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Section: ***COMPLEMENTARY RESEARCH METHODOLOGY*** *Original Paper*

An innovative method of monitoring health, mental, motor and artistic indicators during violin lessons

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Dictionary:

Possibility of action – is the strength, intellectual or manipulative prowess, knowledge (skill) and willingness sufficient to perform a given action [32, 33].

Dispositional feasibility – this is a category of action which can be empirically verified in the process of education, training and during other forms of skill acquisition, if they can be observed with more or less freedom [12].

Situational actionability – means that the performance of a given action under certain circumstances is not thwarted by those very circumstances [32, 33].

Complete possibility of action – has the one who, at a given moment t, can perform the act in question, can not perform it and can postpone the moment of performing the act in question [32, 33].

Motor safety is consciousness of the person undertaking to solve a motor task or consciousness the subject who has the right to encourage and even enforce from this person that would perform the motor activity, who is able to do it without the risk of the loss of life, injuries or other adverse health effects [58].

Abstract:

Background and Study Aim: Teaching instrumental music is also an area of application of INNOAGON's unique methods, means and tools. The basis of such an assumption is the premise of the health effects of many years of practice of instrumental musicians. It is estimated that a musician plays an instrument for over half a century on average, and many stage musicians after the age of 50 almost constantly use the services of masseurs and even orthopaedists. The aim of the work is to recommend an empirically verified method of monitoring health, mental, motor and artistic indicators during violin lessons (sessions).

Material and Methods: The original *Quantitative and Qualitative Evaluation of the Musician's Psychomotor Exertion During the Session* method includes the measurement of: heart rate (HR), sense of pain (on a scale of 0 to 10), motivation (on a scale of 1 to 10) and motor-artistic effect (on a scale of 1 to 25). First, the music teacher (August 2024), under the guidance of an expert in measuring and documenting physical exertion, self-assessed several of her own violin playing sessions, also documenting the remaining indicators in the above-mentioned document. From 10.09.2024 to 12.11.2024, she observed 9 lessons (sessions) of a nine-year-old third-grade violin student (Lucy) at a first-degree state music school. The student, with 33 months of experience in music education, took second place in two national competitions (December 2024) and received international awards in a hybrid competition of violinists in her age group. The violin teacher has over thirty years of teaching experience (51 as a practicing musician). Based on the available complementary research methodology recommendations, the authors compared the documented indicators of the student with observations of the sessions of a teacher who was intersubjectively considered a model.

Results: The similarities of the effort only concern the intensity zones (borderline of low and moderate) and respecting the warm-up based on psychomotor tasks without the violin and bow. Differences: the main part of the student sessions each time included two complexes of violin specific tasks (the first one, in the initial phase, was also an extension of the warm-up, but based on specific to violin playing), while the teacher's 4. The similarities of monitoring health indicators concern the pain experienced during the psychomotor activity, while the differences concern HR before the effort. The documented motivation for the student's psychomotor activities differs from the teacher's model. The teacher assessed her own motor and artistic indicators higher than the student's. The positively correlated indicators of the student's musical complexes of psychomotor tasks are very high ($r = 0.805$, $p<0.01$). The teacher assessed the range and tempo of movement the highest in herself ($M = 22.25$ points), and the student's power ($M = 20.33$ points).

Effort safety is consciousness of the person who starts physical effort or consciousness of the subject who has the right to encourage or even enforce from this person the physical effort of a certain intensity and duration, who it is able to do so without risking life or health [58].

Conclusions: The conjunction of the results of these pioneering observations with the most general mission of innovative agonology, i.e. oriented towards promotion, prevention and therapy encompassing all dimensions of health (apart from the seemingly distant survival thread) is an evidence-based argument that this science meets social expectations.

Keywords: complete possibility of action, dispositional feasibility, effort safety, INNOAGON, motor safety, situational actionability, warm-up

1. Introduction

The recent results and conclusions of the Mann et al 2023 study [1] provide a valuable rationale for addressing the issue identified in the title of our publication. The authors of the study Effects of different violin playing techniques on workload in forearm and shoulder muscles verified positively most of the themes of two hypotheses: 1) high playing speed, thirds and vibrato would be demanding factors for the left forearm due to faster and/or more finger movements on the fingerboard and that playing forte (loudness) would be a demanding factor for right forearm muscles due to changes in the violin bowing with more force applied; 2) this specific music piece without thirds or fast tempo results in lower muscle activity compared to the grand mean of all techniques studied during scale playing [1].

Mann et al. [1] conclude that 'Violinists often rehearse challenging sections multiple times, and if these sections involve, for example, faster playing speeds, fortissimo, or vibrato, it can lead to rapid fatigue. To prevent injury, it may be beneficial to plan rehearsals so that the most strenuous sections are rehearsed using fewer demanding techniques, such as playing piano, using less vibrato, or playing at a slower speed.' However, we consider the reference to a systematic review and meta-analysis by Albulescu et al. [2] on the efficacy of micro-breaks for increasing well-being and performance to be an insufficient recommendation. The authors base this review on premises referring to the 'always-on' culture encouraged by the Fourth Industrial Revolution [3], as well as the human energy crisis' many employees face today [2, 3]. In our opinion, the argumentation that heavy workloads and long hours impede their capacity and energy renewal [4] also does not cover the issues most important from the perspective of health prevention for the instrumental musician of any speciality (not just the violinist).

The distribution of psycho-motor effort of an instrumental musician over daily and weekly cycles more closely resembles that of a professional athlete's training in terms of the number and duration of sessions (training sessions in athletes and similarly musical sessions in artists), as well as the total number of hours (according to Paaeup et al. [5] and [6] a professional musician plays between 23 and 33 h per week). Although the intensity of exertion (measured by heart rate: HR) during most sports training sessions is higher than in instrumentalists, the deviation is the likelihood of a higher HR during learning and perfecting the playing of a musical instrument than during training for most shooting sports competitions.

It is this factor of effort intensity that is a key element of prevention from the earliest years of an instrumental musician's education for four reasons.

Firstly, the child generally starts learning to play a musical instrument along with compulsory primary education at school or individually in the privacy of the home.

For the sake of finger dexterity on both hands, his or her environment restricts physical activities with balls and other utensils, and one tried-and-tested method is sick leave from PE lessons.

Secondly, until the child reaches biological maturity (around 18 years of age), he or she first needs stronger and stronger stimuli from month to month in order to individually reach the point of stabilisation of psychophysical efforts (because parallel to the expected biological development comes the concern for psychological development and the formation of elementary, correct social interactions) in both daily and weekly cycles. The safe effort HR of a seven-year-old, according to the recommendation of Takane et al. [7], is 203.1 beats per minute and that of an eighteen-year-old is 195.4. Since another recommendation, which has been verified by daily practice for years, points to 70-89% intensity of this effort as the most beneficial stimulus (developmental or sustaining, respectively), so even 33 hours of specific effort by an adolescent or adult instrumental musician will not provide stimuli of this intensity in the physiological sense – to a seven-year-old 142-181 HR and to an eighteen-year-old 137-174 HR. Although the total psychomotor activity time of musicians with a sophisticated coordination structure (according to the specificity of the instrument) involving mainly the upper limbs matches and even often exceeds that of a professional athlete, the low and very low intensity is due to the limited participation of large muscle groups in the manipulative motor activities of the instrumental musician. The participation of the musician's large muscle groups is mainly postural activities – in contrast to dancers, athletes of most disciplines and competitions, abstracting from many other professions requiring the involvement of the entire human motor potential.

Thirdly, one of the reasons for the emergence of musculoskeletal pain already among adolescent musicians is precisely the lack of physiological and motor stimuli both optimally distributed in daily and weekly cycles and unrelated to playing an instrument, and during each session of instrumental music (educational or perfecting), but also immediately preceding each public concert (warm up).

Fourthly, the neck and shoulders are the most of musculoskeletal disorders among instrumentalists. However, violinists and violists, are at higher risk of musculoskeletal pain than other instrumentalists because the working position includes constant elevation of the arms [8]. In addition, during violin playing, the passivity of the left hand thumb (abstracting from the few cases of the violinist's counterproductive use of the upper limbs), the varied motor activity of the upper limbs and the involvement of the chin to stabilise the violin are important elements. Therefore, essential elements of the educational practice of adolescent musicians are methods and tools for the ongoing assessment of psychomotor potential from the pre-qualification stage, as well as the documentation of the instrumentalist's psychomotor effort (including intensity as an elementary component of workloads), with parallel monitoring of motor-artistic effects [9-12], motivation, sense of musculoskeletal pain [13] and its reduction during each instrumental session.

These premises and the assumption articulated in the last sentence draw attention to the fact that in music education and concert activity (professional or amateur) it is not just a matter of following an interdisciplinary approach [14, 15], but a complementary one, because every complementary approach is also an interdisciplinary one, but not vice versa. The methodological basis (in the research and educational sense) of a complementary approach in any human psychomotor activity is provided by the new

applied science 'innovative agonology' (INNOAGON), and we base our pilot study on this basis [16-22, 15, 23-25].

The aim of the work is to recommend an empirically verified method of monitoring health, mental, motor and artistic indicators during violin lessons (sessions).

2. Materials and Methods

Basic assumptions of the methodology based on a complementary approach

The scientific and educational exploration of the isolated from reality phenomenon of instrumental music is based on the praxeological terms 'possibility of action', 'dispositional feasibility', 'situational actionability' and 'complete possibility of action' (see dictionary). Thus, the key terms of praxeology (methodology proper) override the terms of each of the languages of the specific disciplines, sub-disciplines and professional languages of the activity in question (intellectual, motor or intellectual-motor), which are applicable either at the educational stage (preparation) or during concert activity (each case of action proper during the fulfilment of the mission of musical cultural heritage and its extension with the best possible effect on public health).

Quantitative and Qualitative Evaluation of the Musician's Psychomotor Exertion During the Session

The applied *Quantitative and Qualitative Evaluation of the Musician's Psychomotor Exertion During the Session* is a consequence of accumulated scientific knowledge: about the importance of music in human culture; about the negative health effects that affect professional and amateur musicians; about the possibilities of learning and improving new motor activities that are closely related to the use of a specific musical instrument in the most perfect way possible; about the diagnosis and reduction of musculoskeletal pain associated with musical practice; and about the possibilities of combining knowledge and practical actions related either to stimulating the biological development of the child or to maintaining at an optimal level those morpho-functional indices that are positively correlated with both positive health criteria and expected motor-artistic effects [9, 7, 5, 10, 6, 13, 16, 26, 27, 1, 2, 28, 11, 12].

The essential frame of reference for this document, in terms of structure and content, is the Protocol Continuous Workload with Variable Intensity [10]. However, in line with the latest recommendations of Innovative Agonology Language (INNOAGON), the word ‘exercise’ has been changed to ‘psychomotor activity’, or abbreviated as ‘activity’. Consequently, we have changed the names of the symbols: T (training time) to (active session time) – in the motor sense, after all, some session time can only refer to mental activity; TE (exercise time) to TA (psychomotor activity time); I (training intensity) to (psychomotor session intensity); IE (exercise intensity) to IA (psychomotor activity intensity); LE (training load) to exertion load during session; LE (exercise load) to LA (load during psychomotor activity) – and this sub-activity within the psychomotor music (learning or improvement) sessions is given an appropriate code (see *Quantitative* ...). The adopted colour scheme for the different zones of effort intensity is useful when analysing multiple protocols of the same or different individuals and coincides with the *Protocol Continuous Workload with Variable Intensity* [10, 29].

In these studies, heart rate per minute (HR) was monitored using a smartwatch.

Load during the psychomotor session (LPS – conventional units) is calculated using the formula LPS = LE + FRT·100, where:

$$L_E = \sum_{k=1}^{n} T_{\text{activity}} \cdot I_{\text{activity}}$$

FRT·100 (load during functional rest) is the product of the break time TR (T − TA) and the conventional heart rate (HR) value of 100 beats per minute.

An exemplification of the recording of psychomotor effort during violin lessons is the attached *Quantitative* ... Lucy from her seventh of nine observed sessions.

Evaluation of motivation and motor and artistic effects

The violinist's motivation (a 10-point scale) was assessed three times: before, in the middle of the session, and at the end of the session the 'self-motivation' to work at home was asked.

The application of this simple 10-degree scale of motivation to the physical efforts of an adolescent violinist does not mandate interpretations based on contemporary psychology's use of the *Work Extrinsic And Intrinsic Motivation Scale* [30, 31]. In this experimental approach, motivation is an element of measuring 'possibility of action' in a praxeological sense [32, 33].

Motor-artistic effect (on a scale of 1 to 25) is based on five movement features modelled on the Schnabel [34] criteria: accuracy, rhythm, range, force, tempo [12].Evaluation of musculoskeletal pain

Evaluation of musculoskeletal pain

We base the measurement on the Visual Analogue Scale from 0 (no pain) to 10 (unbearable pain) [35]. The subjective feeling of pain is monitored at least five times (the student is informed that he/she should report it even without being asked): before the session, after the warm-up (code ‚A'), during the main tasks of the session (instrumental part), after aerobic motor simulation (without instrument): precision action before and during increasing effort (code 'B'), after the relaxation part (code 'C'); after each pain announcing, the teacher applied the interventions recommended by the health prevention expert even before the start of this observation cycle and during the subsequent consultation.

The final section Quantitative and Qualitative Evaluation of the Musician's Psychomotor Exertion During the Session is for editing comments that the teacher considers relevant.

Other advantages Quantitative and Qualitative Evaluation of the Musician's Psychomotor Exertion During the Session

Based on the presented criteria for the evaluation of deliberate psychomotor effort, any separate fragment of a person's daily activity (action and/or spontaneous behaviour) can be observed. The renamed key terms describing human activities and, to a large extent, spontaneous behaviour also correspond to the concept of health-related fitness [36]. This concept was and still is, in a way, a response to the societal reluctance to model exercise and physical training referring to sports models.

Quantitative and Qualitative Evaluation of the Musician's Psychomotor Exertion During the Session

person Lucy **age** 9 years **session date:** 29 October 2024 **place:** Music School, Suwałki

HR resting 107 /HR safe/ **HRmax = 208 – (0.7 × age)** 202 **T** (active session time) 59 minutes

Code	Task (content)	Musical specificity	Motor-musical effect (1 do 25)		Time (min)		Intensity (average HR per minute))		LE	Intensity zone	
			feature of movement	T_A	hour	T_A	HR	I	$T_A \cdot I_A$	%	code
	warm-up without an instrument										
A	alternating: kneading rehabilitation balls; rotational, multi-plane movements of the arms; squats, jumping with clapping under the knees and above the head				T_A 15:10 15:15	5	154, 178	166	830	82	I_H
	instrumental part										
1	extension of the specialist instrumental warm-up: Scale F major in position II; etude 82 in F major; reading etude 2 Konstantin Fortunatow	adagio moderato adagio	accuracy 19 rhythm 20 range 18 force 20 tempo 18 19		T_1 15:15 15:44	29	114, 116, 115	115	3335	57	I_{MO}
2	Etude 33 Wohlfarth - self-preparation test. Elves' Dance with accompaniment	moderato allegro	accuracy 22 rhythm 21 range 22 force 23 tempo 23 22,2		T_2 15:45 16:00	15	134, 106, 120	120	1800	59	I_{MO}
3			accuracy rhythm range force tempo		T_3						
4			accuracy rhythm range force tempo		T_4						
	aerobic motor simulation (without instrument): precision action before and during increasing effort										
B					T_B						
	relaxation										
C	self-massage of hands and neck with rehabilitation balls				T_B	10	107, 104, 95	102	1020	50	I_L

T/time of the session/ T_A/psychomotor activity time/ T_B/break time: $T - T_A$/ **I**/intensity of the psychomotor session/ I_A/intensity of the separate activity/ **LE**/ load of all separate activities / **LPS**/load during the psychomotor session/ L_A/load during separate activity/ **FRT**/load during functional rest/ $T_R \times 100$ (HR)

session indicators			
LPS $\sum(T_A \times I_A)$ add **FRT**	6985	**Intensity zone**	
T $\sum T_A$ or $(T_A + T_{BG})$	59	%	code
I $\frac{\text{LPS}}{\text{T}}$	118.4	58	I_{MO}

author's work: E. Waszkiewicz, RM. Kalina

EXERTION INTENSITY ZONE (%HRmax):

name	*very low*	*low*	*moderate*	*high*	*very high*	*maximum*	*supra maximum*
%HRmax	<35	35-54	55-69	70-89	≥90	100	>100
code	I_{VL}	I_{L}	I_{MO}	I_{H}	I_{VH}	I_{M}	I_{SM}

MOTIVATION TO BE ACTIVE (1 very low; 10 maximum) – circle

before the session	1	2	3	4	5	6	(7)	8	9	10
during the session	1	2	3	4	(5)	6	(7)	8	9	10
for your own work	1	2	3	4	(5)	6	7	8	9	10

Subjective feeling of musculoskeletal PAIN (verbal declaration) – put X

Measure-ment	Body part/parts	None	Mild			Moderate				Strong		
		0	1	2	3	4	5	6	7	8	9	10
before A		X										
after A		X										
during the session (code)		X										
after B		X										
after relax		X										

Comments:

running up the stairs before the session

the 'Elves' Dance', Ezra Jenkinson

author's work: E. Waszkiewicz, RM. Kalina

3. Results

The similarity of the teacher's effort (based on the self-monitoring session) and the student's effort concern the intensity zones (borderline of low and moderate) and respecting the warm-up based on psychomotor tasks without the violin and bow. Differences: the main part of the student sessions each time included two complexes of violin specific tasks (the first one, in the initial phase, was also an extension of the warm-up, but based on specific to violin playing), while the teacher's four.

The similarities in monitoring health indicators relate somewhat to the scale of pain experienced during psychomotor activity, but not the location. The teacher reported increasing pain in her left thumb with a strength of 2 to 3 points during part of the sessions marked "code 1 and 2". The pupil monitored pain during four sessions of strength 1 to 6 points and mainly of the lower limbs (Table 1). The teacher reduced the pain experienced both during the observation of herself and during the sessions with Lucy. The differences concern HR before the effort. The teacher's resting HR before the monitored session was 72 beats per minute. In Lucy's case, only during the third of the monitored sessions, resting HR was 80 beats per minute, and often exceeded 100 (the reason for her tendency to follow the run to the music lesson – Table 1). Also the documented motivation for the student's psychomotor activities differs from the teacher's model. Teacher motivation increased steadily from 5 points before the session to 7 during the session and 8 points for your own work. Lucy most often declared maximum motivation, including four times at each point in the monitored sessions – Table 1. there is no statistically significant relationship between the duration of individual sessions with Lucy and the intensity of her psychomotor effort ($r = 0.281$). The most intense part of each session with Lucy was a warm-up without an instrument (Table 1). The teacher found a slightly higher intensity of effort (HR = 99, and 97 during warm-up) during the fourth part of her violin improvement session.

Table 1. Indicators of psychomotor effort, motivation, and subjective feeling of pain during 9 observed violin lessons of 9-year-old Lucy.

Part of session, code,	**Day of the session in 2014**								
psychomotor effort	10.09	17.09	24.09	01.10	08.10	18.10	29.10	05.11	12.11
motivation to be active (1 very low; 10 maximum)									
before the session	3	10	10	10	10	10	7	10	10
during the session	10	10	10	10	10	10	7	10	10
for your own work	10	5	10	10	9	9	5	10	10
subjective feeling of musculoskeletal PAIN (on a scale of 0 to 10 points)									
before A		eyes 1							
after A					legs 2	legs 2			
during the session 1		legs 6		legs 1	legs 2				
during the session 2					head 1				
after B									
after relax									
time of effort (minute)									
during A	3	4	3	3	5	4	4	3	3

during the session 1	15	10	33	21	13	33	29	32	17
during the session 2	11	17	24	36	41	28	16	22	10
during B	-	-	-	-	-	-	-	-	-
during C	-	-	-	-	-	-	10	3	-
session (T)	**59**	**31**	**60**	**60**	**59**	**65**	**59**	**60**	**30**
intensity (average HR per minute)									
resting	98	96	80	117*	83	89	107*	100	100
during A	120	141	158	176	130	139	166	140	172
during code 1	115	124	123	119	117	97	115	110	105
during code 2	111	91	102	115	104	113	120	107	101
during B	-	-	-	-	-	-	-	-	-
during C	-	-	-	-	-	-	102	145	-
session (I)	**114.5**	**108.9**	**116.4**	**115.5**	**109**	**106.5**	**118.4**	**115.9**	**112.8**
intensity zone %	56.9	53.5	57.6	59.1	54	52.7	58	57.4	55.8
intensity zone (code)	**I_{MO}**	**I_{L}**	**I_{MO}**	**I_{MO}**	**I_{L}**	**I_{L}**	**I_{MO}**	**I_{MO}**	**I_{MO}**
load during the psychomotor session (conventional units)									
LPS	**6778**	**3376**	**6984**	**6930**	**6431**	**6923**	**6896**	**6954**	**3384**

* running up the stairs before the session

The teacher assessed her own motor and artistic indicators starting from 1 to 4 of the instrumental part code, respectively: 21-, 21.6-, 22.6-, 22.8 points. Lucy was also rated by the teacher for motor-artistic effects always higher in relation to code 2 (after all, the instrumental part of each session with her participation was always a two-piece) – Table 2. The positively correlated indicators of the student's musical complexes of psychomotor tasks (code 1 and 2) are very high ($r = 0.805$, $p<0.01$). The teacher assessed the range and tempo of movement the highest in herself (M = 22.25 points), and the student's force (M = 20.33 points – Table 2).

Table 2. Motor-musical effect indicators (on a scale of 1 to 25 points each feature of movement) during the observed sessions.

Feature of movement	**Day of the session in 2014**									**Average cycle result**
	10.09	17.09	24.09	01.10	08.10	18.10	29.10	05.11	12.11	
during the session (code1)										
accuracy	18	18	17	16	18	19	19	18	19	**18**
rhythm	19	18	18	16	18	19	20	19	20	**18.56**
range	18	18	18	17	19	18	18	19	20	**18.33**
force	18	18	17	17	19	19	20	20	21	**18.78**
tempo	18	18	17	17	18	19	18	19	20	**18.22**
average session result	**18.2**	**16**	**17.4**	**16.6**	**18.4**	**18.8**	**19**	**19**	**20**	
during the session (code 2)										
accuracy	19	18	18	18	18	21	22	19	21	**19.33**
rhythm	20	19	19	18	19	20	21	20	21	**19.67**

range	20	19	19	19	20	20	22	20	21	**20**
force	20	19	19	19	19	21	23	21	22	**20.33**
tempo	20	18	18	18	20	21	23	20	21	**19.89**
average session result	**19.8**	**18.6**	**18.6**	**18.4**	**19.2**	**20.6**	**22.2**	**20**	**21.2**	
difference in the result between code 1 and 2 of a given session										
	+1.6	**+2.6**	**+1.2**	**+1.8**	**+0.8**	**+1.8**	**+3.8**	**+1**	**+1.2**	

4. Discussion

The direct prototype of the applied *Quantitative and Qualitative Evaluation of the Musician's Psychomotor Exertion During the Session* is the *Continuous Workload with Variable Intensity Protocol* [10]. The earliest dates back to the late 1970s for use in sport [37, 38] and later physiotherapy [39]. However, when sharing the results of these studies, it is not the questionnaire that is most important in a cognitive and applied sense, but the complementary approach used [19, 14, 15]. A casual perusal of the results of this work may erroneously suggest that this complementarity primarily links the practice and knowledge of sports training and physical education with violin learning, which is, after all, a case of motor learning and performance [40].

However, this is about a strictly methodological aspect and, unfortunately, the elementary standards of the methodology of sciences are perhaps the most ignored criteria for conceptualising many projects of scientific exploration of phenomena regardless of their social or merely cognitive significance. Not only the conceptualisation, but also the communication of research results. Therefore, it would be questionable if the results of this pilot study could be described and interpreted in any of the following languages: sport science and exercises, motor learning and performance, psychology, pedagogy, any of the specific languages of science of medicine, etc., let alone the professional languages (jargon aside) of violin teaching, sport, physical education, physiotherapy, etc.

The basic indicators of the possibility of action (and this is a strict category of praxeology – methodology proper [41-43, 14]) of the adolescent violin student are described in terms and on the basis of the use of tools appropriate to some of the specific sciences mentioned above. This is how we understand the idea of a complementary approach, since there is still no textbook with an interpretation of complementary research methodology. What is certain is that the terms of praxeology, due to their level of generality, are superior. Thus, any borrowings from the languages of the individual specific disciplines and from the professional languages used in educational, diagnostic, preventive, therapeutic practice, etc., are only some particularisation of the key terms of praxeology with the highest possible level of generality.

Lucy confirmed her dispositional feasibility at situational actionability level in December 2024. She has twice taken second place in national, prestigious category two violin competitions and once an honourable mention in a category A competition. We are only signalling a very interesting aspect of complete possibility of action (dispositional and situational) in a methodological sense. On two occasions, at least one juvenile violinist was awarded higher than Lucy (did Lucy therefore meet the

condition of complete possibility of action), and the highest mixed mark of her motor-artistic competence during the observed cycle of 9 sessions was 22.2 points (88.8% of the possible maximum mark) – and it is not important at this point that this is the mark of only one expert, i.e. her teacher. Thus, it is an open question whether the praxeological term 'complete possibility of action', is a graded category, or whether such an interpretation would be logically questionable.

Meanwhile, we emphasise the importance of monitoring motivation and pain from a health prevention perspective. Let us take as an example an incident from the area of extreme human activity unrelated to music. A candidate for the Polish commando formation 'Grom', during a very demanding selection, suffered a rupture of the abdominal shell caused by a hernia. The candidate used an elastic bandage to contain the abdominal contents. However, during the interview with the psychologist concluding the diagnostic stage of the selection, the pain was so severe that the camouflage was exposed. Although the candidate gave evidence of extremely high motivation, the circumstances were not a sufficient condition for him to receive a qualification – in recognition of this determination, he was exceptionally given the chance to proceed with another attempt once the hernia had healed [44].

It is to be reckoned with that adolescent instrumental music students may not inform either the teacher or their parents about the musculoskeletal pain they experience (occasional and especially notorious). The results of these pilot observations provide empirical evidence that the student monitored pain during 44.44% of the sessions, of which 22.22% of the time the pain occurred in two different parts of the lesson (see *Quantitative* ...). Interestingly, the first of the documented claims was for eye pain. Admittedly, this is a pilot study, but musculoskeletal pain among professional violinists [8, 5, 6, 13, 1, 2, 27] only emphasises the preventive significance of such observations.

Ignored in the practice of physical education, the physiological indicator of exercise effectiveness exposes the counter-effective paradigm of the subject of physical education in the school system [45], and the results of this research, although pilot, provide evidence of how right the vision of the most desirable profession of the near future – preventive medicine – is [46], as well as the need for a complementary approach to measuring human motor potential taking into account cognitive (mental) aspects and personal safety [47-50].

It turns out that the average intensity (measured by HR) of a violin lesson concerning only the specific motor activity phase using this instrument is not much inferior to the HR of a PE lesson (based on sports motor skills) of 13-year-old female students of a then Polish secondary school (basketball 128.3-, volleyball 127-, track & field 121.5-, gymnastic 116.7 HR [51]). Both of these are sub-threshold anyway as stimuli for stimulating physical performance (recommendations speak of 70-89% HRmax), and do not even meet the intensity criterion of warm up of 130-140 HR (required stimulation of the body for efficient muscle work during sports training).

However, the warm up standards in place during the training of most sports disciplines and competitions are not a methodological benchmark for instrumental music lessons, or even physical education, let alone military training, rescue formations and anyone individually who is aware that there are circumstances when there is no time for warm up – we refer not only to Canon's law in the classical sense [52, 53], but in the complementary INNOAGON [17, 54-57, 15]: unintentional fall, avoiding collision with an object in motion, repelling physical aggression. Therefore,

in our opinion, it is neither a mistake nor a health risk, but on the contrary, that the intensity is very high during the 3-5 minute warp up sessions of instrumental music. An important directive is that the rule of motor safety [58] is followed and that the intensity of the applied tasks during the warm up also meet the physiological criteria of zone IVH. Then the effort safety rule is also fulfilled [58].

The method used in this pilot study was of great interest not only to the adolescent violinist, but also to the participating mum as an observer. First, questions were raised about the importance of these non-specific psychomotor and warm ups preceding traditional violin teaching and HR measurement. Controlling the feeling of pain seemed obvious to the student and her mum from the start. However, the biggest positive surprise was that the mum asked for guidance for similar psychomotor activity at home with her child.

This unexpected result of our observations draws attention to the issue of the need for careful selection of aerobic psychomotor simulations to end a session not only of learning and perfecting violin playing, but of any other musical instrument. Playing on musical instruments is a tyke-like motor activity that should not have such negative effects on the body structure and musculoskeletal system as many asymmetrical sports based on the exploitation of the dominant hand with consequences also for the lower limbs – especially fencing [59], racket sports [60], baseball [61]. The results of studies on the phenomenon of precision action ability before and during increasing physical exertion [47, 17, 11] can be inspiring. During these aerobic psychomotor simulations, when the primary criterion for upper limb manipulation will be the alternating, cyclic engagement of the same muscle groups of both hands, the effects of the differential motor activity of the previously completed game should be compensated for to some as yet empirically undetermined extent. Assuming, of course, that they can be negative, and that they vary is already known: 'Violin playing involves biomechanically asymmetric use of the muscles: the left forearm shows more muscle activity than the right forearm, and both upper trapezius muscles show constant static muscle activity' [1]

5. Conclusions

The conjunction of the results of these pioneering observations with the most general mission of innovative agonology, i.e. oriented towards promotion, prevention and therapy encompassing all dimensions of health (apart from the seemingly distant survival thread) is an evidence-based argument that this science meets social expectations.

Data Availability Statement: The data supporting this study's findings are available from the corresponding author upon reasonable request.

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