

Gender Representation in Musical Instruments: From Middle School to the Professional Level

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ABSTRACT

While gender stereotypes surrounding musical instruments have been shown to influence musicians' advancement, prior research has largely examined the gender distribution of music ensembles within a single level, such as the middle school or collegiate level. Thus, little is known about how gender distributions compare across different levels of musical progression. Seeking to fill this gap, this study investigates how gender representation differs across classical music ensemble levels and whether gendered instrument patterns become more pronounced in higher-level ensembles. To do so, a content analysis was conducted using rosters from middle school All-State bands, high school All-State bands, selective collegiate ensembles, and professional orchestras in the United States. The final dataset included 3,720 musicians from 155 ensembles representing all 50 states. Descriptive statistics, chi-square tests of independence, Cramér's V , and trend analyses were used to determine associations among gender, instrument, and ensemble level.

Results demonstrate that overall male representation is consistently higher at more advanced ensemble levels. In turn, female representation decreases as ensemble level increases, with the largest decline occurring between the collegiate and professional levels. Significant associations were found between gender and ensemble level and between gender and instrument. Trombone, trumpet, and percussion remain strongly male-dominated; flute remains strongly female-dominated; and male representation generally increases as ensemble level increases in five of the six instruments studied. These findings suggest that gendered patterns in classical music become more pronounced in higher-level ensembles, particularly within male-dominated instruments. Understanding these patterns may help identify where gender disparities intensify and inform efforts to promote greater equity in classical music.

INTRODUCTION

Gender inequalities in classical music are often shaped by gender associations surrounding musical instruments. These associations arise through the interaction of cultural perceptions and instrument characteristics (Doubleday, 2008). Then, through continuous reinforcement, they can solidify into rigid stereotypes, impacting musicians throughout their journey (Kim, 2023). Specifically, gender stereotypes

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affect musicians by influencing instrument choice, causing negative day-to-day experiences, and even leading to dropout from music altogether (Hudson, 2025; Kim, 2023). Thus, they are often manifested in the gender distributions of classical music ensembles. For instance, one study by Fortney and colleagues analyzed the gender composition of middle school bands, finding that 91% of the flute players were female and 88% of the trumpet players were male (Fortney et al., 1993). These findings align with commonly identified gender stereotypes (flutes being feminine and trumpets being masculine), illustrating how such associations are reflected in ensemble participation (Abeles, 2009; Byo, 1991).

As demonstrated by these findings, research on gender distributions helps reveal who is able to participate in classical music and where disparities emerge. However, the existing body of knowledge is limited in this regard. Existing studies largely focus on the gender distributions of individual ensemble levels, such as the middle school or collegiate level (Casula, 2019; Fortney et al., 1993). Although there is substantial research demonstrating how gender minorities are disproportionately at risk of dropout (Doubleday, 2008; Kim, 2023), there is little analysis of how gender distributions differ across ensemble levels. Thus, it is difficult to identify gendered patterns in music participation across stages of advancement. Seeking to fill this gap, this study addresses the question: how does the gender distribution of instrument sections compare across classical music ensemble levels? By doing so, this study seeks to demonstrate gendered patterns in representation across ensemble levels, informing future efforts to address gender inequalities in music.

LITERATURE REVIEW

Gendered Instrument Meanings

Across time periods and cultures, instruments have developed gendered meanings that consistently shape the music field and impact the musicians within it. To fully understand the effect of these meanings, it is necessary to first consider how they form. As Professor Kirkham (1996) explains in *The Gendered Object*, objects develop gendered meanings through their interactions with people. Renowned ethnomusicologist Regula Qureshi (1997) applies this framework to instruments, arguing that relationships between instrument characteristics (objects) and human perceptions (people) form gendered meanings. Within each side of this relationship, there are complex dynamics to consider.

For instruments, two main factors are widely regarded as influential in forming gendered meanings: physical form and sound (Abeles, 2009; Doubleday, 2008; Fortney et al., 1993). An instrument's physical form, developed by instrument makers and wider cultural contexts, can intentionally or unintentionally exhibit gendered meanings. For instance, in Tibesti, Chad, certain drums are made from male acacia wood; thus, they carry male associations within the community. Sonic properties can also contribute to gendered meanings (Doubleday, 2008). Often, large instruments with deep, loud timbres carry masculine associations, while small instruments with high, soft timbres carry feminine associations (Cottrell, 2004; Qureshi, 1997; Zervoudakes & Tanur, 1994). This pattern is widely evident across cultures and is

especially pronounced in Western culture; however, it is not universal, likely due to differing human interpretations of these instrument characteristics (Cottrell, 2004). Additionally, instruments do not always align neatly with binary gender associations. For instance, the saxophone is often seen to possess both feminine and masculine characteristics, leading to a more fluid or ambiguous gender identity (Cottrell, 2004). Ultimately, an instrument's physical form and sonic properties influence gendered meanings in complex ways.

Of course, the ways in which these characteristics produce gendered meanings depend on how they are interpreted through human perception. Within the context of this paper, human perception can be more specifically understood as “embodied cultural capital.” Embodied cultural capital is defined by existing sociology frameworks as internalized knowledge and dispositions accumulated through socialization within a culture (Kim, 2023). Prior research identifies four main influences of embodied cultural capital that shape instrumental gender associations: representation, personal relationships, demographics, and geography. Primarily, existing gender representation is influential in shaping embodied cultural capital. This is because representation (in music textbooks, orchestras, etc.) can shape views of what is appropriate or attainable for certain genders (Kim, 2023). For instance, one study of factors influencing elementary students' instrument choices found that males were more likely to select the clarinet when shown a video of a male clarinet player (Byo, 1991). Additionally, personal relationships are highly influential, especially those formed with parents, teachers, and peers. Through these relationships, individuals often reproduce their own embodied cultural capital onto one another (Kim, 2023). For instance, parents do so by demonstrating gender norms, reinforcing behaviors, and controlling outside influences (Davidson et al., 1995). Further, demographics other than gender can influence gendered meanings. In *Music and Gender: Perspectives from the Mediterranean*, anthropologist Margini (2003) mentions that demographics such as age, class, social status, and ethnicity can shape the perception of instruments as masculine or feminine. For example, language has been shown to be especially influential. In a study of the gendered instrument associations of Spanish speakers, it was found that participants typically considered the grammatical gender of a word before its conceptual meanings (Incera et al., 2018). Finally, geographic location can form embodied cultural capital. As professor Werner (2024) explains, instrument meanings are formed in specific geographic contexts. For instance, certain Moroccan frame drums depict the Prophet Muhammad's daughter, causing them to carry feminine meanings (Doubleday, 2008). These meanings would not be immediately evident outside of the region, demonstrating the influence of location-based cultural knowledge. Ultimately, these factors demonstrate that embodied cultural capital is context-dependent and cumulative.

Having established the complex aspects of the human-instrument relationship, the formation of gendered meanings can now be better understood. Renowned historian and ethnomusicologist Veronica Doubleday (2008) notes that relationships between human perceptions and instrument characteristics can take on three main forms, each influencing gendered meanings in a distinct way. First, in basic relationships, individuals and instruments interact freely to develop gendered meanings. This relationship is primarily theoretical because individuals are not fully free to form meanings; they are influenced by their embodied cultural capital. Next, in exclusive relationships, individuals establish dominance over an instrument. This

monopolizes its gendered meanings and excludes others from contributing to them. For instance, in 18th-century Europe, male church musicians forbade females from playing the organ (Doubleday, 2008). In this case, males formed an exclusive relationship with the organ. Finally, in negative relationships, individuals experience “symbolic violence,” a sociology term reflecting the internalization of power imbalances between dominant and marginalized groups. This relationship is a byproduct of exclusive relationships in which individuals reinforce the gendered meanings controlled by dominant groups. In the aforementioned organ example, the excluded women formed a negative relationship with the organ. Across all three forms of relationships, individuals produce and reinforce gendered meanings through their own perceptions and actions.

Experience and Dropout

Through the relationships described above (basic, exclusive, and negative), gendered meanings are continuously reinforced, eventually solidifying into rigid stereotypes. Dr. Sori Kim of Columbia University (2023) notes that this process is cyclical. When gender stereotypes are formed and reinforced, they reproduce the embodied cultural capital that created them in the first place, creating a feedback loop. Because musicians’ embodied cultural capital develops throughout their progression, the stereotypes they encounter often grow stronger. This is demonstrated by existing studies. In Fortney and colleagues’ study (1993) of middle school musicians, participants noted that they did not feel affected by gender stereotypes. However, in Hudson’s (2025) study of female music majors, participants reported strong gender expectations at the collegiate level. While this contrast suggests stronger gender expectations in higher-level ensembles, the studies were conducted 32 years apart and analyzed highly different populations, demonstrating the need for a consistent analysis of gender representation across ensemble levels.

The potentially increasing strength of gendered stereotypes as well as the lack of existing research on this trend is troubling because gender stereotypes substantially impact musicians across their journeys. As mentioned, it has been argued that stereotypes limit instrument choice. For instance, although the young musicians in Fortney and colleagues’ study (1993) did not feel particularly affected by gender stereotypes, their instrument choices still aligned with them. Thus, musicians may be limited by stereotypes even if they are unaware of their influence. Existing literature largely supports this; however, some perspectives seem to conflict. For instance, several studies identify the majority of instruments as male-dominated (Doubleday, 2008; Zervoudakes & Tanur, 1994; Fortney et al., 1993), while others demonstrate equal gender representation (Elpus, 2015; Lien & Humphreys, 2001). Further, while Doubleday (2008) argues that females’ instrument choices are more limited by stereotypes than males’, Wieser and colleagues (2024) find that women are more likely to cross gender boundaries in instrument choice. Because these studies mainly analyze local music ensembles, discrepancies could be explained by differences in local stereotypes. This demonstrates the need for large-scale studies of multiple ensembles.

Stereotypes have also been shown to impact musician experiences, often negatively affecting gender minorities. In one study, musicians reported facing greater discrimination and social pressures when they

were a gender minority in their instrument due to rigid stereotypes (Buttu, 2008). The effects of stereotypes on musician experiences often vary by gender. For instance, females playing “masculine” instruments are often criticized for their appearance and technique, while males playing “feminine” instruments typically experience teasing or exclusion (Hudson, 2025). Prior research largely demonstrates that female gender minorities are typically more impacted by stereotypes than males (Doubleday, 2008; Buttu, 2008; Hudson, 2025). For instance, they often report fewer leadership opportunities and unique structural barriers, such as underdeveloped DEI programs at the professional level (Ginsborg, 2024).

Finally, gender stereotypes can cause musicians to drop out from music altogether. Musical dropout has been shown to result from stereotype-induced negative experiences, such as those disproportionately faced by gender minorities (Schmidt, 2005; Gavin, 2012). Further, musicians often disengage when they do not see career pathways as attainable due to misalignment with their gender (Jordan, 2006). As mentioned, gender stereotypes can also limit opportunities, preventing musicians from continuing in the music world altogether. However, one study by Dr. Martin Wieser and colleagues found that gender plays a minimal role in a musician’s likelihood to drop out of music (Wieser et al., 2024). Instead, they found that parental motivation and fulfillment of psychological needs were the largest influences. Still, both of these factors have been shown to be influenced by gender in prior studies (Kim, 2023; Doubleday, 2008). Further, Wieser and colleagues (2024) relied on convenience sampling, which resulted in an imbalance between males and females studied. This was noted as a limitation and could have impacted the study’s findings on gender as a factor of musical dropout. This demonstrates the need for balanced data collection when studying gender stereotypes.

Ultimately, drawing on existing studies, it is likely that as musicians progress, embodied cultural capital develops and strengthens gender stereotypes. At the same time, these stereotypes often negatively impact gender minorities, leading to their dropout. Thus, it follows that participation in classical music would be more aligned with gendered instrument stereotypes in higher-level ensembles.

Gap

Understanding gendered patterns in classical music ensembles is crucial for determining who is able to participate in music and where barriers to this participation lie. However, the existing body of knowledge is limited in this regard. Prior studies largely focus on singular ensembles from the same level of advancement, such as the high school or collegiate level. Further, as mentioned, some studies seem to contradict, likely due to their focus on separate ensembles with distinct cultures and stereotypes. This highlights the need for a large-scale, multilevel analysis of music ensemble gender distributions. Seeking to fill this gap, this study analyzes the gender distribution of instruments across classical music ensemble levels. Classical music was chosen as opposed to other music genres because it has been shown to possess especially rigid gender stereotypes, making its study highly important (Garcia-Falgueras, 2023). Taking into account existing research on the formation of gendered meanings and the impact of stereotypes on musicians and ensembles, it is hypothesized that gendered instrument patterns will become increasingly

pronounced in higher-level ensembles—with females concentrated in female-dominated instruments and males concentrated in male-dominated instruments.

METHODOLOGY

In order to analyze how gendered patterns compare across music ensemble levels, a content analysis of public rosters was employed. Although prior studies more commonly use surveys to study gender distributions, a content analysis was selected for two main reasons. First, it avoids the response and sampling biases that occur from small samples or self-reported data, allowing for objective analysis (Shea, 2023). Further, content analysis facilitates the collection of large amounts of data, as demonstrated by large-scale studies such as Dr. Abeles' (2009). Such scale is necessary for this study because comparing multiple ensemble levels requires sufficient data to draw strong conclusions. The research has received district-level approval; Institutional Review Board (IRB) approval was unnecessary as no human participants were involved.

Data Collection

Ensemble rosters were collected from four ensemble levels: high school, middle school, collegiate, and professional. These levels were selected because they have been identified by prior research as crucial stages in musicians' journeys (Kim, 2023; Zervoudakes & Tanur, 1994). Additionally, data was collected for ensembles within the United States. This is because the effects of gendered stereotypes in this country have been found to be especially pronounced due to its historically rigid gender roles and isolation from alternative interpretations (Werner, 2024). At each ensemble level, data sources were chosen due to careful considerations, as described below.

Middle and High School Ensemble Rosters

For the middle and high school level, All-State band rosters were selected for analysis. All-State bands are music ensembles that hold yearly auditions, select the top student musicians from across the state, and perform during the state's music education festival (Lien & Humphreys, 2001). They were chosen because they provide an accurate representation of top secondary school musicians (Lien & Humphreys, 2001) and are readily accessible across states. Further, as Glenn (1997) mentions in his study of United States All-State bands, all students in grades 7-12 with a band director to register them are eligible to audition for their state's band without any direct restrictions. Additionally, All-State auditions are blind (judges cannot see performers), and scoring is standardized. This reduces potential bias based on appearance or demographics such as gender or race, which allows ensemble rosters to more accurately reflect the gender distributions of their state's top musicians (Goldin & Rouse, 2000). As explained by Professor Tobin (2005), a participant's qualification for a selective ensemble such as an All-State band reflects high musical involvement and commitment. Thus, these ensemble rosters provide a consistent starting point for comparison with collegiate and professional ensembles, which are composed of

similarly driven musicians (Schmidt et al., 2006). All-State rosters were collected from each U.S. state's Music Educators Association or Band and Orchestra Association website. For all ensemble levels (including collegiate and professional), rosters from the 2025 season were collected because this is the most recent year that data is consistently available.

However, there are several limitations of this data source. Firstly, competitiveness can vary across states because differences in state populations cause some bands to receive a larger number of auditions (Glenn, 1997). Additionally, a study of South Dakota's All-State band auditions found that students from larger schools and those located closer to audition sites typically score slightly higher (Lien & Humphreys, 2001). As a result, All-State members are not always equally qualified, so rosters may not perfectly reflect each state's most highly qualified musicians. Still, although some All-State bands may be more competitive than others, all of them are incredibly selective (Glenn, 1997).

Collegiate Ensemble Rosters

To maintain consistency with the competitive nature of All-State ensembles, collegiate ensembles for each state were identified based on selectivity. Using Common Data Set information, the collegiate music program with the lowest acceptance rate was selected for each state. These criteria were chosen over relying on institutional rankings because All-State ensembles themselves do not necessarily represent the "best" high school ensembles within a state—only the most auditioned for and selective (Glenn 1997). Following university selection, data was collected from the music program's official website for the top wind or symphonic ensemble.

However, using this method, states with multiple competitive music programs are represented by only one ensemble, even though multiple may be equally or more selective than those included from other states. For instance, New York is home to both The Juilliard School and the Manhattan School of Music (both ranked among the most selective programs nationally), but only Juilliard is included due to its lower acceptance rate (U.S. Department of Education, 2025). Still, because around 73% of U.S. college students attend a university in their home state (College Board, 2024), this approach was selected to maintain relatively equal representation through geographic balance. This allows for comparability across ensemble levels while still collecting data for top musicians.

Professional Ensemble Rosters

For professional ensembles, a multi-criteria selection process was used to keep musical ability consistent with collegiate, high school, and middle school rosters. Based on prior research of high level orchestras (Herrero-Prieto & Gómez-Vega, 2020; Carpos, 2017), the following criteria were used to collect professional rosters from each state. First, all professional orchestras within a state were identified using the League of American Orchestras membership directory. Orchestras were then chosen based on (a) use of screened, multi-round auditions; (b) classification as a full-time, salaried ensemble; and (c) union tier affiliation through the American Federation of Musicians, including ICSOM or ROPA membership. Such

information is available on the official websites of professional orchestras. When multiple orchestras met the above criteria within a single state, the ensemble with the longest season length and highest contract was selected.

Coding Scheme

In order to maintain consistency between instruments and ensemble levels, data was only collected for the top 3 listed players for each instrument; this is the minimum standard number of players per section for the instruments analyzed (Hoffman, 1997). Using the identified ensemble rosters, the following data was collected for each musician:

- ❖ **Ensemble level:** The classification of the ensemble the musician participated in. Levels include middle school, high school, collegiate, and professional.
- ❖ **Instrument:** The instrument played by the musician. Data was collected for musicians playing flute, clarinet, French horn, trombone, trumpet, and percussion. These instruments were selected because they are widely considered to be six of the beginner band instruments (Abeles, 2009; Byo, 1991). Thus, they are present in ensembles from the middle school to the professional level. Unlike some instruments (such as the saxophone or euphonium), they are included within all collected ensemble rosters, allowing for consistent comparison. Additionally, they retain a balance of instruments widely identified as male-dominated, female-dominated, and gender-neutral. Based on professors Zervoudakes and Tanur's (1994) meta-analysis of eight prominent studies of instrument gender distributions, the clarinet and flute are typically female-dominated, the trumpet and percussion male-dominated, and the horn and trombone relatively gender-neutral. However, these findings do not align with other studies, such as Abeles' (2009). Thus, these instruments were selected as a base for data collection, but overall gendered patterns in instrument sections were considered when analyzing data.
- ❖ **Gender:** The gender of the musician. Most rosters do not directly list each member's gender, although many professional rosters do. Specifically, 38 of the professional rosters studied stated the gender of each member, while the remaining 117 rosters—including middle school, high school, and collegiate rosters—did not. When gender was unavailable, it was inferred based on first names using an artificial intelligence-based method. Dominguez-Diaz et al. (2024) determined that ChatGPT predicts name-based gender with high accuracy (around 96%) compared to traditional gender classification APIs such as NamSor. Thus, their method was followed to predict gender. This method does not account for more complex gender identities, including transgender musicians listed under their legal name or nonbinary musicians. However, it applies relatively well to the majority of individuals who identify with their biological gender of male or female, approximately 98.4% of the U.S. population (Brown, 2022).

Data Collection Procedures

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The selected rosters were reviewed, and data was recorded in a Google Sheet, with each musician treated as a single data entry. When rosters did not explicitly list gender, names were collected and gender was inferred using the artificial intelligence-based method used by Dominguez-Diaz et al. (2024). The authors' procedures were followed without modification. As recommended by Cooper and Coetzee (2020), data was de-identified to protect the privacy of ensemble members.

Data Analysis

First, descriptive statistics were calculated, including percentages of male and female musicians for each ensemble level and instrument. In order to determine whether overall gender distributions significantly differed across ensemble levels, chi-square tests of independence were conducted for the association between gender and ensemble level. Then, separate chi-square analyses were conducted for the association between gender and instrument at each ensemble level as well as overall. Statistical significance was evaluated at the $\alpha = .05$ level. When significant associations were identified, Cramér's V was used to determine the effect size. Further, to analyze gender distribution shifts throughout progression, trend analyses were conducted.

RESULTS

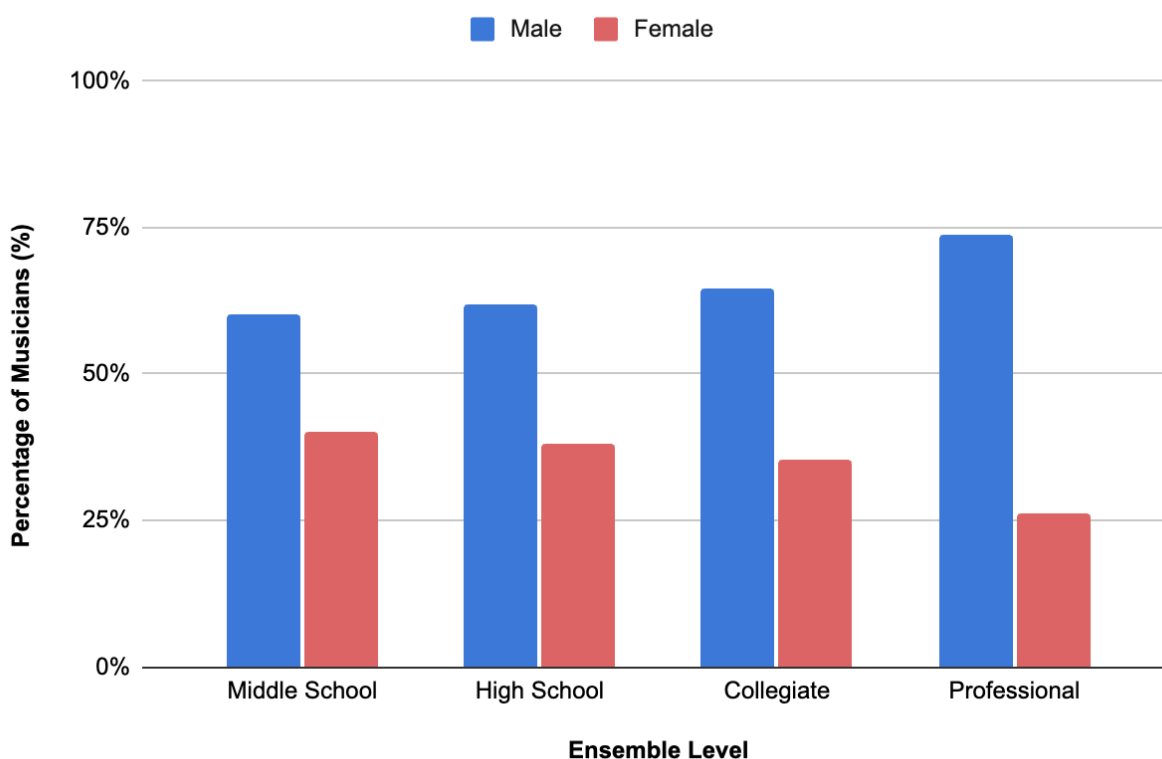
Of the 200 ensembles identified, 155 rosters were obtained for data collection, with each of the 50 U.S. states represented by a minimum of two. In Table 1, a detailed breakdown of the number of rosters collected from each ensemble level is provided. Although professional rosters were successfully acquired for all 50 states, some collegiate, high school, and middle school rosters were not accessible online or able to be obtained through direct contact. Representation was especially limited at the middle school level because a number of states did not have middle school All-State ensembles whatsoever. In total, 3,720 musicians were coded.

Table 1: Number of collected rosters by ensemble level

Ensemble Level	Number of Rosters Collected
Middle School	26
High School	41
Collegiate	38
Professional	50
Total	155

In order to examine overall gendered patterns in ensemble progression, the percentage of male and female musicians at each level (across all instruments) is graphed in Figure 1. As shown, the proportion of male musicians is consistently higher at each level, while the proportion of female musicians is consistently lower. Interestingly, the greatest difference in the percentage of females is between the collegiate and professional level. The proportion of females in professional ensembles is 9.1% lower than the proportion of females in collegiate ensembles. This is nearly twice the total difference observed between the middle school and collegiate level. A chi-square test of independence was performed to determine the association between gender and ensemble level. This association was found to be significant ($\chi^2 = 17.36$, $df = 3$, $p < 0.001$); however, a Cramér's V test indicates that the effect size is weak ($V = 0.119$). This indicates that relatively small differences in distribution affect a large number of musicians.

Figure 1: Gender distribution by ensemble level



Gender distributions by instrument section (across all ensemble levels) are graphed in Figure 2. As shown, the trombone, percussion, and trumpet reflect strong male dominance (>75% male); the clarinet and French horn moderate male dominance (~60% male); and the flute strong female dominance (>75% female). A chi-square test confirmed a strong association between gender and instrument ($\chi^2 = 398.2$, $df = 5$, $p < 0.0001$), and a Cramér's V test revealed a moderate to strong effect size ($V = 0.475$).

Figure 2: Gender distribution by instrument

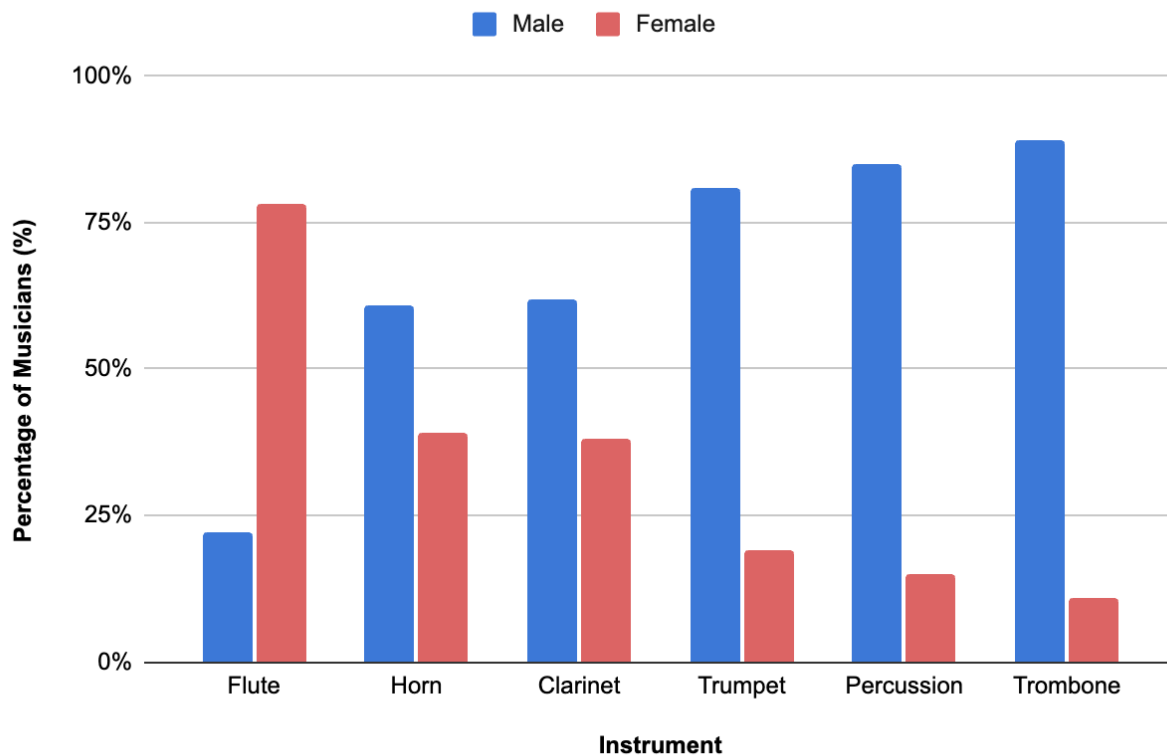
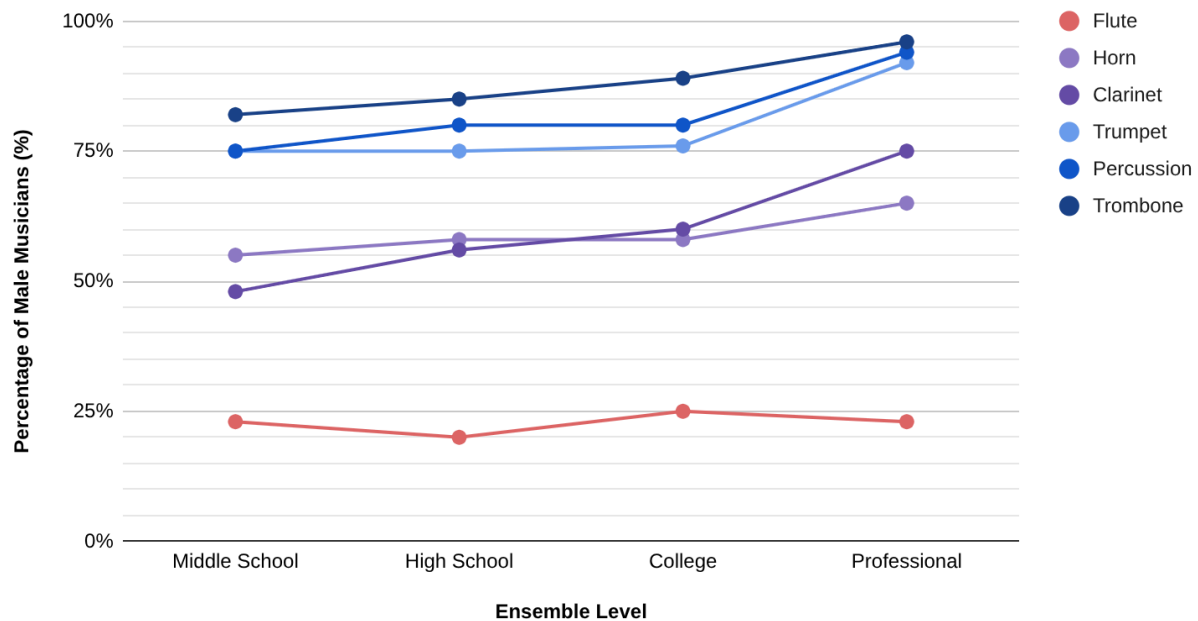


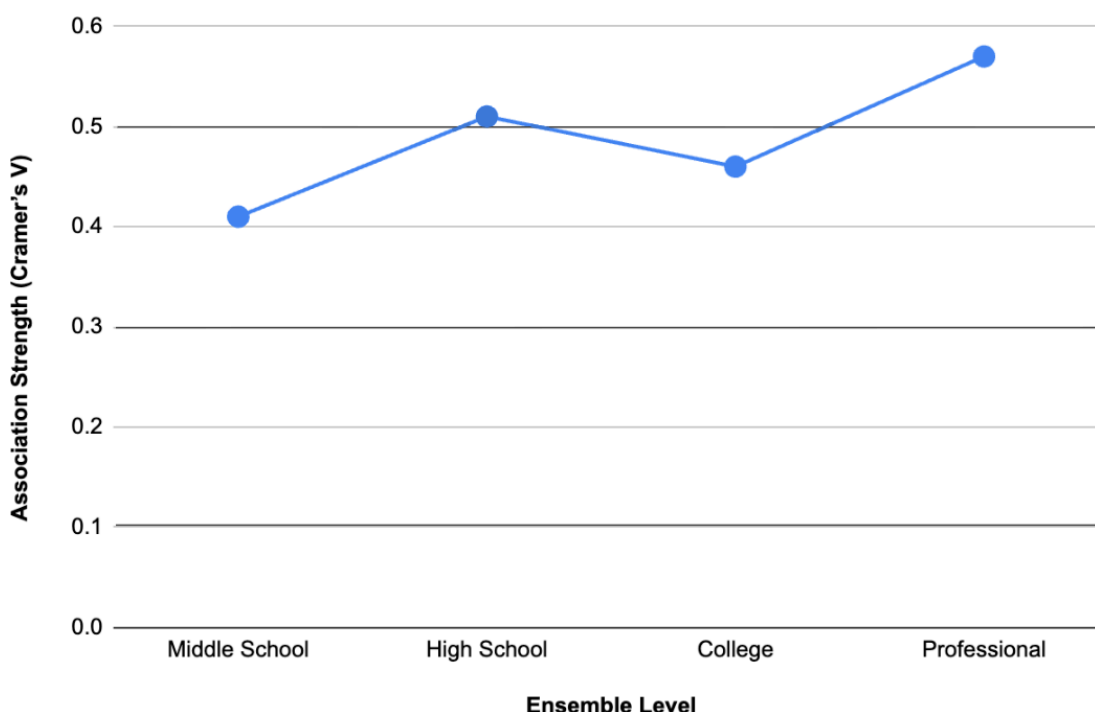
Figure 3 demonstrates how the percentage of males differs across ensemble levels in each of the six studied instruments; each instrument is represented by a data series. The proportion of males was graphed, as opposed to the proportion of females, to better illustrate alignment with overall gendered patterns and prevent redundancy. Each of the five instruments identified as male-dominated in Figure 2 (French horn, clarinet, trumpet, percussion, and trombone) generally increases in male concentration as ensemble level increases. Thus, these distributions show increasing alignment with overall patterns of gender dominance in higher-level ensembles. Further, each of these instruments, with the exception of the clarinet, remains male-dominated across all levels. Conversely, the only female-dominated instrument (the flute) fluctuates in its female concentration, failing to display increasing alignment with or divergence from gendered patterns. The flute did, however, remain female-dominated at each level. Interestingly, as shown in Figure 3, the gender distributions of several instruments (horn, flute, and percussion) display relative shifts towards gender balance at the collegiate level: the horn and percussion have local minima, and the flute has a local maximum.

Figure 3: Percentage of male musicians across ensemble levels by instrument



To analyze how the strength of the association between gender and instrument shifts across ensemble levels, Cramér's V tests were performed at each level. The resulting values were plotted in Figure 4. Overall, the strength of the association increases as ensemble level increases—though there is a dip at the collegiate level. The values consistently reflect a strong (0.3-0.5) or very strong (>0.5) association. For clarity, the threshold values 0.1, 0.3, and 0.5 (indicating weak, moderate, and strong associations respectively) are darkened in Figure 4.

Figure 4: Gender-instrument association strength by ensemble level



Overall, while these findings do demonstrate associations between gender, instrument, and ensemble level, they do not prove the existence of causal relationships behind shifts.

CONCLUSIONS

The findings of this study indicate that gender representation in musical instruments is associated with ensemble level. As ensemble level increases, male-dominated instruments appear to become more male dominated. Of course, the underlying causes of these patterns cannot be directly determined within this study. The significant association between gender and ensemble level indicates that the proportion of male and female musicians shifts meaningfully across ensemble levels, and the significant association between gender and instrument demonstrates that instrument choice remains strongly gendered across levels.

Across nearly all instruments, male representation increased as ensemble level increased. Because classical music has historically possessed male associations (Doubleday, 2008) and this study's dataset was male-dominated overall, this trend supports the hypothesis that gender distributions become more aligned with gender norms in higher-levels of advancement. The largest shift in gender distribution occurred between the collegiate and professional levels. Here, the proportion of females decreased by around 9%. Interestingly, this shift coincides with the transition from music as an educational pursuit to music as a career, suggesting a potential barrier for females in entering the classical music industry. This

barrier could be explained by existing stereotypes because classical music is often seen as unsuitable for females due to its stressful and technical nature (Casula, 2019). Further, in prior research, female music majors have reported feeling discouraged from classical music as a profession due to fear of harassment as well as lack of friendly relationships, women in leadership, and structural support such as maternity leave (Hudson, 2025). These stereotypes and fears could discourage females from pursuing a classical music career, potentially explaining the substantial decrease in female representation at the professional level that was found in this study.

The gender distributions of instruments in this study are largely consistent with prior research (Abeles, 2009). The flute was the only female-dominated instrument, while the trombone, trumpet, and percussion sections were strongly male-dominated. The clarinet and French horn were more balanced—though both were male-dominated. While these distributions largely align with existing research, important nuances emerge. Instruments such as the clarinet and French horn, which were previously identified as showing a female preference (Byo, 1991), showed a male dominance in this study. This is not necessarily a contradiction but may instead reflect the overall gender imbalance of the data set. Because only 33% of musicians were identified as female, instruments with higher female preferences may still appear as male-dominated in this study. Further, the French horn provides an exception to the pattern of brass instruments carrying stronger masculine associations than woodwinds (Cottrell, 2004) because it carries a higher proportion of female musicians than the clarinet. Still, other brass instruments remain consistently more male-dominated than woodwinds, aligning with this pattern. Compared to past research (Fortney et al., 1993), the distributions observed appear more balanced, supporting claims that gender stereotypes in instrument selection may become less rigid over time (Abeles, 2009). However, clear imbalances are still present.

When gender distribution patterns throughout progression are examined by instrument, notable patterns emerge. The five instruments identified as male-dominated (French horn, clarinet, trumpet, percussion, and trombone) became increasingly concentrated with males at each ensemble level, supporting the hypothesis that gender distributions become more aligned with stereotypes at higher levels. However, the only female-dominated instrument (the flute) fluctuated in its gender distribution. This does not directly support the hypothesis, but provides a nuance. Additionally, the increasing strength of gendered instrument associations supports the hypothesis by demonstrating increasing alignment with stereotypes in higher-level ensembles—though there is a dip at the collegiate level. Overall, the gender distributions of classical music ensembles increasingly reflect gender-instrument stereotypes, though not perfectly across all instruments and ensemble levels.

LIMITATIONS

There are several limitations to consider when considering these findings. First, because only one ensemble was selected per state, representation is limited—especially in states with multiple high-ability programs. While this approach did ensure geographic balance, it may reduce the consistency of musical ability.

Second, the study focuses exclusively on top ensembles, meaning the findings are limited to “top musicians” and may not be applicable to all levels of musical ability. Additionally, because collegiate and professional ensembles were selected based on their status as the “top ensemble” in each state, using criteria such as selectivity and acceptance rate rather than randomized selection, the selection process may have introduced differences in gender composition that are unrelated to the study’s hypothesis. For instance, more selective ensembles may have different gender distributions than less selective ensembles, meaning that the gender patterns observed in this study may not accurately reflect those of the broader population of collegiate and professional musicians.

Third, inferring gender based on names introduces a small margin of error and erases complex gender identities. This limits the accuracy of data collected from ensemble rosters. Further, differences in how gender was determined may have affected comparisons between professional and non-professional ensembles. While 38 professional rosters directly stated the gender of each member, the gender of musicians from all other rosters was inferred. Dominguez-Diaz et al. (2024) found that the AI-inferencing method used in this study exhibited a slight bias toward classifying females as males, although it was only 0.1% more likely to do so than to classify males as females. Therefore, the proportion of males at the middle school, high school, and collegiate levels may be slightly higher than in reality, potentially inflating the observed proportion of males at these levels relative to the professional level.

Fourth, because ensemble rosters were disproportionately available, musicians at the middle school level were underrepresented in the dataset. Still, middle school rosters were obtained from the majority of states. Additionally, because of the dataset’s large sample size (3,720 musicians) and geographic balance (every state was represented by at least two ensembles), the effect of this limitation is likely mitigated.

Fifth, ensemble levels were sampled using different selection criteria. The middle and high school levels were represented by each state's All-State ensemble, while the collegiate level was represented by the most selective ensemble in the state and the professional level by the "top" orchestra in the state. Thus, the groups of musicians are not perfectly comparable. Specifically, All-State ensembles typically meet for only a short period once per year, while collegiate and professional ensembles involve longer-term participation and commitment. Therefore, the musicians represented at each ensemble level may differ in ways related to their level of musical commitment. This may influence the observed gender distributions.

Finally, this study is a snapshot of gender distributions from the 2025 season, not a longitudinal analysis that tracks individual musicians. Therefore, shifts in gender representation reflect overall patterns, not changes within the same group of musicians over time.

FUTURE RESEARCH

Future research should further investigate the factors driving differences in gender representation. Specifically, research should study the increase in gender equality at the collegiate level and decline at the professional level. For instance, qualitative methods, such as interviews and surveys, could provide insight into musicians' experiences and identify specific causes of dropout. Quantitative studies could demonstrate how variables such as ensemble skill level influence gender distribution. Further, experimental research could test the impact of interventions, such as those studied by Byo (1991), on instrument choice and retention. Longitudinal studies tracking musicians across ensemble transitions could be valuable in identifying when and why the shifts identified in the research findings occur.

CLOSING STATEMENT

Overall, this study's findings demonstrate that gendered patterns in classical music are more pronounced in higher level ensembles, specifically within male-dominated instruments. Understanding these patterns is essential for developing more equitable opportunities for music participation and addressing barriers within the world of classical music.

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