Respiratory Function in Transgender and Gender Diverse Individuals on Testosterone Therapy: A Comparative Study

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Browy, Jillian River R.; Heitzman, Alicia; Britton, Deanna; Conn, Jeff; Drake, Karen; and Ziegler, Aaron, "Respiratory Function in Transgender and Gender Diverse Individuals on Testosterone Therapy: A Comparative Study" (2022). Student Research Symposium. 5.
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Respiratory Function in Gender Diverse Individuals on Testosterone Therapy: A Comparative Study

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Aaron Ziegler, PhD, CCC-SLP
Disclosures

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Financial Disclosures
• SLP at Salem Health Hospital

Non-financial Disclosures
• ASHA 2021 Voice and Upper Airway Impairments Committee member
• Community member

Jillian River Browy, BA

Financial Disclosures
• No relevant financial relationships to disclose

Non-financial Disclosures
• Graduate student at Portland State University, with this research as their cumulating project
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Non-financial Disclosures
• Nothing to disclose
Disclosures continued

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Non-financial Disclosures
• Nothing to disclose

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Financial Disclosures
• Founder and clinician at Wellness Group for Voice, Speech, and Swallowing, LLC
• Co-founder and educator at Confident Clinician Cooperative, LP

Non-financial Disclosures
• Nothing to disclose
Defining Terminology

Sex assigned at birth — Label assigned at birth by doctor based on genital anatomy and chromosomes

Gender - Social and legal status influenced by societal expectations and based on an individual’s identity and feelings.

Gender diverse — Noting or relating to a person whose gender identity or gender expression does not conform to socially defined binary gender norms.

Transgender — Gender identity that does not correspond to sex assigned at birth.

Cisgender — Gender identity corresponds to sex assigned at birth.

https://www.uwmedicine.org/provider-resource/lgbtq/lgbtq-inclusion-glossary
Interpretation of pulmonary function tests (PFT) is common practice in assessing respiratory function of individuals – including gender diverse individuals who were assigned female at birth.

Interpretation of PFTs for these individuals is challenging:

- Cisgender norms for forced vital capacity (FVC) and forced expiratory volume in 1 second (FEV1), and FVC/FEV1 ratio are based on sex, race, age, and height (Quanjer, et al., 2012).
- Cisgender norms for maximum inspiratory pressure (MIP) and maximum expiratory pressure (MEP) are more debated but fall between a general range based on age and biological sex (Evans and Whitelaw, 2009).
• Impact of gender-affirming hormone therapy – testosterone – on pulmonary function has not been investigated

• Known impact of testosterone therapy
  • Higher lean body mass
  • Lower body and subcutaneous fat
  • Greater muscle strength
  • Thickening of vocal folds

(Irwig, 2016)
• Using a non-assigned birth sex in diagnosing subjects with airflow obstruction can have a significant impact on test interpretation of PFT values
• Consider birth sex and not gender alone when interpreting test results in an ethical and respectful manner
• Need for study with transgender individuals without airflow obstruction, on hormone replacement therapy
Purpose

Investigating the respiratory capacity and strength of individuals who have undergone hormone therapy and comparing their results to established cisgender norms as well as a group of age, race, and biological sex matched peers will aid in the accuracy in PFT interpretation for this group.
Learner Outcomes

Contrast expected respiratory values when assessing transgender and gender diverse individuals compared to both cisgender male and female values.

Describe respiratory changes that occur following testosterone therapy for the purposes of aligning gender identity in transgender and gender diverse individuals.

Differentiate the significant impact of assigning gender when collecting respiration data with transgender and gender diverse individuals.
Participants

Participants:

• Experimental group (GDV)
  • Assigned female at birth, non-smoking, between ages 18-65, on testosterone therapy for at least 1 year

• Control group (CGF)
  • Assigned female at birth, non-smoking, between ages of 18-65, no history of testosterone therapy, matched by age and race to a member of the experimental group
Recruitment – Experimental Group

Respiratory Function of Gender Diverse Individuals on Testosterone Therapy: A Comparative Study

Experimental Group Recruitment

- Control participants recruited via social media and fliers (n = 31)
- Telephone screener administered (n = 31)
  - Participants excluded (n = 6)
    - Smoker status (n = 2)
    - No response (n = 2)
    - Unknown (n = 2)
  - Participants eligible (n = 25)
    - Participants deemed ineligible after screening due to change in medical dx (n = 1)
- Participants included (n = 24)

Impact of Testosterone on Respiratory Support for Voice in Transgender Individuals

Researchers at Portland State University’s (PSU) Department of Speech & Hearing Sciences are conducting a study of how testosterone therapy as part of medical treatment to align gender identity affects respiration and voice.

You may be eligible to participate in this study if you:
- Were assigned female at birth
- Have been on testosterone therapy consistently for at least the past year as part of your gender-affirming medical treatment plan
- Are between the ages of 18-65 years old
- Are a non-smoker or user of tobacco or nicotine products for at least the past 5 years
- Have had no more than 1 asthma attack in the past 6 months
- Do not have any other conditions that would lead to reduced respiratory strength such as: neuromuscular disease, pulmonary (other than asthma), or autoimmune diseases, etc.
- Have had no more than one year of consistent voice lessons outside of k-12 school

Participants will be asked to do the following:
- Complete a screening interview to determine candidacy
- Complete questionnaires relating to your gender, background, voice and respiration
- Undergo an examination of your respiratory capacity and strength
- Undergo examination of vocal quality and range through a series of voice tasks
- Due to the restrictive nature of chest binders, we ask that you remove any binding devices prior to arriving for your 1-hour appointment. Two single-stall, all gender bathrooms will be provided within the department as a safe space to change.

Research data collection will occur at PSU. Participation is voluntary and all identifying information will be kept confidential. Participants will be scheduled for a 1-hour appointment and receive $25 cash as a thank you for taking part in this study.

ARE YOU INTERESTED? For more information or to schedule a screening interview contact Alisa Heitzman at: ach@pdx.edu or call at 503-380-9328
Recruitment – Control Group

Respiratory Function of Gender Diverse Individuals on Testosterone Therapy: A Comparative Study

Control Recruitment

Control participants recruited via social media and flyers
(n = 32)

Telephone screener administered
(n = 33)

Participants excluded
(n = 13)
- Previous testosterone therapy (n = 1)
- Smoker status (n = 1)
- Neuromuscular disease (n = 1)
- Autoimmune disease (n = 1)
- > 1 year voice lessons outside K-12 (n = 3)
- No match (n = 6)

Participants eligible
(n = 20)

Participants who backed out
(n = 6)

Participants included
(n = 14)

Research Study Opportunity

Researchers at Portland State University’s (PSU) Department of Speech & Hearing Sciences are conducting a study of how testosterone therapy as part of medical treatment to align gender identity affects respiration and voice.

We are seeking control participants and you may be eligible to participate in this study if you:

- Were assigned female at birth
- Identity as woman
- Are between the ages of 19-65 years old
- Are a non-smoker or vapor of tobacco or nicotine products for at least the past 5 years
- Have had no more than 1 asthma attack in the past 6 months
- Do not have any other conditions that would lead to reduced respiratory strength such as neuromuscular disease, pulmonary (other than asthma) or autoimmune diseases, etc.
- Have less than one year of consistent voice lessons outside of K-12 school

Participants will be asked to do the following:

- Complete a screening interview to determine candidacy
- Complete questionnaires relating to your gender, background, voice and respiration
- Undergo an examination of your respiratory capacity and strength
- Undergo examination of vocal quality and range through a series of voice tasks

Research data collection will occur at PSU. Participation is voluntary and all identifying information will be kept confidential. Participants will be scheduled for 1-2 hour appointments and receive $25 cash for taking part in this study.

ARE YOU INTERESTED?
For more information or to schedule a screening interview contact Jillian River Browy at jjribrowy@pdx.edu or call at (503) 548-8047
Methods

• Background, demographic data, and information regarding satisfaction with voice were collected via study-specific questionnaire and Voice Handicap Index 30 (VHI30)

• Primary outcomes of interest were measures of respiratory volume and strength, collected using EasyOne-PC Spirometer (NDD Medical Technologies, Inc.) for FVC measures and MicroRPM for values of MIP and MEP

• Assessed average of percent predicted for each measure, instances where participants fell below or above lower limit of normal (LLN) when compared to cisgender norms (Quanjer et al, 2012, Evans and Whitelaw, 2009) and compared results between matched pairs.

• Voice data collected using Computerized Speech Lab (CSL) and Phonatory Aerodynamic System (PAS)
### Preliminary Respiration Results

#### Male Norms
<table>
<thead>
<tr>
<th>Function</th>
<th>Mean % Predicted</th>
<th>Standard Deviation</th>
<th>Range</th>
<th>Number Below LLN</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIP</td>
<td>92.97%</td>
<td>32.28%</td>
<td>34.37%-170.55%</td>
<td>2</td>
</tr>
<tr>
<td>MEP</td>
<td>95.97%</td>
<td>24.61%</td>
<td>48.06%-164.05%</td>
<td>2</td>
</tr>
<tr>
<td>FVC</td>
<td>89%</td>
<td>10.55%</td>
<td>71%-110%</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Female Norms
<table>
<thead>
<tr>
<th>Function</th>
<th>Mean % Predicted</th>
<th>Standard Deviation</th>
<th>Range</th>
<th>Number Below LLN</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIP</td>
<td>115.77%</td>
<td>41.77%</td>
<td>40.44%-219.79%</td>
<td>1</td>
</tr>
<tr>
<td>MEP</td>
<td>137.6%</td>
<td>39.77%</td>
<td>68.33%-247.88%</td>
<td>1</td>
</tr>
<tr>
<td>FVC</td>
<td>108%</td>
<td>12.75%</td>
<td>85%-136%</td>
<td>0</td>
</tr>
</tbody>
</table>

![Mean % Predicted Comparison](chart.png)
Impact of testosterone dosage

Male

<table>
<thead>
<tr>
<th></th>
<th>Pearson Correlation</th>
<th>Sig (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIP</td>
<td>.434*</td>
<td>.049</td>
</tr>
<tr>
<td>MEP</td>
<td>.399</td>
<td>.073</td>
</tr>
<tr>
<td>FVC</td>
<td>.334</td>
<td>.139</td>
</tr>
</tbody>
</table>

Female

<table>
<thead>
<tr>
<th></th>
<th>Pearson Correlation</th>
<th>Sig (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIP</td>
<td>.434*</td>
<td>.049</td>
</tr>
<tr>
<td>MEP</td>
<td>.383</td>
<td>.086</td>
</tr>
<tr>
<td>FVC</td>
<td>.352</td>
<td>.117</td>
</tr>
</tbody>
</table>
Comparing respiration volume and strength between matched pairs

<table>
<thead>
<tr>
<th></th>
<th>COMPARISON OF DATA USING CISGENDER FEMALE NORMS</th>
<th>COMPARISON OF DATA USING CISGENDER MALE NORMS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MIP %PRED</td>
<td>MEP %PRED</td>
</tr>
<tr>
<td></td>
<td>GDV</td>
<td>CGF</td>
</tr>
<tr>
<td>Mean</td>
<td>121%</td>
<td>92%</td>
</tr>
<tr>
<td>SD</td>
<td>31%</td>
<td>20%</td>
</tr>
<tr>
<td>Range</td>
<td>66%–164%</td>
<td>51%–127%</td>
</tr>
<tr>
<td>N below LLN</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
Comparing respiration volume and strength between matched pairs
Conclusions/Discussion

- Percent predicted values were higher when analyzed using cisgender female norms but fell between what was expected for cisgender females and cisgender males.

- Testosterone intervention may be associated with strengthening of pulmonary function in gender diverse individuals assigned female at birth, most prominently with measures reflecting respiratory muscle strength.

- Dosage seems to be more of an indicator than testosterone level.

- When working with transgender and gender diverse clients, consideration of hormonal intervention and sex assigned at birth are important factors in interpreting PFTs.

- Further studies with larger and more diverse participant cohorts are warranted to build on this preliminary data.
Thank you for your time!
References


