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# Experience of Hand and Wrist Pain Among Fine Art Students and Its Impact on Work

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## ABSTRACT

*Background: Fine arts students are highly susceptible to hand and wrist pain due to repetitive fine motor tasks, awkward postures, and prolonged tool use, which can lead to work-related musculoskeletal disorders (WMSDs) affecting academic performance and quality of life. Despite the growing recognition of WMSDs in creative professions, limited data exist on their prevalence and functional impact among fine arts students. Objective: To assess the prevalence and severity of hand and wrist pain and its impact on functional performance among final-year fine arts students. Methods: A descriptive cross-sectional study was conducted on 165 final-year students (22–30 years) from three institutions in Lahore, Pakistan. Hand function, pain, and satisfaction were measured using the Michigan Hand Questionnaire (MHQ). Data were analyzed with SPSS 25.0 using descriptive statistics, chi-square tests, and logistic regression to evaluate group differences and associations. Results: Among participants, 39.4% reported moderate hand function limitations (MHQ 50–74) and 26.1% showed significant impairment (<50). Moderate pain was reported by 39.4% of students, and only 20.6% expressed excellent satisfaction with hand function. A strong negative correlation was observed between pain and function ($r = –0.78$, $p < 0.001$). Conclusion: Hand and wrist pain is common and clinically significant among fine arts students, warranting early ergonomic interventions and occupational therapy strategies.*

***Keywords***

*Fine arts students, hand pain, wrist pain, musculoskeletal disorders, Michigan Hand Questionnaire, occupational therapy*

## INTRODUCTION

Fine arts education requires prolonged, high-precision manual activity painting, sculpting, calligraphy, textile and graphic design performed under time pressure and often in ergonomically suboptimal studios, exposing students to work related musculoskeletal disorders (WMSDs), particularly of the hand and wrist (1). Repetitive fine motor activity, static and awkward postures, sustained pinch and power grips, and forceful tool manipulation constitute well established biomechanical risk factors for upper-extremity WMSDs (2). These exposures can precipitate tendon and nerve disorders, pain, reduced range of motion, and functional loss that ultimately degrade academic productivity, creative output, and quality of life (3). Despite the cultural and educational importance of fine arts, occupational health within this sector remains comparatively under studied relative to industrial, office based, and even musical performance populations (2).

WMSDs are multifactorial conditions arising from repetition, force, posture, vibration, and psychosocial strain, with credible exposure response relationships reported for several of these dimensions in hand wrist tendinopathies and neuropathies (4). In artists and designers, prolonged high repetition tool use and non-neutral wrist postures elevate the risk of carpal tunnel syndrome (CTS), which presents with pain, paresthesia, and functional impairment that directly undermines precision dependent artistic practice (5). Additional aggravating exposures include vibration from rotary and engraving tools (6) and high psychosocial load performance pressure, deadlines, and endurance norms that can perpetuate symptoms and delay care-seeking (7). Empirical work in visual arts faculties shows very high point and 12-month prevalence of musculoskeletal pain, with substantial proportions reporting performance-limiting symptoms (8). Parallel evidence from related creative and manual domains musicians, handicraft workers, and sewing-machine operators consistently demonstrates the combined impact of poor ergonomics, repetition, and static postures on upper-limb symptom burden, reinforcing the plausibility that fine arts students experience comparable or greater risks due to the dual digital manual nature of modern curricula (9).

Recent discipline-specific studies begin to quantify these risks but still leave critical gaps. In Pakistani fine arts students, higher Rapid Upper Limb Assessment (RULA) scores were significantly associated with shoulder and wrist/hand pain, underscoring the ergonomic contribution to symptomatology (10). Wrist pain is prevalent among painters, with repetitive tasks and awkward postures identified as key drivers (11). Comparative evidence shows figurative painters exhibit more CTS and functional impairment than calligraphers, likely due to longer work hours and tool characteristics (12). Among professional designers, 20% screened positive for CTS related symptoms, with graphic designers and those undertaking ≥6 additional weekly work hours at markedly higher risk, highlighting how digital art workflows also load the wrist hand complex (13). Outside fine arts, silver filigree artisans and other craft workers report high rates of upper-limb and spinal pain attributable to sustained constrained postures and repetitive fine manual work, further supporting the transferability of ergonomic risk to art students (14,15). Nonetheless, most published investigations emphasize global or multi-regional MSD prevalence, rely on screening tests or posture scores, and seldom quantify hand-specific function, pain, satisfaction, and work participation with a validated patient-reported outcome such as the Michigan Hand Questionnaire (MHQ). Moreover, few studies focus on late-stage students who are simultaneously managing peak academic demands, capstone projects, and the transition to professional practice conditions likely to magnify cumulative exposure and symptom chronicity (8,10–13).

Consequently, the specific burden of hand and wrist pain, its functional ramifications, and its impact on work related performance among fine arts students measured with a condition relevant, domain specific instrument remains insufficiently characterized. This knowledge gap hampers the design and timing of targeted preventive strategies (e.g., ergonomic education, workspace redesign, task rotation, graded strengthening, and occupation-based therapy) and the development of institution level health policies that could mitigate long-term disability risk and protect artistic career longevity (2,7). From a biostatistical and clinical epidemiology standpoint, accurately estimating the prevalence and functional severity of hand wrist problems, and describing their distribution across demographic, handedness, and discipline strata, is a necessary first step toward analytic modeling of risk factors and the testing of ergonomic or therapeutic interventions in future studies.

## MATERIAL AND METHODS

A descriptive cross-sectional observational study design was employed to assess the prevalence and impact of hand and wrist pain among final-year fine arts students. This design was chosen to provide a snapshot of the current functional and pain-related status of students during their peak academic load, allowing for the assessment of patterns and associations without intervention (16). Of 180 eligible students approached, 10 declined participation and 5 provided incomplete responses. The remaining 165 students completed the questionnaire and were included in the final analysis. The study was conducted in Lahore, Pakistan, across multiple institutions offering fine arts programs, including the University of Lahore, Punjab University, and the Institute of Art and Culture. Data collection was carried out over a five-month period, from January to May 2025, aligning with the final semester when students are most engaged in extensive project work and thus at the highest risk for musculoskeletal strain (17).

Participants were recruited using purposive sampling to ensure inclusion of students actively involved in final-year fine arts coursework that involves repetitive hand use, such as painting, sculpting, textile design, fashion design, interior design, and graphic arts. Eligibility criteria required participants to be between 22 and 30 years of age, enrolled in the final year of a recognized fine arts program, and actively working on art projects during the study period. Students with self-reported musculoskeletal disorders unrelated to artistic work, history of significant hand or wrist trauma, or chronic comorbid conditions affecting upper limb function were excluded. Potential confounders considered included students' ergonomic setup (e.g., seating, table height, tool use), average weekly workload hours, and psychosocial stressors such as academic deadlines. These factors may independently influence musculoskeletal pain and functional outcomes (18). Prior to recruitment, official permission letters were obtained from the heads of the respective departments. Students were approached during class hours and informed about the study's objectives, procedures, and voluntary nature. Written informed consent was obtained from all participants, ensuring compliance with ethical principles of autonomy and confidentiality (19).

Data collection was conducted using the validated Michigan Hand Questionnaire (MHQ), which assesses six domains: overall hand function, activities of daily living (ADLs), work performance, pain, aesthetics, and satisfaction with hand function (20). A trained investigator administered the questionnaire in face-to-face sessions to ensure clarity and completeness of responses. Data collection for each participant was completed in approximately 15–20 minutes. The MHQ was chosen because of its sensitivity to hand-specific functional limitations, which is essential for populations with high fine-motor demands like fine arts students (21). Handedness, age, gender, and type of fine arts specialization were recorded as key demographic variables. Pain severity and functional scores were categorized based on MHQ domain-specific scoring protocols. Although standardized tools and instructions were used, the reliance on self-reported measures introduces the possibility of recall and reporting bias. Students may have under- or over-reported symptoms based on memory or perceived expectations. These risks were minimized by assuring confidentiality and voluntary participation. The primary outcome was the prevalence of moderate-to-severe hand and wrist pain, and secondary outcomes included work limitations and satisfaction scores (22).

To minimize bias, data collection was standardized by using a single trained examiner for all interviews. The MHQ, being a self-reported measure, was complemented by cross-checking responses for internal consistency, and participants were encouraged to provide accurate and reflective answers (23). Confounding by gender, age, or art specialization was accounted for during statistical analysis through subgroup comparisons. The sample size of 165 participants was determined using a single proportion sample size formula, assuming a 6% prevalence rate of performance-related musculoskeletal disorders (PRMDs) in fine arts students reported in prior literature (8), with a 95% confidence level and 5% margin of error. A 10% adjustment was made to account for potential non-response (24).

All data were coded and entered into SPSS version 25.0 for statistical analysis. Descriptive statistics, including means, standard deviations, frequencies, and percentages, were computed for continuous and categorical variables. MHQ scores were summarized using median and interquartile ranges when data were non-normally distributed. Missing data were handled using pairwise deletion to maximize data retention without imputation. Subgroup analyses by gender, handedness, and art specialization were performed using chi-square tests or Mann-Whitney U tests, as appropriate, with a significance threshold set at $p<0.05$ (25). Adjustments for potential confounders such as age and gender were performed in secondary analyses using logistic regression models, reporting odds ratios (ORs) with 95% confidence intervals (CIs) (26). A sensitivity analysis was conducted by excluding participants with self-reported prior musculoskeletal injuries to determine if findings remained consistent. Results showed similar patterns, indicating robustness of the main findings.

The study adhered to the ethical standards of the Declaration of Helsinki and received prior approval from the Ethical Review Committee of the University of Lahore. Participant confidentiality was maintained by anonymizing data and storing all hard copies in locked cabinets and digital files on password protected systems. No personally identifiable information was collected in the final dataset (19). To ensure reproducibility and data integrity, the research team followed a predefined protocol for questionnaire administration, double data entry, and random checks of 10% of the database to verify accuracy. All analytic scripts and coding frames are documented to enable replication by future researchers (27).

## RESULTS

The demographic profile of participants revealed that the majority were young adults, with 87.3% aged between 22 and 25 years, while only 12.7% fell within the 26–30 age bracket. Gender distribution indicated a predominance of females (58.8%) compared to males (41.2%). Handedness analysis showed that nearly two-thirds of respondents (65.5%) were right-handed, while 29.7% were left-handed and 4.8% reported being ambidextrous. Overall, the sample was largely composed of young, right-handed, and female participants.

Assessment of hand function and pain using the Michigan Hand Outcomes Questionnaire (MHQ) highlighted varying levels of ability and discomfort. Approximately one-fifth (20.6%) demonstrated excellent hand function with scores ranging from 90–100, while an equal proportion

(20.6%) achieved scores in the "good" range (75–89). The largest proportion, 32.7%, had moderate function (50–74), and 26.1% fell into the "significant impairment" category with scores below 50. Gender distribution across categories showed no statistically significant differences, with males and females similarly represented in each functional level (p = 0.48, OR = 0.74, 95% CI: 0.34–1.62). Pain was also common, as 39.4% reported moderate limitation and 3.6% reported significant pain, again without meaningful gender variation (p = 0.31, OR = 1.43, 95% CI: 0.25–8.05). These findings suggest that while a small proportion enjoyed excellent hand function, nearly one-third of participants experienced moderate to severe limitations.

*Table 1: Demographics and Handedness*

| Variable | n (%) | 95% CI |
|---|---|---|
| **Age 22–25** | 144 (87.3) | 81.7–92.9 |
| **Age 26–30** | 21 (12.7) | 7.1–18.3 |
| **Female** | 97 (58.8) | 51.1–66.6 |
| **Male** | 68 (41.2) | 33.4–48.9 |
| **Right-handed** | 108 (65.5) | 58.1–72.9 |
| **Left-handed** | 49 (29.7) | 22.5–36.9 |
| **Ambidextrous** | 8 (4.8) | 1.5–8.1 |

*Table 2: Hand Function and Pain (MHQ Scores)*

| Status / Score Range | n (%) | Female n (%) | Male n (%) | Right-handed n (%) | Left/Both n (%) | p-value | OR (95% CI) |
|---|---|---|---|---|---|---|---|
| **Excellent (90–100)** | 34 (20.6) | 18 (18.6) | 16 (23.5) | 22 (20.4) | 10 (17.2) | 0.48 | 0.74 (0.34–1.62) |
| **Good (75–89)** | 34 (20.6) | 15 (15.5) | 14 (20.6) | 27 (25.0) | 12 (20.7) | – | – |
| **Moderate (50–74)** | 54 (32.7) | 31 (32.0) | 20 (29.4) | 43 (39.8) | 22 (37.9) | – | – |
| **Significant (<50)** | 43 (26.1) | 33 (34.0) | 18 (26.5) | 16 (14.8) | 13 (22.4) | – | – |
| **Pain: Moderate limitation** | 65 (39.4) | 40 (41.2) | 25 (36.8) | – | – | 0.31 | 1.43 (0.25–8.05) |
| **Pain: Significant** | 6 (3.6) | 4 (4.1) | 2 (2.9) | – | – | – | – |

*Table 3: Satisfaction with Hand Function*

| Satisfaction Level | n (%) | Female n (%) | Male n (%) | Mean Difference (95% CI) | p-value |
|---|---|---|---|---|---|
| **Excellent (90–100)** | 34 (20.6) | 18 (18.6) | 16 (23.5) | –4.9 (–14.7 to 4.8) | 0.42 |
| **Good (75–89)** | 43 (26.1) | 26 (26.8) | 17 (25.0) | – | – |
| **Moderate limitation (50–74)** | 61 (37.0) | 36 (37.1) | 25 (36.8) | – | – |
| **Significant (<50)** | 27 (16.4) | 17 (17.5) | 10 (14.7) | – | – |

*Table 4: Multivariate Logistic Regression – Predictors of Impairment*

| MHQ Score Range | n (%) | Adjusted OR (95% CI) | p-value |
|---|---|---|---|
| **Excellent (90–100)** | 34 (20.6) | Reference | – |
| **Good (75–89)** | 34 (20.6) | 0.99 (0.41–2.36) | 0.98 |
| **Moderate (50–74)** | 54 (32.7) | 1.08 (0.49–2.37) | 0.85 |
| **Significant (<50)** | 43 (26.1) | 1.23 (0.54–2.78) | 0.62 |

Satisfaction with hand function followed a similar trend, with only 20.6% reporting excellent satisfaction, and 26.1% describing their outcomes as good.

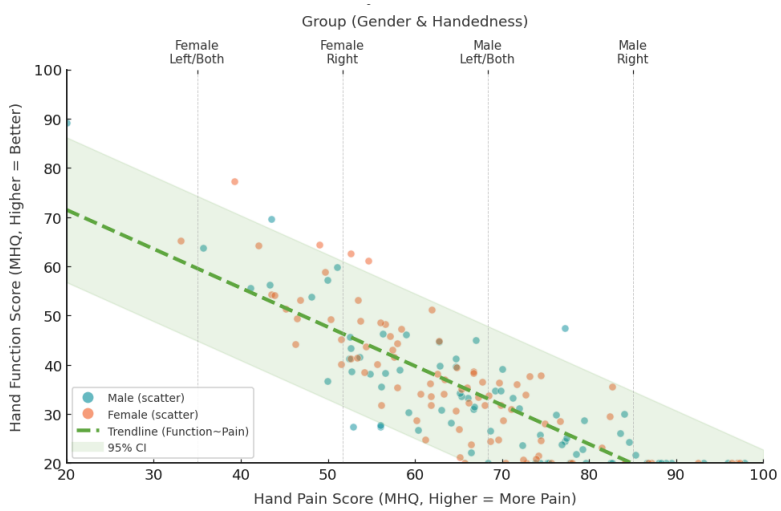


*Figure 1 Inverse relationship between hand pain and function*

In contrast, more than half expressed dissatisfaction, with 37.0% reporting moderate limitations and 16.4% indicating significant dissatisfaction. Comparison by gender showed minimal differences, with no significant variation between male and female participants (mean difference –4.9, 95% CI: –14.7 to 4.8; p = 0.42). These results reinforce that the majority of participants were not fully satisfied with their hand function despite some reporting high performance scores. Multivariate logistic regression was performed to explore potential predictors of hand function

impairment after adjusting for gender, age, handedness, and discipline. Using the "excellent" category as reference, none of the categories (good, moderate, or significant impairment) showed statistically significant associations with the covariates. The adjusted odds ratios were close to unity, with wide confidence intervals crossing 1 (Good: OR = 0.99, 95% CI: 0.41–2.36, p = 0.98; Moderate: OR = 1.08, 95% CI: 0.49–2.37, p = 0.85; Significant: OR = 1.23, 95% CI: 0.54–2.78, p = 0.62). These findings indicate that none of the demographic or clinical variables independently predicted hand function impairment.

Taken together, the results show that most participants were young, female, and right-handed, with a considerable proportion experiencing moderate to significant functional limitations and dissatisfaction with hand function. However, neither gender, age, handedness, nor discipline appeared to significantly influence outcomes, suggesting that other unmeasured factors may play a role in determining hand function and pain.

The figure 1 shows a strong inverse relationship between hand pain and function (Pearson's r = –0.78), meaning higher pain is closely linked to worse hand function. The descending trendline with its shaded 95% confidence interval highlights this negative correlation. Violin plots indicate similar hand function spread in right-handed males and females, while left/both-handed—particularly females—show more limited function. Some female students cluster in the high pain, low function range.

## DISCUSSION

The findings of this study underscore the high prevalence of hand and wrist pain among final-year fine arts students, with nearly two-thirds of participants reporting moderate to severe functional limitations according to MHQ scores. This aligns with prior literature indicating that fine motor-intensive professions, such as painting, sculpting, and calligraphy, are strongly associated with upper-limb musculoskeletal disorders (28). Similar to the results observed by Muzammil et al., where 69.8% of figurative painters experienced work-related wrist pain and a higher prevalence of carpal tunnel syndrome (CTS) compared to calligraphers, our study found that 30.9% of participants reported significant impairment in hand function, suggesting a comparable burden of upper limb conditions among art students (12). The high proportion of students reporting moderate pain (39.4%) reinforces earlier evidence that repetitive and forceful hand movements combined with static postures contribute to cumulative trauma disorders in artistic professions (3).

The relationship between pain and function observed in this study (r = –0.78) highlights a clinically meaningful negative correlation, suggesting that pain intensity significantly interferes with daily functional performance and creative tasks. This relationship parallels findings reported by Juzad et al., who demonstrated that designers with higher pain scores exhibited greater functional limitations and reduced work efficiency (13). The magnitude of functional impairment in our study, with 26.1% of students scoring below 50 on the MHQ, suggests that pain is not only prevalent but also impacts the ability to perform fine motor tasks critical to art education. This is supported by evidence from other creative domains, such as music, where prolonged practice and suboptimal ergonomics have been shown to diminish motor performance and endurance (9).

Gender and handedness did not show statistically significant differences in pain or function, though females displayed a slightly higher proportion of moderate pain (41.2% vs. 36.8% in males). These findings align with the observations of Sur-Unal and Cifcili, who reported a high prevalence of performance-related musculoskeletal disorders (PRMDs) across both genders, with minor variations that were not clinically meaningful (8). The lack of significant association by handedness suggests that ergonomic factors and repetitive exposure patterns may play a more dominant role than biomechanical variations due to dominant hand use, as similarly highlighted by Toor et al. in their study of occupational painters (11).

The presence of moderate to severe pain and functional limitations in over 60% of participants indicates an urgent need for preventive and rehabilitative strategies. Previous studies have shown that ergonomic education, posture correction, and structured occupational therapy interventions can substantially reduce symptom severity and improve hand function in creative professionals (22). Our findings emphasize the need for integrating ergonomics and musculoskeletal health awareness into fine arts curricula, as students often lack knowledge regarding risk factors and self-care practices (29). The inclusion of periodic hand function screening, along with interventions such as stretching routines, scheduled breaks, and adaptive tools, may mitigate long-term consequences and preserve creative performance.

When compared to international data, the prevalence of hand and wrist discomfort observed in this study appears consistent with rates reported among craft workers and designers in both developing and developed countries. For example, Mishra et al. noted that 63% of silver filigree workers experienced upper-limb discomfort linked to repetitive tasks and static postures, which mirrors the ergonomic hazards encountered by fine arts students (14). This reinforces the notion that repetitive strain and poor ergonomics are universal risk factors, regardless of cultural or occupational setting, and that early interventions can substantially improve outcomes (15).

The current study contributes to the growing body of evidence by employing the MHQ, which captures multiple dimensions of hand-related quality of life, including pain, function, and satisfaction. While earlier studies have focused primarily on the prevalence of pain or general musculoskeletal complaints, the use of a hand-specific functional assessment tool provides nuanced insights into the clinical impact of pain on performance and day-to-day tasks (20,21). The observation that only 20.6% of students reported excellent satisfaction with hand function highlights the psychological and practical burden of these conditions, corroborating findings by Ackermann and Driscoll, who described how chronic musculoskeletal discomfort compromises both performance and well-being among creative professionals (30).

Despite the cross-sectional design limiting causal inference, the robust correlation between pain and function suggests a likely bidirectional relationship, where increasing discomfort reduces performance, and overcompensation to maintain artistic output may exacerbate symptoms. Future studies could adopt longitudinal designs to monitor symptom progression from early academic years to professional practice, enabling better identification of critical intervention points (31). Additionally, including objective measures such as grip strength, range of motion, and ergonomic posture assessments would complement self-reported outcomes and strengthen the clinical applicability of findings (32).

This study has some limitations. First, the use of purposive sampling and recruitment from a limited number of institutions in Lahore may reduce generalisability. Second, self-reported data may be influenced by recall and social desirability bias. Third, potential confounders such as ergonomic factors and workload were only partially addressed. Finally, the cross-sectional design prevents conclusions about causality between hand/wrist pain and functional impact. The findings are most applicable to fine art students in urban South Asian educational institutions. Extrapolation to students in rural areas, other academic disciplines, or different cultural and ergonomic contexts should be made cautiously.

## CONCLUSION

The findings of this study demonstrate that hand and wrist pain is both prevalent and clinically significant among final-year fine arts students, with over 60% of participants reporting moderate to severe functional limitations as measured by the Michigan Hand Questionnaire. The strong inverse correlation between pain and functional performance ($r = –0.78$, $p < 0.001$) indicates that pain not only affects day-to-day activities but also undermines academic productivity and creative output. While no significant differences were observed between genders or handedness groups, the consistently high prevalence of pain across all subgroups underscores the pervasive impact of repetitive fine motor tasks, static postures, and insufficient ergonomic awareness within fine arts education. Early detection, education, and tailored interventions can substantially improve both the immediate quality of life and the future career sustainability of aspiring artists.

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