

The prevalence of complaints of arm, neck and/or shoulder in amateur musicians

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Name student: Taco Jan Douglas
Student number: 3373967
Date: 2nd of July 2014
Internship supervisors: Drs. L.M. Kok, Prof. Dr. R.G.H.H. Nelissen
Internship institute: Leiden University Medical Center
Lecturer/supervisor Utrecht University: Dr. J. Van der Net

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Taco Jan Douglas,

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Examiner

Dr. M.F. Pisters

Assessors:

Drs. L.M. Kok

Dr. M.F. Pisters

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SAMENVATTING

Doelstelling: Klachten aan arm, nek en schouder (KANS) zijn veel voorkomend onder musici. Bekende risicofactoren in professionele musici zijn houding, armpositie en speeltijd. Onderzoek onder amateurmusici is beperkt. Twee vragen staan centraal: (1) wat is het verschil in het voorkomen van KANS in amateurmusici die dan wel met geheven dan wel met neutrale arm positie spelen? (2) Wat is de associatie tussen speelduur per week en KANS in amateurmusici?

Methode: Cross-sectioneel onderzoek onder medisch studenten die amateurmusicus zijn (18-30 jaar). Achtergrondgegevens, instrument en musculoskeletale klachten werden geëvalueerd. Alle respondenten werden ingedeeld naar het spelen met arm in neutrale dan wel geheven positie ($\geq 40^\circ$ abductie en/of flexie, een- of tweezijdig). De twee groepen werden vergeleken middels een T-test, Chi Square test en Mann Whitney U Test. Multiple Logistische regressie werd gebruikt om de associatie tussen speeltijd en KANS te bestuderen.

Resultaten Voor analyse waren 162 amateurmusici beschikbaar, waarvan 46.9% met geheven armpositie speelde. De puntprevalentie van KANS was 24.4% bij neutrale armpositie en 15.8% bij geheven armpositie (Odds ratio (OR) 0.41, $p=0.06$). De 12 maanden prevalentie was 45.3% en 48.7% in de groep met neutrale dan wel geheven arm positie (OR 1.14, $p=0.67$). KANS was niet significant gerelateerd aan de armpositie, behoudens klachten van de linker schouder bij geheven linker arm; OR 6.69 ($p<0.05$) vergeleken met spelen met neutrale linker arm. Het aantal speeluren was niet van invloed op de aanwezigheid van klachten (OR 1, $p=0.36$).

Conclusie In amateurmusici is de totale prevalentie van KANS niet gerelateerd aan armpositie, behalve klachten van de linker schouder welke significant vaker voorkomen bij geheven linker arm positie. Het aantal speeluren was niet gerelateerd aan KANS.

Klinische relevantie De prevalentie van KANS onder amateurmusici is verhoogd vergeleken met de algemene bevolking. Met name instrumentalisten welke spelen met geheven linker arm positie zijn at risk.

ABSTRACT

Aim: Complaints of arm, neck and/or shoulder (CANS) are common in musicians. Identified risk factors in professional musicians include posture, arm position and playing time. Studies in amateur musicians are limited. Two questions are addressed: (1) what is the difference in prevalence of CANS in amateur musicians playing in either elevated or neutral arm position? (2) What is the association between duration of playing time per week and CANS?

Methods: Cross-sectional survey in amateur musicians. Evaluated were background, instrument and musculoskeletal complaints. Respondents were categorized by arm position; neutral versus elevated ($\geq 40^\circ$ abduction and/or flexion (one- or two-sided)). The groups were compared using T-test, Chi Square test and Mann Whitney U Test. Multiple logistic regression analysis modeled playing time as predictor of CANS.

Results: Available for analyses were 162 amateur musicians, of which 46.9% played with elevated arm position. The point-prevalence of CANS was 24.4% in neutral arm position and 15.8% in elevated position (Odds ratio (OR) 0.41 ($p=0.06$)). The 12-months prevalence was 45.3% in those playing in a neutral arm position and 48.7% in elevated arm position (OR 1.14, $p=0.67$). CANS was not statistically significant related to arm position. Except complaints in the left shoulder with elevated left arm; OR 6.69 ($p<0.05$) compared to neutral left arm position. The number of hours per week playing was found not to contribute to CANS in a statistically significant way (OR 1, $p=0.36$).

Conclusion: The total prevalence of CANS is not related to arm position in amateur musicians, except complaints of the left shoulder that are found significantly more often when the left arm is elevated. Playing time was not related to CANS.

Clinical Relevance: The prevalence of CANS in amateur musicians is higher than the prevalence in the general population. Especially instrumentalists playing with elevated left arm are at risk.

Keywords: *Epidemiology; Music; Upper extremity; Playing related*

INTRODUCTION

Approximately twenty percent of the Dutch population plays a musical instrument.¹ In these musicians, either amateur or professional, musculoskeletal complaints as a consequence of playing an instrument are common.² One of the first reports on playing related musculoskeletal complaints in instrumental musicians dates from 1887.³ The reported range of the prevalence of musculoskeletal complaints in (student-) musicians and music teachers as well as in the open population is broad. This is a consequence of methodological choices and the definition of musculoskeletal complaints applied in the various studies. In professional instrumental musicians the gross prevalence of musculoskeletal complaints is reported to be as high as 89 percent when also mild aches and pains are included.^{2,4-9} It is found that the prevalence in amateur musicians is 74% and in the open population 36.8%.^{10,11} It is suggested that the higher prevalence in instrumental musicians reflects the high physical demands of performing.¹²

In instrumental musicians musculoskeletal complaints of arm, neck and/or shoulder (CANS) are more prevalent than musculoskeletal complaints of the lower extremities.¹³ CANS, formerly referred to as e.g. non-specific occupational overuse syndrome or repetitive strain injury, is defined as musculoskeletal complaints not caused by acute trauma or by any systemic disease.^{11,14} The tissue involved includes bones, joints and bursae, the musculotendinous unit, the muscles, the nerves and other supporting structures of the body. However, not always a specific pathogenic substrate can be found.¹⁴⁻¹⁹

The cause of musculoskeletal complaints is multifactorial and is the easiest classified into intrinsic and extrinsic factors. Intrinsic factors include among others gender, anthropometric features and health status. Earlier research identified female gender and high age as risk factors for the development of playing related musculoskeletal complaints.^{5,20} Concerning extrinsic factors, biomechanical factors are suggested to be of special importance.¹³ The type of instrument played implies particular biomechanical load factors. The weight of the instrument but also posture and arm position is associated with the occurrence of complaints.²¹⁻²³

There are several reasons to explore musculoskeletal complaints in amateur musicians in more detail. The number of amateur instrumentalists is large compared to the number of professional musicians (in the Netherlands +/- 3.2 million and 25 thousand respectively).²⁴ In many amateurs, making music is not for personal enjoyment only. Music is important in life, resulting in music related activities outside the home. Moreover, music has been found to positively influence the perceived quality of life in amateur musicians.²⁵ This is in contrast with professional musicians who play to entertain others and they must do so to make a living whether they are enjoying it or not.²⁶

Arm position and posture are a consequence of the instrument played by the musician. Some instruments are associated with a higher risk of musculoskeletal injury than others.^{9,27,28} It is found that the risk for abnormal posture is increased when playing an (asymmetric) instrument^{29,30} and that the blood flow to the supraspinatus muscle is impaired when elevating the arm $\geq 30^\circ$.³¹⁻³⁶ In professional musicians playing an instrument using elevated arm position a higher number of musculoskeletal complaints was found compared to those playing in neutral arm position.²² We hypothesize that also in amateur musicians, arm position is a risk factor for the development of CANS.

Earlier research suggests that the average dedicated, active amateur instrumentalist may differ from the professional musician only in the absence of music related income, but not in the medical problems.²⁵ However, it was found that especially young male amateur musicians, without adequate playing technique but with recurrent intense playing time, are the most at risk for the development of overuse symptoms.²⁶ We hypothesize that the prevalence of CANS in amateur musicians however, is lower than the prevalence of CANS in professional musicians. Although the professional musicians possess better technical skills, they have on average a much longer practice time and experience additional occupational stressors.¹²

To date, the number of years playing and exercise behavior (practice schedule) are identified as predictors of the development of playing related symptoms in musicians.^{17,37-39} A strong linear relationship between the hours spent playing an instrument (practice time) and the frequency of musculoskeletal complaints has been found.⁴⁰⁻⁴² Although the findings in literature are not consistent,^{43,44} we hypothesize that longer practice time result in persistent biomechanical forces on the body, resulting in CANS, also in amateur musicians.

Early diagnose and proper management of CANS is important in all musicians.¹⁸ Acknowledgment of risk factors of CANS in amateur musicians by health care professionals may encourage preventive activities in and work beneficial for, amateur musicians treated for musculoskeletal complaints.

In this study we aim to address the prevalence of CANS in amateur musicians and its association with arm position, related to the duration of playing time.

Therefore in this study the research questions are formulated as follows:

- (1) What is the difference in (point- and period) prevalence of complaints of arm, neck and/or shoulder (CANS) in instrumental amateur musicians playing in either elevated or neutral arm position?
- (2) What is the association between duration of playing time per week and complaints of arm, neck and/or shoulder (CANS) among amateur-musicians?

METHODS

DESIGN AND PARTICIPANTS

This cross-sectional survey study investigated the point- and period prevalence of CANS in amateur musicians playing in neutral or elevated arm position. Also the association between CANS and duration of playing time per week among amateur-musicians was studied.

The study was performed at the medical faculty of the Leiden University, The Netherlands. This study is part of a larger study. The Medical Ethical Committee of the Leiden University Medical Center approved the protocol of this larger study.

Participants were recruited from attendance lists from courses ranging from years 1 through 6 at the aforementioned medical faculty between February and May 2011. Eligible for this study were those who were (1) able to read and understand the Dutch language and (2) were instrumental musician. All eligible students were invited by email and received an online questionnaire. Those subjects who were under 18 and above 30 years of age and/or were a student at a music academy were excluded.

The participants were categorized into exposure groups according to arm position. The type of instrument played, result in a certain playing posture using either none, one or both arms elevated. Since three-dimensional joint motion data are available for a limited number of instruments only (piano, trumpet and violin), a two-dimensional concept of joint movement was applied.⁴⁵ The most straightforward way to describe the (upper) arm position in relation to the shoulder is when the movement is described in the sagittal and frontal plane. Elevation of the arm is a combination of flexion in the sagittal plane and abduction in the frontal plane. The arm position was defined as elevated when: $\geq 40^\circ$ abduction and/or $\geq 40^\circ$ flexion while playing. Neutral arm position: $<40^\circ$ while playing.^{22,31} Two researchers (TD and LK) defined the arm position in amateur musicians when playing an instrument. Discrepancies were solved by personal discussion.

SURVEY

The online questionnaire included questions on socio-demographic variables, general health, playing time and musculoskeletal complaints. The baseline questionnaire evaluated socio-demographic variables (age, gender, anthropometric data and principal handedness), general health variables (medical history, medication, intoxications, sports). Also playing time (years of active practicing and playing time in hours per week) and type of instrument the participant plays. The response alternatives, based on the instrument most frequently played, were 'violin', 'viola', 'cello', 'bass', 'piano/keyboard', 'flute/piccolo', 'oboe/alt oboe', 'clarinet', 'saxophone', 'bassoon', 'horn', 'trumpet', 'trombone', 'tuba', 'percussion', 'harp', 'guitar/mandolin', 'recorder' and 'other'.

To evaluate musculoskeletal complaints the questionnaire constructed by Kok et al. was used (copies available from the author upon request).² This comprehensive questionnaire evaluates musculoskeletal complaints in six body regions ('elbows, wrists and hands', 'neck shoulders and upper back', 'lower back', 'hips and knees', 'ankles and feet' and 'jaw and

mouth'). In the present study, in which CANS was the main topic; the questions concerning the elbows, wrists, hands, neck and shoulders were included. The region 'elbows, wrists and hands' was subdivided in six localizations (elbow, wrist and hand left and right). And the region 'neck shoulders' was subdivided in three localizations (shoulder left and right, neck). CANS was considered to be present when a complaint in one of these localizations had been reported.

ASSESSMENT OF OUTCOME

Primary outcome is defined as the point- and period prevalence (12 months) of CANS in amateur-musicians playing in neutral or elevated arm position.

The point prevalence is based on the presence of CANS (at least one complaint) in the respondents at the time the online questionnaire is filled in. To calculate the point-prevalence the number of students with CANS at the time the questionnaire is filled in, is divided by the total number of students participating in that study-group, times 100. The result is expressed as a percentage. The period prevalence is based on the report of CANS in the 12 months prior to filling in the questionnaire. The 12-months prevalence is calculated by the total number of students with at least one complaint during the last 12 months, divided by the total number of students participating in that specific study-group, times 100. The result is expressed as a percentage. The difference between the prevalence in the two groups is expressed as an odds ratio (OR).

Secondary outcome is defined as the relationship between prevalence of CANS and the average number of hours per week devoted to playing the main instrument. The result is expressed as an OR.

DATA ANALYSIS

All statistical analyses were performed with SPSS Statistics for Macintosh, Version 20.0. Armonk, New York: IBM Corp. Released 2011. The results were analyzed using statistical tests to compare amateur musicians playing in neutral arm position with amateur musicians playing in elevated arm position (T-test, Chi square test and Mann-Whitney U test). Within the group using elevated arm position localization of CANS were related to which arm was elevated using the Chi square test. Multiple logistic regression analysis was used to model playing time as predictor of the presence of CANS. A significance level for all tests was set to $p < 0.05$. The study is reported in accordance with the STROBE statement.⁴⁶

RESULTS

The online questionnaire was sent to 2870 medical students and was returned by 503, of who 162 fulfilled the inclusion criteria for this study. Available for analysis were the results of all 162 amateur musicians. Of those 16 (9.9%) played a bowed string instrument, 39 (24.1%) a plucked string instrument, 26 (16%) a woodwind, 8 (4.9%) brass, 5 (3.1%) percussion and 68 (42%) keyboard. Consensus was found regarding the classification of the instruments played by the respondents, into two groups; those with neutral arm position and those with elevated arm position (Appendix A). Of all amateur musicians 46.9% (n=76) played an instrument using elevated arm position (23 both arms in elevated position, 1 elevated left arm, 42 elevated right arm only). Those playing with elevated arm position were comparable to those playing in neutral arm position with respect to age, gender, BMI, hand preference, practice time and sports (Table 1).

Table 1 Baseline characteristics of amateur musicians by arm position

	Neutral arm position (n=86)	Elevated arm position (n=76)	Difference (p)
Age (years) *	21.8 (2.7)	21.7(2.4)	.93 ^a
Gender (% female)	67 (77.9)	53 (69.7)	.24 ^b
Body Mass index (kg/m2) *	21.2 (2.0)	21.8(2.3)	.06 ^c
Right-handedness (%)	74 (86.0)	64 (84.2)	.74 ^b
Playing-time (hours per week) *	2.6 (3.0)	3.3 (3.2)	.06 ^a
Sports (hours per week)	2.8 (2.5)	3.3 (3.2)	.90 ^a

*Data expressed as mean and (SD)

^a Mann Whitney U Test, ^b Chi square test, ^c T-test

Thirty-three amateur musicians reported current CANS, indicating a point prevalence of CANS in amateur musicians of 20.4% (33/162 times 100). The point prevalence of CANS in amateur musicians playing in neutral position was found to be 24.4% (21/86 times 100) and 15.8% (12/76 times 100) in those playing in elevated position. The odds ratio for the point prevalence for CANS in amateur musicians playing in elevated arm position was 0.41 (95% CI 0.162-1.046, p=0.06).

In total seventy-six amateur musicians reported CANS during the past 12 months; indicating a 12-months prevalence of CANS in amateur musicians of 46.9%. Of those, 39 amateur musicians played in neutral arm position and reported in total 52 complaints during the past 12 months. The 12-months prevalence in those playing in a neutral arm position was found to be 45.3% (39/86 times 100). Thirty-seven amateur musicians playing in elevated arm position reported 50 complaints during the past 12 months. The 12-months prevalence of CANS when playing with elevated arm position was found to be 48.7% (37/76 times 100). The odds ratio (OR) for the 12 months prevalence for CANS in was 1.14 (95% CI 0.612-2.12 p=0.67). Indicating increased odds for amateur musicians playing in elevated arm position, however this was not statistically significant. The most prevalent site of complaints in amateur musicians was the neck, followed by shoulder and wrist. The distribution of CANS by body-region did not differ significantly between the two arm positions (Table 2). The distribution of CANS by body-region did not differ significantly between male and female.

Table 2 Musculoskeletal complaints during the last twelve months among amateur musicians specified by arm-position and localization

	Hand	Wrist	Elbow	Shoulder	Neck	CANS
Neutral arm position (n=86) (%)	7 (8.1)	9 (10.5)	1 (1.2)	12 (14)	23 (26.7)	39 (45.3)
Elevated arm position (n=76)(%)	8 (10.5)	7 (9.2)	1 (1.3)	15 (19.7)	19 (25)	37 (48.7)
Difference (p) [*]	.60	.79	.93	.32	.80	.67

Note: the total CANS is NOT the sum of the complaints in left and right; since CANS was defined to be present in a subject when a musculoskeletal complaint in one of the localizations had been reported.

^{*}Chi-square test.

The OR for complaints in the left shoulder when the left arm was elevated was 6.69 (CI 95% 2.154-20.783, p<0.05). All other sites of complaints were not found to be statistically significant related to arm position (Table 3). The arm position was exclusively left elevated in n=1 (cello); in all other cases of left arm elevation also the right arm was elevated.

Table 3 Arm position and site and number of musculoskeletal complaints among amateur musicians

		ARM POSITION (n=324)					
SITE OF COMPLAINTS		LEFT			RIGHT		
		Neutral	Elevated	OR (95% CI)	Neutral	Elevated	OR (95% CI)
		n=138 (%)	n=24 (%)		n=87(%)	n=75 (%)	
LEFT	Neck	38 (27.5)	4 (16.7)	.526 (0.169-1.640)	23 (26.4)	19 (25.3)	.944 (0.466-1.912)
	Hand	5 (3.6)	3 (12.5)	3.8 (0.845-17.091)	5 (5.7)	3 (4)	.683 (0.158-2.960)
	Wrist	5 (3.6)	0	-	5 (5.7)	0	-
	Elbow	1 (0.7)	1 (4.2)	5.957 (0.360-98.619)	1 (1.1)	1 (1.3)	1.162 (0.071-18.906)
RIGHT	Shoulder	8 (5.8)	7 (29.2)	6.691 (2.154-20.783) #	5 (5.7)	10 (13.3)	2.523 (0.822-7.747)
	Hand	7 (5.1)	2 (8.3)	1.701 (0.332-8.727)	4 (4.6)	5 (6.7)	1.48 (0.0383-5.733)
	Wrist	9 (6.5)	4 (16.7)	2.867 (0.806-10.192)	6 (6.9)	7 (9.3)	1.39 (0.446-4.333)
	Elbow	0	0	-	0	0	-
	Shoulder	13 (9.4)	3 (12.5)	1.374 (0.360-5.234)	10 (11.5)	6 (8)	.670 (0.231-1.938)

Note: Total number of included arms n=324 (respondents n=162)

* Chi-square test.

Significant P<0.05

Multiple logistic regression analysis was used to model playing time as predictor of the presence of CANS. The number of hours per week devoted to playing an instrument was found not to contribute to the presence of CANS in a statistically significant way (OR 1 CI 95% 0.947-1.165, p=0.36) (Table 4).

Table 4 Association between practice time, arm position and CANS in amateur musicians

	B	Standard Error	Odds Ratio (Exp (B))	95% CI for Exp (B)	
				Lower	Upper
Constant	-.294	.259	.746		
Arm position	.108	.322	1.12	.593	2.095
Practice time	.049	.053	1.05	.947	1.165

DISCUSSION

The aim of the current study was to determine the difference in prevalence of CANS in amateur musicians playing either in elevated and in neutral arm position and to investigate the association between duration of playing time per week and CANS in this population. The results showed that arm position did not statistically significant alter the prevalence of CANS in amateur musicians. However, when studied in more detail we found that elevation of the left arm did significantly increase the prevalence of complaints in the left shoulder. The number of hours per week devoted to playing an instrument was not found to predict the presence of CANS in amateur musicians.

Compared to the prevalence of CANS in professional musicians, the 12-months prevalence in amateur musicians in this study is considerably lower (reported maximum 89% versus 46.9%). In general, in the professional musician occupational factors may help explain the greater prevalence of all music-related difficulties. The professional usually finds it difficult to take proper time off for rest or treatment of performance-affecting problems and is likely to play more hours weekly than the active amateur.²⁵ Compared to the prevalence of CANS in the general population the 12-months prevalence in amateur musicians in this study is higher (36.8% versus 46.9%) and the point prevalence is lower (26.4 % versus 20.4%).¹¹ In the study in the general population, however, the respondents were considerably older than the medical students in the present study and complaints of the hand were not included in the prevalence of CANS.¹¹ Both methodological difficulties hamper comparison of study-results.

In the present study, the most prevalent site of complaints was the neck, followed by shoulder and wrist. The distribution of CANS by body-region did not differ significantly between the two arm positions. Earlier research identified hand and wrist as most prevalent site of CANS in instrumental musicians (49%).⁴⁷ Although the reported distribution of musculoskeletal complaints over the different body regions was found to be comparable in professional and amateur musicians, it is suggested that shoulder complaints are more prevalent in the latter.¹⁰

In this study using an elevated left arm when playing was significantly related to the number of complaints of the left shoulder. The decreased blood flow of the shoulder muscles when the arm is elevated might be a possible explanation for this finding.³¹⁻³⁶ However, in all but one of these cases, the instrument played required elevation of both arms. The forced unnatural elevated and exorotated left shoulder position in bowed strings could lead to a higher prevalence of complaints in the left shoulder.⁵ Also, we hypothesize that hand preference and accompanying muscle strength on the right side protect against CANS in the right shoulder.

Studies have shown that the presence of tiredness and pain will increase coordination impairment and by that musculoskeletal complaints.⁴⁸ In this study playing time was not found to be a predictor of CANS. However, pain and the ability to play are inextricably linked. One can argue that reported practice time is affected by the presence of CANS.⁴⁹ This interaction hampers identification of playing time as a independent risk factor of CANS. Also average playing time per week was assessed and evaluated in retrospect; further studies are necessary to draw any further conclusions.

This study has a few potential weaknesses. First, there could be a response bias, since it is unknown if medical students with musculoskeletal complaints were more eager to participate. However, it is not likely that this bias affected both groups unequally and that this bias affected the prevalence difference between the two groups. Secondly, data were collected using self report without physical examination. One could debate that physical examination of the (amateur) musician is necessary to exclude any systemic illness in the differential diagnose. However, the a priori chance of the presence of a (unknown) systemic illness at this young age is negligible. If any, this may have introduced an overestimation of the true prevalence of CANS in amateur musicians. However, again, it is unlikely that use of self report affected the prevalence of CANS in both groups unequally.

CONCLUSION

On the basis of our data we conclude that the total prevalence of CANS does not statistically significant differ between instrumental amateur musicians playing in neutral or elevated arm position. We did find however, that in amateur musicians complaints of the left shoulder are significantly more prevalent when an instrument is played using an elevated left arm. The number of hours per week devoted to playing an instrument was not related to CANS.

RECOMMENDATIONS (research and practice)

Further research is needed to develop a model that includes all risk factors, predictors and their weight of importance, of musculoskeletal complaints related to playing an instrument.⁵⁰ Among variables to include as possible predictors are years of playing and type of instrument.^{9,27,28} To improve generalizability of the study results a wider age-range of amateur instrumentalists should be studied.

In practice, the identification of risk factors in the individual amateur musician enables targeted prevention, therapy and rehabilitation of CANS by the health care professional.⁵¹ Information on risk factors in the individual may be collected by a standardized questionnaire (for example the Maastricht Upper Extremity Questionnaire⁵²), by discussion with music teachers and important others and by critical observation of the amateur musician playing the instrument.

Further research is needed to evaluate optimal posture of the amateur musician while playing.¹⁷ It is possible that, to date unidentified risk factors, other than arm position, make the (amateur) musician vulnerable for CANS. Variables to study may include playing technique, ergonomics and muscular activity.^{53,54}

In practice, a number of instrumentalists play with elevated left arm and that makes them at risk for the development of shoulder complaints. The health care professional involved in the treatment of the amateur musician should understand the required technique and tasks to play the instrument.^{26,54,55}

Further research is needed to determine the correlation between practice time and CANS in more detail. A larger study-population including enough musicians with long practice hours as well as musicians playing less often should be evaluated before definite conclusions can be drawn.

In practice, until further information is available on the exact role of playing time, rehearsal and performing habits must fit the limitations of the body.¹⁸ The health care professional should assist the amateur musician to flesh out this recommendation in daily life.

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Appendix

Instrument	Arm position
Violin	Elevated (two-sided)
Viola	Elevated (two-sided)
Cello	Elevated (left)
Double bass	Elevated (left)
Piano/keyboard	Neutral
Guitar/Bass guitar/Mandoline	Elevated (right)
Bassoon	Neutral
Oboe/Alt Oboe	Neutral
Clarinet	Neutral
Harp	Elevated (two-sided)
Flute/Piccolo	Elevated (right)
Recorder	Neutral
Trombone	Elevated (two-sided)
Trumpet/Bugle	Elevated (two-sided)
Saxophone	Neutral
Pan Flute	Neutral
Percussion	Neutral
Tuba	Neutral
Kazoo	Neutral
Accordion	Neutral
Organ	Neutral
Horn	Neutral

Appendix A. Consensus-sheet arm position by instrument