulated |
|-------------|-------------|--------------|-------------|--------------|------------------|-------------------|
| A           | 62          | 58           | 48          | 42           | 44               | 35                |
| B           | 70          | 65           | 55          | 48           | 40               | 30                |
| C           | 60          | 55           | 50          | 45           | 38               | 28                |
| D           | 68          | 63           | 52          | 46           | 42               | 32                |
| E           | 65          | 60           | 47          | 41           | 36               | 25                |

## Aggregated Anxiety Means

### Neutral

- Mean Pre: 65
- Mean Post: 60.2
- Mean Reduction: 4.8

### Embodied Solfège

- Mean Pre: 50.4
- Mean Post: 44.4
- Mean Reduction: 6

### Co-Regulated

- Mean Pre: 40
- Mean Post: 30
- Mean Reduction: 10

# Access Delays and Vocal Initiation

## Neutral Condition:

- Delayed phonation
- False starts
- Visible tension
- Evaluative self-monitoring

## Co-Regulated Condition:

- Immediate vocal onset
- Sustained airflow
- Reduced facial tension
- Increased willingness to retry

**Pitch difficulty frequently reflected delayed access, not absent ability.**

# Self-Monitoring and Motor Interference

## Anxiety and Motor Control

- Anxiety →
- ↑ conscious self-monitoring
- → interference with automatic motor processes
- → increased motor variability
- → inconsistent pitch production

## Motor Learning Theory

- Skilled actions rely on automatic motor programs
- Excessive conscious control disrupts execution
- Known as reinvestment or paralysis by analysis (Schmidt & Lee, 2011)

# Anxiety Reduction as Precursor to Accuracy

**Observed in this study**



1.

VAS anxiety ratings  
decreased

2.

Immediate accurate  
attempt followed

3.

Improvement occurred  
within first or second trial

Interpretation:

Anxiety reduction functioned as  
enabling condition, not merely  
outcome of success.

# Pitch Access = Auditory Capacity

1.

Motor Coordination

2.

Affective State

3.

Pedagogical Framing

Interpretation:

Anxiety operates as gatekeeper variable influencing access to existing vocal skill.

# Theoretical Contributions

1.

Extends performance anxiety research into instructional micro-contexts

2.

Integrates embodiment and co-regulation into music pedagogy

3.

Challenges deficit-based interpretations of pitch inaccuracy

4.

Supports access-based, relational understanding of vocal skill

# Pedagogical Implications

## For teachers:

- Regulate before correcting
- Assess under multiple conditions
- Avoid deficit labeling
- Incorporate embodied scaffolds

## For institutions:

- Rethink early aptitude judgments

## Assessment of students during first lesson should consider:

- Hesitation and onset delay
- Breath quality and posture
- Emotional readiness
- Instructional framing

Shift from:

Can they match pitch?



To:

What conditions allow access to pitch?

# Limitations

- Small sample
- Binary pitch measurement
- Fixed condition order
- Insider positionality
- Single session design

- Conducting the study within a familiar teaching environment enhanced emotional safety.
- Interpretivist paradigm: Research integrity is maintained not through control alone, but through transparency, reflexivity, and alignment

# Future Research

- Larger sample replication
- Counterbalanced design
- Continuous pitch deviation measurement
- Inclusion of ADHD attentional variables

- Further investigation into neurodivergent populations and varied age groups may also yield important insights.
- Long-term studies could explore whether sustained use of co-regulated and embodied pedagogy leads to enduring improvements in pitch accuracy and musical self-efficacy.

# Conclusion

**Pitch-matching is not solely a technical skill.  
It is an affectively mediated, relational behavior.**

*If anxiety gates vocal access, pedagogy is not neutral.*

**If anxiety gates vocal access, pedagogy must regulate before it corrects.**

*The way we structure pitch tasks may determine whether a student believes they “can’t sing.”*

# References

Dwyer, S. C. and Buckle, J. L. (2009) 'The space between: On being an insider-outsider in qualitative research', *International Journal of Qualitative Methods*, 8(1), pp. 54–63.

Jellison, J. A., Draper, E. A. and Brown, L. S. (2021) *Including Everyone: Creating Music Classrooms Where All Children Learn*. New York: Oxford University Press.

Juslin, P. N. and Laukka, P. (2004) 'Expression, perception, and induction of musical emotions: A review and a questionnaire study', *Journal of New Music Research*, 33(3), pp. 217–238.

Kenny, D. T. (2011) *The Psychology of Music Performance Anxiety*. Oxford: Oxford University Press.

McPherson, G. E. and Welch, G. F. (2018) *Music Learning and Teaching in Infancy, Childhood and Adolescence: An Oxford Handbook of Music Education*. Oxford: Oxford University Press.

Porges, S. W. (2011) *The Polyvagal Theory: Neurophysiological Foundations of Emotions, Attachment, Communication, and Self-Regulation*. New York: Norton.

Schmidt, R. A. and Lee, T. D. (2011) *Motor Control and Learning: A Behavioral Emphasis*. 5th edn. Champaign, IL: Human Kinetics.

Sheets-Johnstone, M. (2015) *The Phenomenology of Movement*. Amsterdam: John Benjamins.

Welch, G. F. (2006) 'Singing and vocal development', *Music Educators Journal*, 92(4), pp. 59–65.

Welch, G. F., Himonides, E., Saunders, J., Papageorgi, I. and Sarazin, M. (2010) 'Researching the first year of the National Singing Programme in England', *Psychology of Music*, 38(1), pp. 45–62.



Thank you!