Developing a Screening Tool for Psychological Stress in Musicians:

The Lübeck Inventory on Musicians' Psychological Stress (LIMIT)

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OBJECTIVES: Psychological stress concerns many musicians and poses a risk for their mental and physical health. However, there are thus far no instruments that measure psychological stress of musicians in particular. We aimed to fill this gap by developing a questionnaire designed specifically to detect components that increase psychological strain in musicians. **METHODS:** The Lübecker Inventar für psychischen Stress bei Musizierenden (Lübeck Inventory on Musicians' Psychological Stress, LIMIT) was developed through consultation with experts from the field. Subsequently, the factorial structure was examined on a sample of N = 602 musicians. Multiple factor extraction methods were compared using model fit criteria to determine an adequate/representative number of factors and items. Reliability and validity of the questionnaire were tested. **RESULTS:** The Kaiser-Meyer-Olkin criterion revealed an excellent sampling adequacy (0.945). Excluding non-fitting items, the final LIMIT is composed of 34 items loading on four factors: "self-efficacy," "depression," "time-management," and "pressure." The scale reached an excellent reliability (Cronbach's α = 0.938) and fulfilled validation criteria. **CONCLUSIONS:** The LIMIT can be a useful screening tool for assessing musician-specific psychological strain, enabling musicians and practitioners to identify stress at an early stage and to seek out support in good time. An English validation is in progress. *Med Probl Perform Art* 2025;40(4):97–113.

KEYWORDS: mental health, musicians, musicians' health, psychological stress, questionnaire construction

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WHILE PSYCHOLOGICAL health issues are a constant topic in today's society, many are not aware of the role psychological strain plays in the life of professional musicians. Research shows that musicians face a stressful work environment, consisting of high mental and physical demands with comparably low control options (31). As a result, many musicians do not only develop physical health issues (11) but also show a high prevalence of psychological disorders such as depression and anxiety (16,18).

The WHO defines stress as ". . . a state of worry or mental tension caused by a difficult situation" (32). While working as a musician results in known health benefits (24) and is associated with the presence of positive emotions and a sense of meaning (2), it simultaneously includes "difficult situations" or "mental tension" on a regular basis.

Musicians are subjected to the constant pressures to perform in front of colleagues, an audience, or a jury. This pressure consists of a negative error culture and strict musical expectations (1). They furthermore are expected to learn new music at the highest level in a short time, or to switch between different musical engagements, making time management a constant issue (33).

When considering factors evoking stress in musicians, the individual sense of competence plays an important role. As Altenmüller (1) stated: "Sense of competence results from mastery experiences, sufficient opportunities to demonstrate newly acquired skills, initiative and freedom of choice of musical activities, and a sense of being personally in charge of one's own behavior and therefore able to cope with difficulties" (p51). Sense of competence is closely related to the construct of self-efficacy, a person's belief to have control and the necessary abilities to perform a certain task (21). Musicians with higher self-efficacy were found to engage more in health-promoting behavior and to experience more positive affect. Consequently, lack-

ing self-efficacy is associated with stress, a negative emotional state and reduced self-regulation (21). Research argues that low self-efficacy furthermore leads to a degradation of self-esteem in musicians, resulting in less confidence on stage which is experienced as highly stressful (9,13). It is therefore important to consider both self-efficacy and self-esteem when screening for psychological stress in musicians.

Studies further show that music performance anxiety (MPA) is one of the most important indicators of experienced stress in musicians since it is known to directly affect mental health (2). MPA consists of certain cognitions (thoughts of failing on stage), physiology (activation of the sympathetic nervous system), emotions (fear, anxiety), and behavior (avoiding performances, trembling) (17). Especially the negative cognitions and emotions are contributing to the retention of MPA and thereby enhancing the psychological stress. Likely, Osborne and Kenny (25) found inferior performance in musicians with high MPA compared to less anxious individuals. The authors concluded an underlying vulnerability, or psychological stress, that leads the highly affected musicians to experience the performance as even worse than objectively judged.

Finally, previous studies have shown that the illustrated low self-esteem and MPA prominent in highly stressed individuals are connected to depression (28). Early studies investigated the influence of stress on depression and vice versa by measuring prolactin levels in non-musicians (30), finding evidence for the direct link between those constructs.

To date, there is no measuring instrument to screen for psychological stress and separate straining factors in musicians regarding the illustrated mental health issues within one tool. Current instruments measuring musicians' well-being are the Psychosocial Risks Questionnaire for Musicians (PRQM, 15), the Occupational Stress Measure for Popular Musicians (MOSS, 19), and the Kenny Music Performance Anxiety Inventory (K-MPAI, 18). The PRQM focuses on stressful work demands for professional musicians, the MOSS was developed for popular musicians, and the K-MPAI was designed specifically to detect performance anxiety. There is, therefore, a need for a screening instrument that measures general aspects of psychological health in professional classical, pop, and jazz musicians and music students. This research aims to fill the current gap by creating the *Lübecker Inventar für psychische Musizierendengesundheit* (Lübeck Inventory on Musicians' Psychological Stress, LIMIT), tailored to detect psychological stress in musicians and to analyze its factorial structure, validity, and reliability.

METHODS

Questionnaire Development

Using the search terms "stress," "psychological wellbeing," "depression," "anxiety," "psychosomatic," and "sleep" in combination with "music" or "musicians," we selected a

TABLE 1. Keywords and Correlations Between the Constructs Given by the Literature

	Stress	Concerns	Anxieties	Self-Esteem	Overload/ Underload	Pressure Self	Self-Efficacy	Perfectionism	Depression	Physical Arousal	Sleep	Preparation	Interference	Pressure Others	Lack of PE-Fit
Stress	—														
Concerns		—													
Anxieties		$\rho = .8446^{19}$	—												
Self-Esteem			$\rho = -.593^{28}$	—											
Overload/ Underload					—										
Pressure From Self	$\rho = .36^{21}$					—									
Self-Efficacy	$\rho = -.392^{1}$					$\rho = -.42^{22}$	—								
Perfectionism			$r = .451^{17}$					—							
Depression			$\rho = .697^{28}$	$\rho = -.714^{28}$			$\rho = -.21^{21}$		—						
Physical Arousal			$r = .68^{7}$	$\rho = -.44^{13}$		$\rho = .30^{14}$	$\rho = -.36^{21}$			—					
Sleep											—				
Preparation												—			
Interference	$\rho = .35^{15}$									$r = .21^{14}$			—		
Pressure From Others	$\rho = .35^{15}$									$r = .35^{14}$				—	
Lack of PE-Fit	$\rho = .45^{15}$		$r = .63^{7}$							$r = .43^{7}$					—

Note: Use of r and rho and the number of decimals as in the referring article.

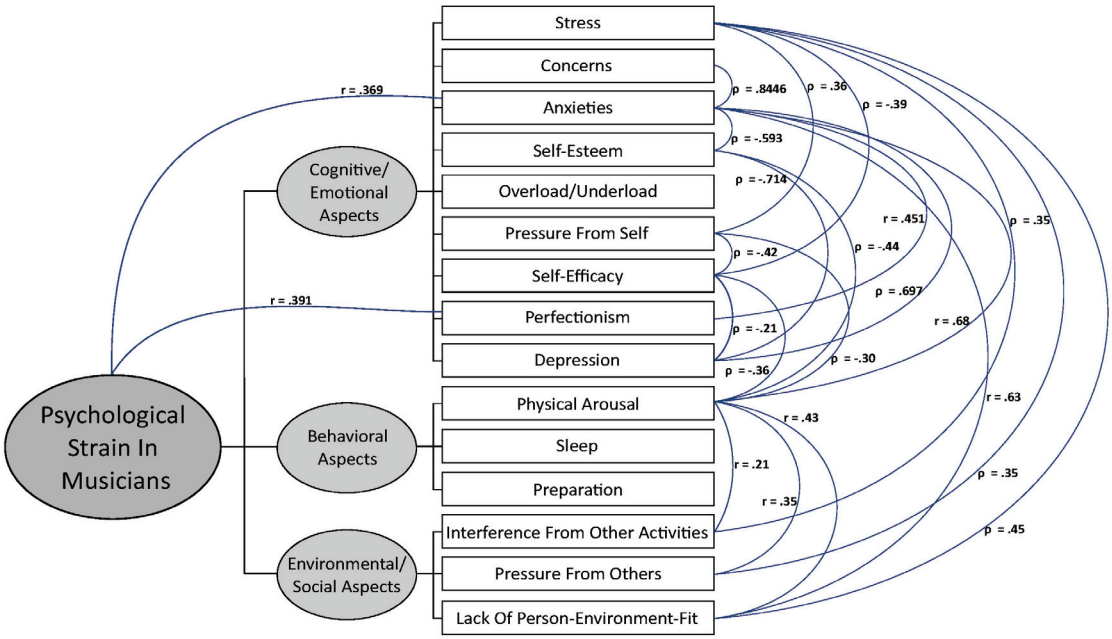

FIGURE 1. Nomological network of psychological stress in musicians. The correlations are derived from Table 1. Use of r or rho and the number of decimals as in the referring article.

broad range of literature from scientific databases. A complete list of the literature in this extensive research can be provided by the corresponding author. Through a consultation process with eight professors, medical doctors, and scientists of the *Deutsche Gesellschaft für Musikphysiologie und Musikermedizin* (German Association for Music Physiology and Musicians' Medicine, DGfMM), 15 keywords were selected that were considered to have the largest impact on musicians' strain (Table 1).

Subsequently, correlations between aspects of the construct given by the literature were extracted (22). In this case, only research dealing with a sample of musicians was considered (Table 1).

Based on both approaches, a nomological network for "psychological stress in musicians" was constructed (Figure 1). It includes all aspects found in the literature and rated by experts and finally illustrates them in a net including the associations between the latent variables.

Resilience depicts the antagonist of the construct of interest "psychological stress in musicians." It is therefore included and depicted by several items in the questionnaire as antagonist to the construct under research, as suggested by Bühner (5).

Item Construction

The items for the new screening tool were constructed based on the selected keywords. Each domain in the nomological network was depicted by 3 items to maintain the possibility of rejecting non-selective items after factor analysis. Thus, 48 items were created. A 5-point Likert-scale was chosen as a response format including the options never, rarely, sometimes, often, and always, where never equaled 1 and always equaled 5 within the 34 positively coded items. The remaining 14 items were coded in reverse. Thus, a minimum of 104 points and a maximum of 184 points could be reached within this first version of the LIMIT, with a high score representing high psychological stress. The original items, their domains, polarity, and further explanations are displayed in the supplements (Appendix 1).

The items were to be rated based on the last 4 weeks, as the new screening tool is supposed to measure stress as a state rather than a trait (i.e., chronic stress). Inventories that measure stress as a trait/chronic stress usually screen stress based on the last 3 months (i.e., the Trier Inventory for Chronic Stress, TICS; 26). The shorter period of 4 weeks offers the possibility to assess short-term changes between screening timepoints and is also used in similar screening tools such as the Perceived Stress Scale (PSS).

Statistical Methods

To investigate the factorial structure of the LIMIT, an exploratory factor analysis (EFA) was conducted in SPSS 29.0.1.0 following the examination of the EFA requirements. A reflective model was assumed for the construct of psychological stress (latent variable), as the manifest variables named in the nomological network and the corresponding factors are expected to show high intercorrelations (5). Therefore, the oblique rotation direct oblimin was chosen to investigate the underlying factorial structure. Factors were then extracted using a Screeplot, Parallel-test, Velicer's MAP and interpretations regarding the content and the Eigenvalues. Additionally, the extracted factors were named regarding their content based on the included items per factor.

TABLE 2. Statistical Characteristics of the LIMIT's Items

	M	SE	95%-CI for Mean		SD	Skew	Kurtosis
			Lower Bound	Upper Bound			
Item 01	3.71	.034	3.64	3.77	.829	–.919	.992
Item 02	4.29	.036	4.22	4.36	.880	–1.449	2.156
Item 03	2.66	.042	2.58	2.74	1.021	.430	–.261
Item 04	2.47	.041	2.38	2.55	1.002	.270	–.672
Item 05	3.96	.034	3.89	4.03	.838	–.728	.365
Item 06	4.57	.028	4.52	4.63	.694	–1.628	2.197
Item 07	3.16	.039	3.08	3.23	.948	–.355	–.317
Item 08	2.04	.034	1.97	2.10	.841	.570	.238
Item 09	2.18	.040	2.10	2.26	.978	.572	–.314
Item 10	2.75	.042	2.67	2.83	1.029	.054	–.586
Item 11	3.09	.050	2.99	3.19	1.229	–.196	–.886
Item 12	2.75	.045	2.66	2.83	1.093	–.001	–.796
Item 13	3.16	.037	3.08	3.18	.908	–.380	–.512
Item 14	2.09	.038	2.02	2.17	.937	.553	–.282
Item 15	3.58	.033	3.52	3.65	.820	–.609	.335
Item 16	3.54	.037	3.47	3.62	.913	–.707	.307
Item 17	2.47	.044	2.38	2.55	1.081	.526	–.354
Item 18	3.62	.038	3.55	3.70	.930	–.667	.093
Item 19	2.28	.039	2.21	2.36	.954	.365	–.618
Item 20	2.29	.037	2.22	2.36	.915	.441	–.166
Item 21	2.30	.044	2.21	2.38	1.082	.578	–.355
Item 22	2.53	.042	2.45	2.61	1.030	.190	–.738
Item 23	3.86	.037	3.79	3.93	.905	–.559	.100
Item 24	2.63	.045	2.54	2.72	1.095	.198	–.779
Item 25	4.36	.032	4.29	4.42	.795	–1.287	1.680
Item 26	2.77	.049	2.67	2.86	1.191	.211	–.849
Item 27	3.47	.039	3.39	3.54	.950	–.459	–.186
Item 28	3.23	.045	3.14	3.32	1.106	–.044	–.777
Item 29	2.58	.041	2.50	2.66	.994	.431	–.265
Item 30	3.53	.037	3.46	3.57	.916	–.671	.147
Item 31	3.28	.037	3.21	3.36	.912	–.139	–.470
Item 32	2.79	.039	2.72	2.87	.957	.033	–.577
Item 33	3.74	.031	3.68	3.80	.753	–.855	1.109
Item 34	2.97	.046	2.88	3.06	1.139	.174	–.785
Item 35	3.18	.043	3.09	3.26	1.052	–.064	–.723
Item 36	2.28	.039	2.20	2.35	.957	.483	–.041
Item 37	4.34	.029	4.28	4.39	.704	–.893	.833
Item 38	3.48	.042	3.39	3.56	1.035	–.389	–.527
Item 39	2.28	.043	2.19	2.36	1.045	.448	–.527
Item 40	2.18	.045	2.09	2.27	1.106	.637	–.500
Item 41	2.58	.044	2.49	2.66	1.078	.369	–.525
Item 42	2.34	.040	2.26	2.42	.976	.490	–.180
Item 43	2.78	.040	2.71	2.86	.987	.214	–.590
Item 44	3.22	.045	3.13	3.31	1.105	–.194	–.633
Item 45	2.08	.040	2.00	2.16	.992	.643	–.224
Item 46	2.85	.040	2.77	2.93	.974	.336	–.363
Item 47	3.12	.046	3.03	3.21	1.123	–.017	–.755
Item 48	3.80	.043	3.71	3.88	1.052	–.525	–.645

Note: N = 602 for all items. The final items and their wording are displayed in Table 5.

For the following analyses, the items 1, 5, 7, 13, 15, 16, 18, 23, 25, 27, 30, 33, 37, and 38 were coded reversely due to their phrasing.

To measure convergent validity, the Perceived Stress Scale (PSS) and the Kenny-Music-Performance-Anxiety-Inventory (K-MPAI-R) were investigated and correlated with the final LIMIT scales. High correlations thereby depict high convergent validity, whereas low correlations depict specificity of the used tool (5). The PSS is not designed for a specific population and does not entirely fit musicians' reality of life. High correlations are expected due to the common topic "stress." The K-MPAI-R was chosen since MPA appears to be a major source of psychological stress in musicians (17–19,27). Therefore, high correlations were expected.

Participants

A link to the online survey including the LIMIT and demographic data was sent to musicians and spread via a

TABLE 3. Parallel-Test Analysis

Random Data Eigenvalues Parallel Analysis			
Root	Means	Percentile	Initial Eigenvalues
1.000000	1.541559	1.606243	13.658
2.000000	1.485063	1.531595	2.666
3.000000	1.439591	1.475970	1.949
4.000000	1.398332	1.434176	1.527
5.000000	1.336924	1.395044	1.341
6.000000	1.336816	1.369774	1.283
7.000000	1.304637	1.328919	1.119
8.000000	1.277315	1.307028	1.058
9.000000	1.253102	1.274016	1.040
10.000000	1.226867	1.252926	.938
11.000000	1.201361	1.222081	.862
12.000000	1.178115	1.198525	.817
13.000000	1.157771	1.175481	.758
14.000000	1.132777	1.152807	.736
15.000000	1.109950	1.128998	.705
16.000000	1.088968	1.107130	.663
17.000000	1.067196	1.084775	.640
18.000000	1.046594	1.064623	.621
19.000000	1.027122	1.048533	.596
20.000000	1.008328	1.025705	.563

Note: Specifications for this run: Ncases = 602, Nvariables = 42, Ndatsets = 100, Percent = 95.

snowball system in social media and in German music schools, universities, and orchestras.

Before the actual survey, participants were informed about the background of the questionnaire, the ethics, the possibility to end the participation any time, and the criteria for inclusion, namely: 1) legal age, 2) fluency in the German language, and 3) playing an instrument, singing, or conducting including on-stage experience. All participants in the survey gave informed consent prior to submitting their data. Musicians of all levels, musical genres, and instruments could participate during a 6-week survey period.

The study was approved by the local ethics committee of the University of Lübeck, with reference to questionnaire studies, no. 2023-112.

RESULTS

Participant Demographics

A total of N = 602 participants were included in the data analysis with 221 (36.7%) males, 377 (62.6%) females, and 4 (0.7%) non-binary participants. The age was distributed between 18 and 80 years (M = 34.94, SD 14.84). Participants were divided into four subgroups: 135 (22.4%) were professional musicians employed in orchestras or jazz-ensembles, 59 (9.8%) freelancers, 224 (37.2%) music students, and 184 (30.6%) amateurs. The distribution of instruments played by the total sample and the subgroups is displayed in Appendix 2. Regarding the total sample, 546 (90.6%) were affiliated with classical music, 23 (3.8%) with jazz, and 33 (5.5%) with pop music. The professionals were employed for an average of M = 18.88 years (SD 12.83).

Finally, the participants were asked about existing diagnoses of psychological disorders. One-hundred twenty-two (20.3%) indicated to have perceived a diagnosis, which was given on average M = 6.42 years ago (SD 8.14). An overview of the diagnoses is displayed in Appendix 3. Depression was the most frequently mentioned diagnosis, in 42.6% of pre-diagnosed participants, while it was even more commonly mentioned as co-diagnosis (67.2%). Of the total sample, 8.6% had suffered from depression before. Seven participants did not specify their diagnosis after indicating that they had been given one.

Assumption Checks

Since the variables were intendedly not all normally distributed, following a variable item difficulty, Spearman's correlations were computed to quantify monotone associations between the variables (Table 2).

Based on the requirements by Tabachnick and Fidell (29), items 2, 5, 6, 8, 14, and 25 needed to be excluded, since they showed no correlation of $\rho > 0.3$ with any of the remaining items. None of the items correlated with $\rho > 0.9$, so that multicollinearity could be ruled out.

The Kaiser-Meyer-Olkin (KMO) and the Bartlett's test of sphericity were conducted to check all assumption criteria for a factor analysis. The KMO showed an excellent result (0.945). The Bartlett's test of sphericity was significant, indicating a reasonable association between the variables [$\chi^2 = 11724.69$, $df = 861$, $p < 0.001$].

After assumption checks were made for the remaining 42 items of the LIMIT and all requirements were met, an EFA was conducted.

Extraction of Factors

Multiple strategies were followed to find an adequate number of factors for the new screening tool. A factor analysis using a direct oblimin rotation with maximum likelihood was computed. Investigation of the eigenvalues according to the Kaiser-Guttman-Criterion revealed nine factors that showed eigenvalues > 1 and might therefore be extracted following the criterion. Additionally, a parallel-test following Horn (12) was conducted with 100 data sets

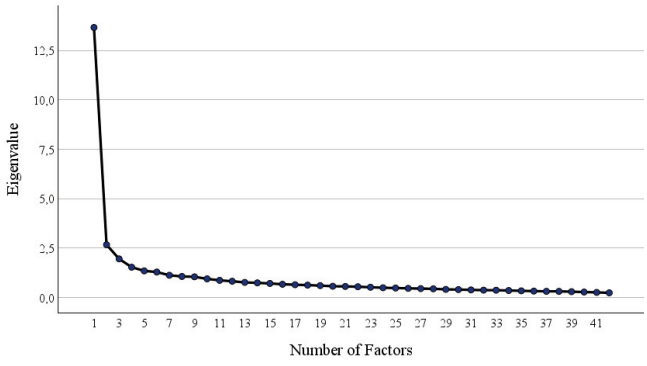

FIGURE 2. Screeplot of the LIMIT.

TABLE 4. Initial Pattern Matrix of the LIMIT with Four Factors

	Factor						
	1	2	3	4	h^2	u^2	Power
LIMIT27	.796				.566	.434	.542
LIMIT16	.753				.544	.456	.549
LIMIT42	.694				.600	.400	.648
LIMIT01	.660				.419	.581	.469
LIMIT43	.651				.504	.496	.606
LIMIT15	.650				.490	.510	.581
LIMIT03	.561				.496	.504	.623
LIMIT46	.551				.371	.629	.525
LIMIT44	.494				.421	.579	.569
LIMIT30	.459				.282	.718	.454
LIMIT47	.408			.334	.409	.591	.548
LIMIT41	.386				.598	.402	.744
LIMIT07	.326				.370	.630	.566
LIMIT37					.292	.708	.532
LIMIT19		.888			.703	.297	.647
LIMIT04		.699			.536	.464	.598
LIMIT24		.683			.678	.422	.650
LIMIT39		.645			.427	.573	.532
LIMIT35		.561			.620	.380	.704
LIMIT17		.439			.230	.770	.398
LIMIT13		.394			.496	.504	.647
LIMIT09					.185	.815	.374
LIMIT18					.211	.789	.454
LIMIT22			.707		.470	.430	.576
LIMIT29			.695		.557	.443	.561
LIMIT10			.532		.397	.603	.491
LIMIT31			.519		.341	.659	.402
LIMIT20	.313		.453		.366	.634	.503
LIMIT33			.436	–.316	.402	.598	.415
LIMIT40			.416		.423	.577	.575
LIMIT45			.388		.152	.848	.234
LIMIT28	.324		.354		.381	.619	.543
LIMIT36					.147	.853	.324
LIMIT23					.277	.723	.509
LIMIT48				.566	.525	.475	.588
LIMIT11				.516	.272	.728	.230
LIMIT26				.456	.513	.487	.631
LIMIT38				.342	.237	.763	.387
LIMIT34				.333	.485	.515	.654
LIMIT12					.410	.590	.601
LIMIT32					.316	.684	.494
LIMIT21					.329	.671	.546

Note: Loadings below λ <0.3 are not shown. Extraction method: maximum-likelihood, rotation method: direct-oblimin rotation with Kaiser normalization. Rotation converged within 20 iterations. h^2 = communalities, u^2 = uniqueness, power = statistical selectivity.

and α = 0.05 (Table 3). This test was found to support a four-factor solution, since the initial Eigenvalues extend the percentile until the 4th factor. Velicer's minimum average partial (MAP) test was conducted as a third extraction method. It compares the partialized extracted factors and the regarded partial correlations, the number of extracted factors follow the lowest squared partial correlations. The results indicated three factors according to the original MAP test and six factors following the revised MAP test to be extracted from the data. Additionally, a Screeplot (Figure 2) was inspected, searching for the "break" in the eigenvalue depiction. It indicated six factors based on subjective evaluation.

In summary, factorial solutions with nine, four, and six factors were possible based on the given parameters. All possibilities were analyzed to find the most adequate solution for the LIMIT based on their content and pattern matrices. While a pattern matrix with both, six and nine factors, showed at least one factor with only two items and lower factor loadings, the four-factor solution was investigated further as the most promising, viable factor structure. A model comparison using RMSEA, TLI and BIC revealed similar results (Table 6).

Factor Analysis

The pattern matrix including the items' communalities h^2, uniqueness u^2, and their statistical selectivity is displayed in Table 4. Items with factor loadings λ < 0.3 were eliminated in the pattern matrix as they did not sufficiently depict the factor, i.e., items 9, 12, 18, 21, 23, 32, 36, and 37. The final version of the LIMIT therefore consisted of 34 items (Appendix 4).

All factors appeared to be coherent with regard to the items' content and were named accordingly. All items, factors, and the factors names are displayed in Table 5. The factor intercorrelations showed substantial Spearman's ρ correlations (Table 7).

Quality Criteria

The internal consistency for all 34 items of Cronbach's α = 0.938 is an excellent score. Additionally, the parameter for the four factors was investigated separately with good internal consistencies (self-efficacy α = 0.905, depression α = 0.859, time management α = 0.817, pressure α = 0.728).

Convergent validity was fulfilled with positive correlations between the PSS subscale "Helplessness" (ρ = 0.685) and the entire K-MPAI-R (ρ = 0.880), as high correlations between two scales indicate convergent validity. Multicollinearity is not expected given the correlation. All correlations turned significant with p < 0.001. Content validity, internal validity and face validity are given by including experts in the construction of the questionnaire.

DISCUSSION

The present study presents the development and factor analysis of the *Lübecker Inventar für psychischen Stress bei Musizierenden* (LIMIT), a new screening tool to measure psychological stress in musicians using only 34 items (Appendix 4 and 4a). The goal was to create a measuring tool applicable to musicians of all levels (i.e., employed musicians, freelancers, music students, and amateurs) that reflects the particular challenges of making music and screens stress across different domains.

A Four-Factor Solution Capturing Psychological Stress in Musicians

Several methods were used to find an adequate number of factors to be extracted from the data. The parallel test sup-

TABLE 5. The Items and Factors of the Final LIMIT Version

Item	Wording	Factor	Name
01 (r)	[On stage I have full control of my abilities.]	1	Self-efficacy
02	[I am afraid to perform.]		
04 (r)	[I am satisfied with the speed of my musical development.]		
08 (r)	[I feel self-confident when making music.]		
09 (r)	[Even during large and important concerts or auditions I can trust in my musical abilities.]		
16 (r)	[On stage I can entirely be myself, I feel comfortable and at ease.]		
19 (r)	[After the concert I am satisfied with my performance despite minor mistakes or uncertainties.]		
27	[The thought of the next performance or audition worries me.]		
28	[When making music, I feel restricted and insecure.]		
29	[During important concerts or auditions, a lot does not work out the way I want it to.]		
30	[I think I play or sing worse than others.]		
32 (r)	[During performances I do not sing or play as well as I would have had expected based on my abilities.]		
33	[When making music I notice physical signs of nervousness (sweating, dry mouth, cold fingers).]		
03	[I do not have any energy and cannot motivate myself to do something.]	2	Depression
07 (r)	[I am very relaxed and at ease.]		
10	[I have difficulties falling asleep and/or sleeping through the night.]		
11	[I feel depressed and hopeless.]		
14	[I cannot control my spiraling thoughts.]		
23	[I feel inner tension.]		
25	[Things that have previously brought me joy are not enjoyable anymore.]		
05	[It is difficult for me to organize my everyday life around my musical activities.]	3	Time management
12	[Others expect more from me in musical situations than I can deliver.]		
13	[I cannot keep up with preparations for concerts, lessons or auditions.]		
17	[During performances or auditions, I often think that I should have practiced more.]		
18	[I am given too many diverse tasks that I cannot master within the given time frame.]		
20	[Due to my musical activities, I have to cancel other appointments.]		
21 (r)	[I am well prepared for my musical activities.]		
26	[I feel lonely when I can only do minimal other activities because of my solo musical practice.]		
31	[My family and friends are disappointed when I have to cancel plans [because of a concert.]		
06	[I want to be the best when making music.]	4	Pressure
15	[The intense competition amongst musicians puts me under pressure.]		
22	[The judgment of other musicians weighs on me.]		
24 (r)	[Small mistakes when making music do not have an effect on me.]		
34	[I put pressure on myself to meet my standards when making music.]		

Note: (r) = item must be coded reversely for the data evaluation. Items are displayed in English while data acquisition took place using the original German wordings. An English validation of the LIMIT is pending.

ported four factors, while the MAP-test and the screeplot indicated six factors. The eigenvalue analysis supported a nine-factor solution, however, the problem of over-factoring, in other words extracting too many factors for the given number of items, needs to be considered when extracting nine factors (7). There is no general rule on how many factors to extract as a maximum given a certain number of items. Revuelta and colleagues (25) investigated the impact of the type of rotation on the factors to be extracted. They found maximum-likelihood estimations to rather lead to overfactoring in skewed distributions of the items. Since a maximum-likelihood estimation has been used in the analysis of the LIMIT and, following Bühner (4), none of the mentioned parameters was computed, over-factoring with nine factors on 34 items for the LIMIT cannot be ruled out.

Literature on the extraction of factors emphasizes that any factorial solution given by any extraction method is always to be viewed subjectively by the researcher, as they must assess the plausibility of the factors in terms of the content which is given by the included items (3,4,8). Thus, there is no "correct" number of factors to extract from the data. It is rather the number of factors that offers the best arguments regarding content and parameters. However, the actual poor fit of the nine- and six-factor solutions regarding the strengths of the factors is supported by Montoya and Edwards (23), who emphasize the lack of conclusiveness given by parameters and the need for direct model compar-

TABLE 6. Model Comparison

Factors	Chi-Square	df	Sig.	RMSEA	TLI	BIC
4	2037.595	699	.000	.0564	0.8482	3112.8382
6	1440.553	624	.000	.0466	0.8962	3053.4178
9	957.901	519	.000	.0375	0.9329	4279.6346

Note: RMSEA = root-mean-square-error of assumption, TLI = Tucker-Lewis-Index, BIC = Bayesian information criterion.

TABLE 7. Factor Intercorrelations

	Self-efficacy	Depression	Time Management	Pressure
Self-efficacy	—			
Depression	.602	—		
Time management	.513	.623	—	
Pressure	.369	.568	.372	—

Note: Spearman's ρ correlations.

ison (Table 6) as well as the subjective investigation as already mentioned above. Considering the model comparison, the solutions using nine and six factors were finally neglected and the four-factor solution was investigated.

In summary, a four-factor solution is considered the most reasonable in terms of creating a reliable and valid instrument, with items loading interpretably on four subscales named "self-efficacy," "depression," "time-management," and "pressure." When comparing the factors' names with the keywords taken from the literature research and the expert ratings, a clear association between the factors and the construct of psychological stress in musicians becomes evident. All intended domains from the nomological network (Figure 1) are represented in the final version of the LIMIT, which demonstrates the good fit between network and construct.

Following the available literature, emotional and cognitive aspects were expected to have the most severe impact on psychological stress in musicians. The content of the four final factors is in line with these findings, as self-efficacy, depression, and pressure are consent with the first domain in the nomological network, while time-management is linked to the environmental/social domain. The behavioral aspects of psychological stress are not illustrated within a separate factor, but the items depicting these aspects are clearly represented within the four factors. However, psychological stress appears to be no separate factor in the LIMIT. Several reasons might have caused this result.

Psychological stress is associated with most of the remaining keywords and aspects (Figure 1). Even if no precise correlations were calculated in previous research, the association is mentioned frequently (i.e., 2,16). It is therefore possible that stress lies within all factors and in fact has the biggest impact on psychological stress but is hard to separate from the domains. Looking back at the WHO's definition of stress (see introduction), similarities between this definition and the definition of psychological stress are obvious. It must therefore be considered that psychological stress is a latent variable measured by the LIMIT and cannot entirely be separated from the desired construct due to its connatural appearance in the musicians' lives.

Self-efficacy depicts the factor with the most eigenvalue. This is not surprising given the literature on the association between self-efficacy, its influencing factors and psychological stress (Figure 1). Self-efficacy is closely related to other stressful aspects experienced by musicians and is likely related to negative experiences on stage and thus the development of MPA, low confidence, and low self-esteem (19). Hence, a lack of self-efficacy might depict the aspect that creates the most psychological stress for musicians. Professional musicians depend on performing on stage or in studios as their main source of income, either as part of their employment in an orchestra or ensemble, or as freelancers. When the performance is endangered by MPA due to low self-efficacy, the musicians begin to lose their basis (17). It is therefore understandable that a lack of self-efficacy shows such a big impact on psychological stress in the present sample. Having the opportunity to perform is essential for music students. They must create knowledge about repertoire and expand their own repertoire list. Additionally, they must perform during auditions to win jobs, internships, or academies in professional orchestras or ensembles, which is even more complex when dealing with a lack of self-efficacy. Thereby, fear and MPA decrease the level of their performances.

The high levels of MPA in music students have been shown in previous studies (i.e., 25), which is why the strong impact on psychological stress expressed in low self-efficacy is once again not surprising. Finally, arguments for the strong influence of low self-efficacy on psychological stress are on hand for amateurs as well. In contrast to the other mentioned subgroups, amateurs do not depend on their performances to create a living. However, the design of their free time often strongly relies on making music, e.g., meeting friends in their ensembles or having a timeout from their jobs outside of the music sector. Once low self-efficacy impairs the comfort of being on stage for amateur musicians, a big part of their free time is accordingly impaired as well, which in turn has a direct influence on their psychological stress.

Demographic and Sample Considerations

Of the current sample, 112 (20.3%) participants reported to have received at least one psychological diagnosis, and most of these diagnoses were depression with or without a co-diagnosis (66.9% of the subgroup, 13.5% of the entire sample). According to Jacobi et al. (12), the prevalence of depression in Germany lies at 8.6%. Since increasing numbers of such diagnoses have been reported during the COVID-19 pandemic (5), an increasing prevalence is expected in upcoming statistical analyses. However, musicians of this sample showed a higher prevalence compared to the German average which is concerning and highlights the importance of implementing a proper screening tool to prevent musicians from developing psychological disorders. Nevertheless, the high prevalence of psychiatric diagnoses in the present sample might have an influence on the results of the LIMIT. MPA appears to have the strongest influence on psychological stress as discussed above, while 5.3% of the entire sample had a previous (co-)diagnosis of anxiety. A bias might therefore occur in the strength of the influence of each aspect and the factors' eigenvalues. However, respecting only the data of psychologically healthy individuals without a previous diagnosis makes no sense

when developing a screening tool for psychological stress, as entirely healthy individuals are likely to have more resilience and therefore do not depict the population of musicians in need of such a screening instrument.

Limitations

The first version of the LIMIT was constructed using items in German. An English validation is being developed.

As the number of factors is dependent on the rotation method, the chosen methods might be a limiting factor in the analysis. An oblique rotation was chosen since an intercorrelation between the factors was expected given the literature research (Table 7). Two oblique extraction methods were compared, namely promax and direct-oblimin, and information about the best fitting rotation method for the data was gathered. The results of literature research showed no distinctive difference in either rotation method or changes of the parameters. Thus, a direct-oblimin rotation was chosen due to the simple structure of the results given by this rotation, which would be easier to interpret. However, future research could try a promax rotation and discuss the results compared to the present findings.

Furthermore, a revised version of the LIMIT questionnaire might revisit the exact wording of items. Wording was carried out subjectively, based on the given literature. We are confident to have attained a valid top-down method by including experts and inviting eminent scientists within the field of musicians' medicine to rate the given keywords regarding their importance for the construct of psychological stress in musicians. Experts rated the keywords in only one round and were given the opportunity to comment on the aspects. It added additional value to the research to have experts rate every item in detail and create items that fit the domains based on their expert knowledge. After critical discussion within our group to avoid potential misunderstandings, items were rephrased accordingly following the criteria by Bühner (4). However, there remains a risk of some items being ambiguous. Finally, 14 items were rejected from the final questionnaire, still leaving an adequate pool of items for the LIMIT. A revised version of the LIMIT should apply an entire Delphi method (20) for revisiting the items' wording and finding keywords to be rated by involving more revisions by more researchers and musicians themselves.

Finally, the survey was spread online via a snowball system. It cannot be ensured that all participants took part while being in their usual everyday environment. Secondly, this distribution method might have led to participants taking part who were interested in the topic of psychological health in musicians and/or suffer from psychological disorders. The composition of the sample might therefore be biased.

Conclusion

The present study presents a new screening tool to measure psychological stress in musicians. The new questionnaire captures four separable facets of psychological stress in musicians, "self-efficacy," "depression," "time-management," and "pressure," based on 34 items measured in over 600 practicing musicians. The original German version and the translated English version of the LIMIT are to be found in Appendices 4 and 4a, including the introduction and evaluation guide.

This new screening tool for psychological stress in musicians bears the opportunity to influence knowledge about the stressful aspects of music making of all levels. While preventive offers are still scarce in German conservatories, orchestras, or music schools, the new tool can be easily implemented in all institutions and thereby might help musicians to identify stressors early on and deal with them effectively before serious damage afflicts on their mental health. In addition, the reluctance to seek professional help from psychiatrists or psychotherapists will hopefully be reduced once musicians are confronted with their own psychological wellbeing regularly while filling in the LIMIT. Teachers and professors as well as orchestra managements should make use of the new screening tool regularly to enable early identification of changes in employees' or students' mental health. In addition, the tool can help psychiatrists and psychotherapists to investigate their clients' stressors and implement therapy methods designed for the specific needs of the individual musician.

Future studies should re-investigate and validate the LIMITs' structure in a larger sample and thus might revise the factorial structure. Additionally, the items' wording should be reinvestigated by completing a Delphi method and incorporating musicians' opinions and keywords. Finally, the English translation of the German LIMIT is pending.

Authors' Contributions: Christine Sickert: conceptualization, data collection, data analysis, writing—original, draft; Stine Alpheis: reviewing and editing; Jonas Obleser: reviewing and editing, supervision; Daniel S. Scholz: reviewing and editing, supervision, validation.

Data availability: The data that support the findings of this study are available from the corresponding author upon reasonable request.

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APPENDIX 1. Original German Items of the LIMIT

Domain/Item	Pol.	Comment
Stress		
Ich fühle mich innerlich angespannt.	+	Inner exertion, physiological
Ich bin sehr entspannt und gelassen.	–	strain, locus of control
Ich denke, dass ich beim Musikmachen die Kontrolle an andere abgebe.	+	
Concerns		
Ich habe meine Gedanken nicht unter Kontrolle und befinde mich in Gedankenspiralen.	+	Impatience about progress,
Ich bin besorgt über verschiedene Aspekte des Musizierens.	+	control over thoughts,
Ich bin zufrieden mit der Geschwindigkeit meiner musikalischen Entwicklung.	–	worries
Music Performance Anxiety (MPA)/Anxiety		
Auf der Bühne kann ich ganz ich selbst sein, dort fühle ich mich wohl.	–	Cognitive aspect of MPA
Ich habe Angst vor meinen Auftritten.	+	(major impact)
Der Gedanke an meine nächsten Auftritte oder Probespiele bereitet mir Sorgen.	+	
Self-Esteem		
Ich fühle mich beim Musizieren selbstbewusst.	–	
Ich kann beim Musizieren nicht aus mir herauskommen und bin unsicher.	+	
Ich denke, dass ich schlechter spiele oder singe als andere.	+	
Depression		
Ich fühle mich niedergeschlagen und hoffnungslos.	+	Main diagnostic criteria of
Ich bin antriebslos und kann mich nicht aufraffen.	+	depression
Dinge, die mir früher Freude bereitet haben, tun das jetzt nicht mehr.	+	
Overload/Underload		
Mir werden zu viele verschiedene Aufgaben gestellt, die ich in der Kürze der Zeit nicht meistern kann.	+	
Ich fühle mich gelangweilt und unterfordert von den Stücken, die ich vorbereiten soll.	+	
Ich komme mit dem Vorbereiten von Konzerten, meinem Unterricht oder Probespielen nicht mehr hinterher.	+	
Pressure from Oneself		
Ich mache mir selbst Druck, meinen Ansprüchen beim Musizieren zu genügen.	+	Comparison, choking under
Ich möchte der/die Beste beim Musizieren sein.	+	pressure
Bei Auftritten spiele oder singe ich nicht so gut, wie ich es meinen Fähigkeiten entsprechend von mir erwartet hätte.	+	
Perfectionism		
Ich strebe nach Fehlerfreiheit in meiner Musik.	+	
Kleine Fehler beim Musizieren machen mir nichts aus.	–	
Nach dem Konzert bin ich mit meinem Auftritt trotz kleiner Fehler oder Unsicherheiten zufrieden	–	
Self-Efficacy		
Ich kann auch bei großen und wichtigen Konzerten oder Probespielen auf meine musikalischen Fähigkeiten vertrauen.	–	
Bei wichtigen Konzerten oder Probespielen funktioniert vieles nicht so, wie ich will.	+	
Auf der Bühne habe ich die volle Kontrolle über meine Fähigkeiten.	–	
Physical Arousal		
Beim Musizieren habe ich Schmerzen.	+	
Durch das Musikmachen bin ich körperlich erschöpft.	+	
Beim Musizieren bemerke ich körperliche Anzeichen von Nervosität (Schwitzen, trockener Mund, kalte Finger).		
Sleep Disturbances		
Ich kann schlecht ein- und/oder durchschlafen.	+	
In Lebensphasen mit vielen musikalischen Aktivitäten schlafe ich gut.	–	
Ich kann vor wichtigen Konzerten nicht einschlafen oder wache nachts auf.	+	
Preparation		
Ich bin für meine musikalischen Aktivitäten gut vorbereitet.	–	
Bei Auftritten oder Probespielen denke ich, dass ich besser mehr geübt hätte.	+	
Ich finde immer noch eine Sache, die ich üben kann.	+	
Interference from Other Activities		
Wegen meiner musikalischen Aktivitäten musste ich andere Termine absagen.	+	
Es bereitet mir Schwierigkeiten, meinen Alltag um meine musikalischen Verpflichtungen herum zu organisieren.	+	
Meine Freunde oder Familie sind enttäuscht, wenn ich Termine mit ihnen wegen eines Konzertes absagen muss.	+	

APPENDIX 1. Original German Items of the LIMIT (*continued*)

Domain/Item	Pol.	Comment
Pressure from Others		
Die Beurteilung durch andere Musiker*innen belastet mich.	+	
Der Konkurrenzkampf unter Musiker*innen setzt mich unter Druck.	+	
Andere erwarten musikalisch mehr von mir als ich leisten kann.	+	
Person-Environment Fit		
Es stört mich, dass ich so spielen oder singen muss, wie mein/e Lehrer*in oder der/die Dirigent*in es mir sagt.	+	Loneliness, lack of autonomy
Musik ist für mich eine Möglichkeit Kraft und Energie zu schöpfen.	–	
Ich fühle mich einsam, wenn ich wegen des Übens wenig anderes unternehmen kann.	+	
Resilience		
Ich bin mir bewusst, welche musikalischen Aufgaben mich stressen.	–	Challenge mindset,
Das Musizieren tut mir gut.	–	strengthening psychological
Meine Familie und Freunde unterstützen mich bei meinen musikalischen Vorhaben.	–	skills, facilitative environment

APPENDIX 2. Instruments Played by the Study Participants

	Employed professionals *n* = 135	Freelancers *n* = 59	Music students *n* = 224	Amateurs *n* = 184	Total *n* = 602
Piano	2 / 1.5%	6 / 10.2%	31 / 13.8%	4 / 2.2%	43 / 7.1%
Violin	29 / 21.5%	8 / 13.6%	34 / 15.2%	44 / 23.9%	115 / 19.1%
Viola	11 / 8.1%	1 / 1.7%	5 / 2.2%	8 / 4.3%	25 / 4.2%
Cello	14 / 10.4%	5 / 8.4%	17 / 7.6%	21 / 11.4%	57 / 9.5%
Bass/E-Bass	7 / 5.2%	2 / 3.4%	8 / 3.6%	4 / 2.2%	21 / 3.5%
Flute	7 / 5.2%	1 / 1.7%	20 / 8.9%	10 / 5.4%	38 / 6.3%
Oboe	5 / 3.7%	3 / 5.1%	2 / 8.9%	6 / 3.3%	16 / 2.7%
Clarinet	7 / 5.2%	4 / 6.8%	12 / 5.4%	7 / 3.8%	30 / 5.0%
Bassoon	6 / 4.4%	1 / 1.7%	2 / 0.9%	6 / 3.3%	15 / 2.5%
Trumpet	2 / 1.5%	0	4 / 1.8%	12 / 6.5%	18 / 3.0%
French Horn	19 / 14.1%	9 / 15.3%	7 / 3.1%	19 / 10.3%	54 / 9.0%
Trombone	8 / 5.9%	2 / 3.4%	8 / 3.6%	8 / 4.3%	26 / 4.3%
Tuba	3 / 2.2%	0	3 / 1.3%	3 / 1.6%	9 / 1.5%
Timpani/Percussion	7 / 5.2%	3 / 5.1%	7 / 3.1%	2 / 1.1%	19 / 3.2%
Harp	1 / 0.7%	0	0	0	1 / 0.2%
Saxophone	0	0	5 / 2.2%	4 / 2.2%	9 / 1.5%
Guitar	0	4 / 6.8%	5 / 2.2%	6 / 3.3%	15 / 2.5%
Organ	1 / 0.7%	2 / 3.4%	8 / 3.6%	2 / 1.1%	13 / 2.2%
Singing	3 / 2.2%	2 / 3.4%	35 / 15.6%	16 / 8.7%	56 / 9.3%
Conducting	3 / 2.2%	6 / 10.2%	8 / 3.6%	1 / 0.5%	18 / 3.0%
Recorder	0	0	2 / 0.9%	1 / 0.5%	3 / 0.5%
DJ	0	0	1 / 0.4%	0	1 / 0.2%

APPENDIX 3. Types of Psychological Disorders Reported by the 112 (20.3%) Musicians Who Had Been Diagnosed Previously

Primary Diagnosis*	Musicians with psychological disorder (n/%) *n* = 122	Percentage of Total *n* = 602
ADHD	2 / 1.6%	0.3%
Anxiety/panic disorder	13 / 10.6%	2.2%
Social phobia	2 / 1.6%	0.3%
Adaptive disorder	3 / 2.4%	0.5%
Bipolar disorder	1 / 0.8%	0.2%
Burnout	2 / 1.6%	0.3%
Eating disorder	3 / 2.4%	0.5%
Depression	52 / 42.6%	8.6%
ADHD	3 / 2.4%	0.5%
Anxiety disorder	14 / 11.4%	2.3%
Burnout	1 / 0.8%	0.2%
Eating disorder	2 / 1.6%	0.3%
Personality disorder	3 / 2.4%	0.5%
PTSD	4 / 3.3%	0.6%
Social phobia	3 / 2.4%	0.5%
Obsessive-compulsive disorder	3 / 2.4%	0.5%
Psychogenic pain	1 / 0.8%	0.2%
PTSD	3 / 2.4%	0.5%
N/A	7 / 0.8%	0.2%

*Diagnoses in the second column are co-diagnoses of the related primary diagnosis on the far left.

APPENDIX 4. Anwendung des Lübecker Inventar für psychischen Stress bei Musizierenden (LIMIT)

Hintergrund

Der vorliegende Fragebogen „LIMIT" wurde zur Messung psychischen Stresses bei Musizierenden aller Niveaus entworfen. Ein regelmäßiges Screening zur Verlaufsmessung psychischen Stresses durch Instrumentallehrer*innen und Lehrbeauftragte wird empfohlen, der LIMIT stellt jedoch kein diagnostisches Erhebungsinstrument dar. Eine Ableitung psychischer Erkrankungen anhand der Summenscores des LIMIT ist daher nicht zulässig. Bei steigender Tendenz in regelmäßigen Screenings ist jedoch eine Beratung durch den/die Hausärzt*in oder die Inanspruchnahme eines Erstgespräches bei psychologischen Psychotherapeut*innen oder Psychiater*innen zur frühzeitigen Prävention ratsam.

Auswertung

Der Summenscore des Fragebogens wird durch Addition der Punktwerte einer Antwortoption berechnet. „Nie" = 1 Punkt, „Selten" = 2 Punkte, „Manchmal" = 3 Punkte, „Oft" = 4 Punkte, „Immer" = 5 Punkte. Dabei werden Items 1, 7, 13, 15, 16, 27, 30, 33, 38 und 46 in ihrem Punktewert invertiert (r), sodass „Nie" hier 5 Punkten und „immer" 1 Punkt entsprechen. Der Summenscore bewegt sich somit zwischen 74 und 130 Punkten, wobei ein niedriger Wert eine geringe und ein hoher Wert eine hohe Belastung durch psychischen Stress widerspiegelt. Einen Cut-Off Score gibt es nicht, da ein Verlauf zur Beobachtung des psychischen Stresses über verschiedene Messzeitpunkte ersichtlich sein soll.
Zudem kann die Auswertung anhand der verschiedenen Faktoren des Fragebogens erfolgen (s.u.).

Lübecker Inventar für psychischen Stress bei Musizierenden (LIMIT)

		Nie	Selten	Manchmal	Oft	Immer
1.	Auf der Bühne habe ich die volle Kontrolle über meine Fähigkeiten.	○	○	○	○	○
2.	Ich habe Angst vor meinen Auftritten.	○	○	○	○	○
3.	Ich bin antriebslos und kann mich nicht aufraffen.	○	○	○	○	○
4.	Ich bin zufrieden mit der Geschwindigkeit meiner musikalischen Entwicklung.	○	○	○	○	○
5.	Es bereitet mir Schwierigkeiten, meinen Alltag um meine musikalischen Verpflichtungen herum zu organisieren.	○	○	○	○	○
6.	Ich möchte der/die Beste beim Musizieren sein.	○	○	○	○	○
7.	Ich bin sehr entspannt und gelassen.	○	○	○	○	○
8.	Ich fühle mich beim Musizieren selbstbewusst.	○	○	○	○	○
9.	Ich kann auch bei großen und wichtigen Konzerten oder Probespielen auf meine musikalischen Fähigkeiten vertrauen.	○	○	○	○	○
10.	Ich kann schlecht ein- und/oder durchschlafen.	○	○	○	○	○
11.	Ich fühle mich niedergeschlagen und hoffnungslos.	○	○	○	○	○
12.	Andere erwarten musikalisch mehr von mir als ich leisten kann.	○	○	○	○	○
13.	Ich komme mit dem Vorbereiten von Konzerten, meinem Unterricht oder Probespielen nicht mehr hinterher.	○	○	○	○	○
14.	Ich habe meine Gedanken nicht unter Kontrolle und befinde mich in Gedankenspiralen.	○	○	○	○	○
15.	Der Konkurrenzkampf unter Musiker*innen setzt mich unter Druck.	○	○	○	○	○
16.	Auf der Bühne kann ich ganz ich selbst sein, dort fühle ich mich wohl.	○	○	○	○	○
17.	Bei Auftritten oder Probespielen denke ich, dass ich besser mehr geübt hätte.	○	○	○	○	○
18.	Mir werden zu viele verschiedene Aufgaben gestellt, die ich in der Kürze der Zeit nicht meistern kann.	○	○	○	○	○
19.	Nach dem Konzert bin ich mit meinem Auftritt trotz kleiner Fehler oder Unsicherheiten zufrieden.	○	○	○	○	○
20.	Wegen meiner musikalischen Aktivitäten muss ich andere Termine absagen.	○	○	○	○	○
21.	Ich bin für meine musikalischen Aktivitäten gut vorbereitet.	○	○	○	○	○
22.	Die Beurteilung durch andere Musiker*innen belastet mich.	○	○	○	○	○
23.	Ich fühle mich innerlich angespannt.	○	○	○	○	○
24.	Kleine Fehler beim Musizieren machen mir nichts aus.	○	○	○	○	○
25.	Dinge, die mir früher Freude bereitet haben, tun das jetzt nicht mehr.	○	○	○	○	○
26.	Ich fühle mich einsam, wenn ich wegen des Übens wenig anderes unternehmen kann.	○	○	○	○	○
27.	Der Gedanke an meine nächsten Auftritte oder Probespiele bereitet mir Sorgen.	○	○	○	○	○
28.	Ich kann beim Musizieren nicht aus mir herauskommen und bin unsicher.	○	○	○	○	○
29.	Bei wichtigen Konzerten oder Probespielen funktioniert vieles nicht so, wie ich will.	○	○	○	○	○
30.	Ich denke, dass ich schlechter spiele oder singe als andere.	○	○	○	○	○
31.	Meine Familie oder Freund*innen sind enttäuscht, wenn ich Termine mit ihnen wegen eines Konzertes absagen muss.	○	○	○	○	○
32.	Bei Auftritten spiele oder singe ich nicht so gut, wie ich es meinen Fähigkeiten entsprechend erwartet hätte.	○	○	○	○	○
33.	Beim Musizieren bemerke ich körperliche Anzeichen von Nervosität (Schwitzen, trockener Mund, kalte Finger).	○	○	○	○	○
34.	Ich mache mir selbst Druck, meinen Ansprüchen beim Musizieren zu genügen.	○	○	○	○	○

Selbstwert		Depression		Zeitmanagement		Druck	
Item	Score	Item	Score	Item	Score	Item	Score
Item 01 (r)		Item 03		Item 05		Item 06	
tem 02		Item 07 (r)		Item 12		Item 15	
Item 04 (r)		Item 10		Item 13		Item 22	
Item 08 (r)		Item 11		Item 17		Item 24 (r)	
Item 09 (r)		Item 14		Item 18		Item 34	
Item 16 (r)		Item 23		Item 20			
Item 19 (r)		Item 25		Item 21 (r)			
Item 27				Item 26			
Item 28				Item 31			
Item 29							
Item 30							
Item 32 (r)							
Item 33							
Faktorscore							
Gesamtscore							

APPENDIX 4a. Application of the Luebeck Inventory on Musicians' Psychological Stress (LIMIT)

Background

The present questionnaire "LIMIT" was developed to measure psychological stress in musicians of all levels. Regular screening by instrumental teachers and lecturers to measure the progression of psychological stress is recommended, but the LIMIT is not a diagnostic assessment tool. It is therefore not permissible to diagnose mental illness based on the total scores of the LIMIT. However, if regular screenings show an upward trend, it is advisable to consult a family doctor or make an initial appointment with a psychological psychotherapist or psychiatrist to enable early prevention.

Evaluation

The total score for the questionnaire is calculated by adding up the points for each answer option. "Never" = 1 point, "Rarely" = 2 points, "Sometimes" = 3 points, "Often" = 4 points, "Always" = 5 points. Items 1, 7, 13, 15, 16, 27, 30, 33, 38, and 46 are inverted (r) in their point value, so that "Never" corresponds to 5 points and "Always" to 1 point. The total score thus ranges between 74 and 130 points, with a low value reflecting low psychological stress and a high value reflecting high psychological stress. There is no cut-off score, as the aim is to observe the progression of psychological stress over different measurement points in time.
In addition, the evaluation can be based on the various factors of the questionnaire (see below).

The Luebeck Inventory on Musicians' Psychological Stress (LIMIT) [English Translation*]

		Never	Rarely	Sometimes	Often	Always
1.	On stage, I have full control of my abilities.	○	○	○	○	○
2.	I am afraid to perform.	○	○	○	○	○
3.	I do not have any energy and cannot motivate myself to do something.	○	○	○	○	○
4.	I am satisfied with the speed of my musical development.	○	○	○	○	○
5.	It is difficult for me to organize my everyday life around my musical activities.	○	○	○	○	○
6.	I want to be the best when making music.	○	○	○	○	○
7.	I am very relaxed and at ease.	○	○	○	○	○
8.	I feel self-confident when making music.	○	○	○	○	○
9.	Even during large and important concerts or auditions, I can trust in my musical abilities.	○	○	○	○	○
10.	I have difficulties falling asleep and/or sleeping through the night.	○	○	○	○	○
11.	I feel depressed and hopeless.	○	○	○	○	○
12.	Others expect more from me in musical situations than I can deliver.	○	○	○	○	○
13.	I cannot keep up with preparations for concerts, lessons or auditions.	○	○	○	○	○
14.	I cannot control my spiraling thoughts.	○	○	○	○	○
15.	The intense competition amongst musicians puts me under pressure.	○	○	○	○	○
16.	On stage I can entirely be myself, I feel comfortable and at ease.	○	○	○	○	○
17.	During performances or auditions, I often think that I should have practiced more.	○	○	○	○	○
18.	I am given too many diverse tasks that I cannot master within the given time frame.	○	○	○	○	○
19.	After the concert, I am satisfied with my performance despite minor mistakes or uncertainties.	○	○	○	○	○
20.	Due to my musical activities, I have to cancel other appointments.	○	○	○	○	○
21.	I am well prepared for my musical activities.	○	○	○	○	○
22.	The judgment of other musicians weighs on me.	○	○	○	○	○
23.	I feel inner tension.	○	○	○	○	○
24.	Small mistakes when making music do not have an effect on me.	○	○	○	○	○
25.	Things that have previously brought me joy are not enjoyable anymore.	○	○	○	○	○
26.	I feel lonely when I can only do minimal other activities because of my solo musical practice.	○	○	○	○	○
27.	The thought of the next performance or audition worries me.	○	○	○	○	○
28.	When making music, I feel restricted and insecure.	○	○	○	○	○
29.	During important concerts or auditions, a lot does not work out the way I want it to.	○	○	○	○	○
30.	I think I play or sing worse than others.	○	○	○	○	○
31.	My family and friends are disappointed when I have to cancel plans because of a concert.	○	○	○	○	○
32.	During performances I do not sing or play as well as I would have had expected based on my abilities.	○	○	○	○	○
33.	When making music I notice physical signs of nervousness (sweating, dry mouth, cold fingers).	○	○	○	○	○
34.	I put pressure on myself to meet my standards when making music.	○	○	○	○	○

*Note: The English translation of LIMIT is not yet validated. This rough translation is provided to help readers understand the items appearing in the original German LIMIT.

Self-efficacy		Depression		Time management		Pressure	
Item	Score	Item	Score	Item	Score	Item	Score
Item 01 (r)		Item 03		Item 05		Item 06	
tem 02		Item 07 (r)		Item 12		Item 15	
Item 04 (r)		Item 10		Item 13		Item 22	
Item 08 (r)		Item 11		Item 17		Item 24 (r)	
Item 09 (r)		Item 14		Item 18		Item 34	
Item 16 (r)		Item 23		Item 20			
Item 19 (r)		Item 25		Item 21 (r)			
Item 27				Item 26			
Item 28				Item 31			
Item 29							
Item 30							
Item 32 (r)							
Item 33							
Factor score							
Total score							