

Quiet please! –

**School Noise and its Effects on Student Teachers and Practicing
Teachers**

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ZUSAMMENFASSUNG

Lärm in Schulen gilt aus unterschiedlichen Gründen als massiver Belastungsfaktor für Lehrkräfte und kann deshalb zu Leistungsdefiziten im Beruf, aber auch zu physischen und psychischen Beeinträchtigungen führen. Die Erforschung von Schullärm und seinen Auswirkungen ist daher essentiell. Die drei Studien, die in dieser Arbeit vorgestellt werden, untersuchten die unmittelbaren Auswirkungen von Lärm auf Lehramtsstudierende und die mittelbaren Auswirkungen auf praktizierende Lehrkräfte.

In der ersten und zweiten Studie wurde im Rahmen zweier Experimente überprüft, wie sich Pausenlärm auf das Stresserleben, die Leistung in einem Konzentrationstest und auf die Fehlerkorrektur eines Diktats auswirkt. Auf Grundlage des transaktionalen Stressmodells (Lazarus & Folkman, 1984) wurde vermutet, dass Lärm zu einer Erhöhung des Stresserlebens führt. Der Maximal-Adaptability-Theorie (Hancock & Warm, 1989, 2003) nach sollte der Lärm zunächst eine optimale Leistung, langfristig jedoch eine Leistungsbeeinträchtigung verursachen. Um dies zu überprüfen, bearbeiteten in der ersten Studie 74 und in der zweiten Studie 104 Lehramtsstudierende der Universität Passau zwei unterschiedliche Konzentrationstests und korrigierten das Diktat eines Schülers, während sie kurzen, kontinuierlichen oder keinen Pausenlärm hörten. In beiden Experimenten führte kontinuierlicher Lärm zu einer Erhöhung des Stresserlebens. Weder kurzer noch kontinuierlicher Lärm führte zu einer Verschlechterung der Konzentrationsleistung. Weiter zeigten sich unterschiedliche Befunde: Im ersten Experiment führte ein kurzer Konzentrationstest in Kombination mit kontinuierlichem Lärm zu positiven Effekten in der Diktatkorrektur, d.h. die Versuchspersonen wiesen eine bessere Leistung in der Fehlerkorrektur auf. Im zweiten Experiment führte ein langer Konzentrationstest in Kombination mit kurzem oder kontinuierlichem Lärm zu negativen Effekten, d.h. die Probanden machten vergleichsweise mehr Fehler bei der anschließenden Diktatkorrektur. Daraus lässt sich schlussfolgern, dass Schullärm einerseits das Stresserleben erhöhen und

andererseits die anschließende Leistungsfähigkeit der Lehrkräfte verbessern oder einschränken kann. Letzteres scheint allerdings von der konkreten Situation abzuhängen.

Im ersten Teil der dritten Studie lag der Fokus auf den Bewältigungsstilen und dem erlebten Stress der Lehrkräfte. Da Bewältigungsstile nachweislich einen großen Einfluss auf die psychische Gesundheit haben, lag die Vermutung nahe, dass das durch Lärm verursachte Stresserleben je nach Bewältigungsstil unterschiedlich ausfällt. Auf der Grundlage des Belastungs-Beanspruchungsmodells (Rudow, 2000) und des transaktionalen Stressmodells (Lazarus & Folkman, 1984) wurde angenommen, dass Lehrkräfte mit riskanten Copingstilen mehr Stresssymptome erleben. Deshalb wurde im Rahmen einer Online-Studie untersucht, ob es in Bezug auf psychische und körperliche Symptome Unterschiede zwischen Lehrkräften mit distinkten Bewältigungsstilen gibt. Dazu wurden 99 bayerische Grund- und Mittelschullehrkräfte befragt. Aus den übergeordneten Skalen Engagement und Resilienz resultierten vier berufliche Bewältigungsstile. Der Typ Gesundheit (hohes Engagement, hohe Resilienz), der Schon-Typ (niedriges Engagement, hohe Resilienz), Typ A (hohes Engagement, niedrige Resilienz) und Typ Burnout (niedriges Engagement, niedrige Resilienz) unterschieden sich hinsichtlich Bedrohungseinschätzung, Lärmstress, Stimm- und Hörproblemen sowie lärmbedingtem Burnout. Im Vergleich zum Typ Gesundheit wiesen die Risikotypen Typ A und Typ Burnout ein höheres Stresserleben auf und erwiesen sich generell anfälliger gegenüber Schullärm als der Typ Gesundheit. Dies ist die erste Studie, die zeigen konnte, dass Schullärm besonders für Lehrkräfte mit riskanten Copingstilen eine Gefährdung darstellt.

Im zweiten Teil der dritten Studie lag der Fokus auf den Wirkungspfaden von Schullärm. Hier wurden Zusammenhänge zwischen individuellen Eigenschaften der Lehrkräfte und den unterschiedlichen Auswirkungen von Schullärm vermutet. Basierend auf dem vereinfachten Modell von Lehrerstress (van Dick & Wagner, 2001) wurde an 159 bayerischen Grund- und Mittelschullehrkräften untersucht, ob Lärmstress und

Stimmermüdung die Verbindung zwischen Lärmempfindlichkeit und lärmbedingtem Burnout vermitteln. Die Ergebnisse zeigten, dass Stress die Beziehung zwischen Lärmempfindlichkeit und Stimmermüdung vermittelte; Stimmermüdung vermittelte die Beziehung zwischen Lärmstress und lärmbezogenem Burnout; Lärmstress und Stimmermüdung vermittelten seriell die Beziehung zwischen Lärmempfindlichkeit und lärmbedingtem Burnout. Dies ist die erste Studie die Verbindungen zwischen lärmempfindlichen Lehrkräften und Lärmstress, Stimmproblemen und lärmbedingtem Burnout aufzeigen konnte.

ABSTRACT

Noise in schools is considered a massive stress factor for teachers because of various reasons and can therefore lead to performance deficits in the job, but also to physical and psychological impairments. Consequently, research on school noise and its effects is essential. The three studies presented in this paper examined the immediate effects of noise on student teachers and the collateral effects on practicing teachers.

In the first and second study, two experiments were conducted to examine the effects of noise during breaks on stress experience, performance in a concentration test, and error correction of a dictation. Based on the transactional stress model (Lazarus & Folkman, 1984), it was hypothesized that noise leads to an increase in stress experience. According to the maximal adaptability theory (Hancock & Warm, 1989, 2003), noise should initially cause optimal performance, but in the long run should cause performance impairment. For this purpose, in the first study 74 and in the second study 104 student teachers of the University of Passau worked on two different concentration tests and corrected a student's dictation while listening to short, continuous, or no noise. In both experiments, continuous noise led to an increase in the experience of stress. Neither short nor continuous noise led to a deterioration in concentration performance. Further, different findings emerged: In the first experiment, a short concentration test in combination with continuous noise led to positive effects in dictation correction, i.e., subjects showed better performance in error correction. In the second experiment, a long concentration test combined with short or continuous noise resulted in negative effects, i.e., subjects made more errors in the subsequent correction of dictation. It can be concluded that school noise can, on the one hand, increase the experience of stress and, on the other hand, promote or limit teachers' subsequent performance. The latest, however, seems to depend on the specific situation of the individual.

In the first part of the third study, the focus was on teachers' coping styles and experienced stress. Since coping styles have been shown to have a major impact on mental

health, it was reasonable to assume that the stress experience caused by noise would vary depending on the coping style. Based on the stress-strain model (Rudow, 2000) and the transactional stress model (Lazarus & Folkman, 1984), it was hypothesized that teachers with risky coping styles experience more stress symptoms. Therefore, an online study was conducted to investigate whether there were differences in psychological and physical symptoms between teachers with different coping styles. For this purpose, 99 Bavarian elementary and middle school teachers were surveyed. Four professional coping styles resulted from the overarching scales of professional commitment and resilience. The healthy type (high commitment, high resilience), the unambitious type (low commitment, high resilience), type A (high commitment, low resilience), and type burnout (low commitment, low resilience) differed in terms of threat appraisal, noise stress, voice and hearing problems, and noise-related burnout. Compared to the healthy type, the risk types – type A and type burnout – exhibited higher stress experience and were generally more susceptible to school noise than the healthy type. This is the first study to show that school noise is particularly hazardous for teachers with risky coping styles.

The second part of the third study focused on the impact pathways of school noise. Associations between teachers' individual characteristics and the consequences of school noise were hypothesized. Based on the simplified model of teacher stress (van Dick & Wagner, 2001), we examined 159 Bavarian elementary and middle school teachers to determine whether noise stress and vocal fatigue mediate the association between noise sensitivity and noise-related burnout. Results indicated that noise stress mediated the relationship between noise sensitivity and vocal fatigue; vocal fatigue mediated the relationship between noise stress and noise-related burnout; noise stress and vocal fatigue serially mediated the relationship between noise sensitivity and noise-related burnout. This is the first study to show links between noise-sensitive teachers and noise stress, voice problems, and noise-related burnout.

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1. General Introduction

1.1.Introduction

“Students can be noisy. It distracts my concentration, takes time from the class, and, also, I am afraid someone else will hear the noise and think it’s disruptive or not a learning environment” (Blase, 1986, p. 32). This teacher statement from the 1980s illustrates well that noise was a major stressor in schools for various reasons. However, Blase (1986) was not the first researcher to identify school noise as a stress factor for teachers. Since the 1950s and 1960s, scientists have been addressing the issue of noise in educational institutions (Lane, 1957; Sanders, 1965).

Since then, of course, the teaching profession has changed a lot (cf. Perkhofer-Czapek & Potzmann, 2016). Examples include the form of teaching as well as the composition of the class (Laal et al., 2014; Werning, 2010). Whereas in the past, students were taught primarily in a frontal manner, nowadays open lessons or group work are increasingly used because of their positive effects on students’ growth of knowledge, self-esteem or even on the relationship between students (Laal et al., 2014; Laal & Ghodsi, 2012). In addition, with the UN Convention on the Rights of Persons with Disabilities, the goal of inclusive education came to the fore (cf. Hendriks, 2007). In line with the implementation of inclusive education, today’s classes often include students with quite different intellectual, social and emotional ability profiles, prior knowledge and social backgrounds (Werning, 2010). Despite some improvements due to these changes (e.g., Rafferty et al., 2003; Tolmie et al., 2010), school noise levels do not seem to have decreased as a result (cf. Galaterou & Antoniou, 2017; Sala & Rantala, 2016). Thus, school noise still is a central topic in educational research (Kyriacou, 2001; Nübling et al., 2008; Schönwälder et al., 2004) and, given the aforementioned changes (Laal et al., 2014; Werning, 2010), is perhaps an even more important issue today than it was then, as demands on teachers have increased (cf. van Droogenbroeck et al., 2014) and noise levels are still high (cf. Galaterou & Antoniou, 2017; Sala & Rantala, 2016).

Much of the focus so far has been on the negative effects that noise has on children's and adolescents' stress experience, cognitive development, memory performance, or academic achievement (Klatte et al., 2010; Klatte et al., 2013; Klatte et al., 2017; Lercher et al., 2003; Shield & Dockrell, 2008). As will become obvious below, fewer researchers have addressed the ways in which daily noise exposure affects teachers.

Some research has at least shown that teachers experience stress symptoms and health problems due to school noise (Enmarker & Boman, 2004; Kristiansen et al., 2014; Lin et al., 2020; Meuer & Hiller, 2015). Research on other occupational groups has already revealed noise-related psychological, physical and behavioral impairments at work as well as correlations to individual traits (Evans & Johnson, 2000; Golmohammadi et al., 2021; Kjellberg et al., 1998). Unlike these professions, teachers' performance (e.g., teaching behavior, assessments/grades), protective factors (e.g., coping styles, individual characteristics) and pathways of impact regarding noise have been largely ignored. However, since teachers often have to teach in noisy classrooms or work in other noisy environments (e.g., supervision during breaks), scientific knowledge on the issue of noise is also necessary in this professional field.

To the best of my knowledge, there is only one experimental and one quasi-experimental study that investigated the negative effects of noise on teachers' performance and showed that their cognitive performance suffered (Arezes et al., 2010; Enmarker, 2004). Another study examined impact pathways on female teachers and other female employees and elicited noise annoyance as a significant mediator between occupational noise exposure and auditory fatigue, with stress acting as a moderator (Fredriksson et al., 2017). Studies on how school noise affects teachers with different coping styles are completely lacking.

From my experience, there might be three reasons why there is so little research in this area. Firstly, it is generally legally difficult to conduct research in schools. Secondly, schools may even fear negative consequences due to the study results. Thirdly, a theoretical model

regarding noise on the basis of which hypotheses can be explicitly derived is lacking so far for the educational context.

Despite these difficulties, teachers' continuous noisy school life with its possible negative consequences (Kristiansen et al., 2011) emphasize the need for scientific investigations in this field. Resulting findings could help to shift the focus to the issue of school noise and recognize the importance of taking appropriate action. Therefore, the main objective of the present work was to investigate effects of school noise on (prospective) teachers' behavior, mental and physical health, to survey possible protective factors, and to identify impact pathways. To achieve these goals, two experiments on student teachers and a quantitative online survey on practicing teachers were conducted. These three studies are the subject of this paper.

In the first chapter, a detailed description of the theoretical models used in the studies is provided. After that, the theoretical background is explained in more detail. It briefly discusses the teaching profession, teachers' general stress responses, common factors that cause stress in the teaching profession, and possible protective factors. Subsequently, the term noise is defined and guidelines for noise exposure are analyzed. Thereafter, school noise is discussed in more detail, the relationship to noise sensitivity and coping styles is established and consequences of noise are discussed. Finally, a brief description of the study objectives is provided. While study 1 and 2 are presented together in the second chapter, the third study is presented separately by survey period and research focus in chapters 3 and 4. Since Study 3a has already been published, in this work only its abstract is presented. Finally, the fifth chapter summarizes the main findings and discusses practical implications for everyday school life as well as for future research.

1.2.Models

In order to be able to investigate the extent of the consequences of school noise for teachers, theoretical models are needed that make it possible to derive concrete hypotheses. In

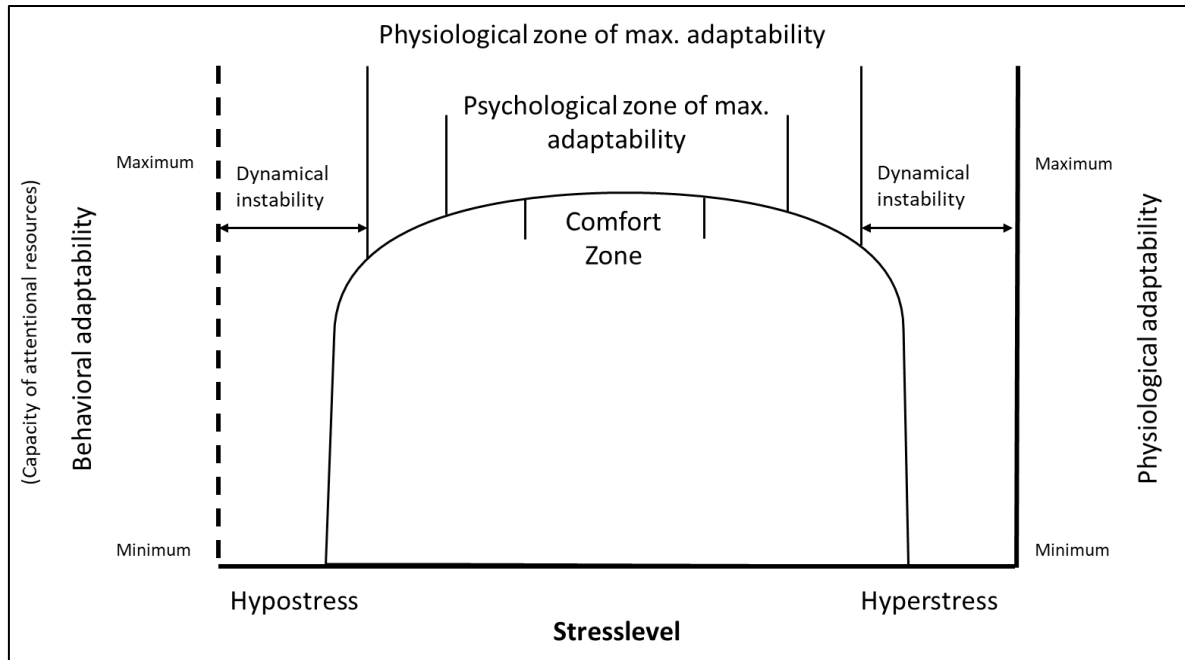
the following, four models are presented on the basis of which potential effects of noise on teachers' work performance or stress experience can be predicted.

1.2.1. Maximal Adaptability Theory

The maximal adaptability theory (Hancock & Warm, 1989, 2003) was developed to explain performance under various conditions and assumes that environmental factors have an impact on task performance. Thus, it has been tested not only with the environmental stimulus noise, but also by means of heat, cold, or pressure. As can be seen in Figure 1.1, the authors assume an optimal range, called the comfort zone, in which the individual performs best. Outside this comfort zone, the individual is in a dynamic instability, where performance is worse. The comfort zone is reached only when there is an optimal level of stress resulting from task and environmental demands. This optimal level of stress enables the body to adapt optimally to the requirements; i.e. it is in the zone of maximal physiological, psychological and behavioral adaptability. The physiological adaptability refers to the physical homeostasis, i.e. the body constantly tries to establish a balance by comparing actual and target values and, if necessary, initiating changes. One way to explain this physiological adaptability is with the following example (cf. Hancock & Warm, 1989, 2003): If a person hears noise during a task, their ears react with a protective reflex, i.e. the ears are *closed* somewhat in order to reduce the acoustic stress and to better isolate from the noise. The psychological adaptability comprises evaluation processes: If the person perceives the task processing in combination with noise as a challenge and estimates their own coping resources as sufficient, an optimal psychological adaptability prevails. Behavioral adaptability refers to attentional resources. Optimal behavioral adaptive performance occurs when the available capacity of attentional resources can be used optimally. Outside these zones, there is too little activation (*hypostress*) or too much activation (*hyperstress*), both of which cause instability of the system and a lack of optimal adaptation, which in turn has a negative effect on performance.

Figure 1.1

The Maximal Adaptability Model for Stress and Performance in Simplified Form, based on Hancock and Warm (1989, 2003)



This can be illustrated by an example: If the individual is required to solve a monotonous task that activates poorly, additional noise may lead to an improvement in performance because the individual is approaching the comfort zone. If the individual is confronted with a very complex task and is highly activated, additional noise leads to poorer adaptation and thus poorer performance. This can also be applied separately to physiological, behavioral and psychological adaptability (cf. Hancock & Warm, 1989, 2003): If the individual is confronted with a monotonous task, they are probably barely activated (physiological) and likely to evaluate the task as unchallenging, perhaps even as irrelevant or boring (psychological), which also means that attentional processes are not optimally utilized (behavioral). If the individual works on a simple task and is additionally exposed to noise, the interaction of environmental and task demands leads to greater activation (physiological), so that the individual may experience the task as challenging (psychological) and attentional

resources are fully utilized for task accomplishment (behavioral). If the individual works on a complex task and is additionally exposed to noise, the interaction of environmental and task demands leads to excessive activation (physiological), so that the individual may experience the task as threat and perceive that their coping resources are not sufficient to cope well with the task under noise (psychological). In addition, attentional resources (behavioral) are not sufficient to master the task well. This model (cf. Figure 1.1) formed the basis for the hypotheses of study 1 and 2.

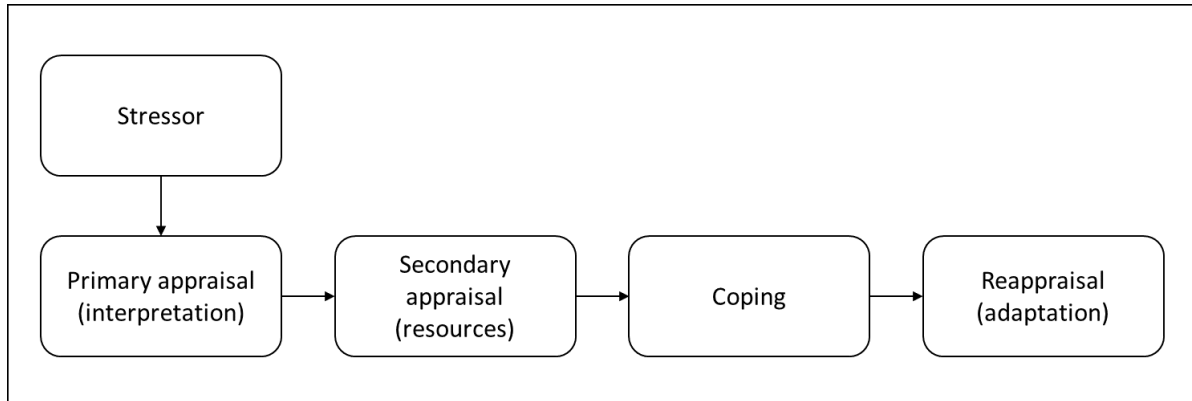
1.2.2. Transactional Stress Model

The transactional stress model (Lazarus & Folkman, 1984) is probably the best-known model in psychological stress research. The authors assume that stress experience arises from two cognitive appraisal processes (cf. Figure 1.2). A person is exposed to an internal (e.g., mental, pictorial) or external (e.g., from the environment, from another person) stressor, which triggers an unconscious evaluation process: First, the individual assesses whether the stressor is relevant or irrelevant. If it turns out to be relevant for the individual, then it assesses whether the stressor is threatening, harmful or challenging (*primary appraisal*). Second, the assessment of coping resources takes place: The individual assesses whether their own coping resources are sufficient to deal well with the stressor (*secondary appraisal*). The highest stress experience results from the assessment of the stressor as a threat or harm and from the experienced lack of coping resources (cf. Lazarus & Folkman, 1984).

According to Lazarus and Folkman (1984), reappraisal can result from coping with the stressor. For example, after successfully coping with a task during noise exposure, the individual might experience subsequent tasks involving noise as less threatening than before. However, if the noise lasts longer and is experienced as uncontrollable, coping attempts may fail, leading to stress or fatigue, which in turn has a negative impact on mental health (Eisenmann, 2006).

Figure 1.2

Transactional Stress Model in a Highly Simplified Form, based on Lazarus and Folkman (1984)



Indeed, noise is often experienced as uncontrollable (cf. Glass & Singer, 1973), chronic, negative, and intractable (Campbell, 1983). In addition, adequate coping with noise is limited (Lercher et al., 2000). According to the transactional stress model, these appraisals should result in severe stress experience (cf. Lazarus & Folkman, 1984). In line with this assumption, a study was able to show that individuals who are exposed to noise and know that it can be harmful are more likely to report noise stress (Crichton et al., 2015). The transactional stress model (Lazarus & Folkman, 1984) was used as the theoretical basis for deriving most of our hypotheses, except for the second part of the third study.

1.2.3. Stress-Strain Model

The third model used in the present work is the stress-strain model (Rudow, 2000). In order to explain this model (see Figure 1.3), it is necessary to first define the terms *demands*, *psychological stress* and *strain*:

Demands of a work action result from the work assignments and the working conditions. The demands define the regulation necessary to master a work action.

Demands that exceed or fall short of the performance prerequisites can lead to overload or underload, respectively (cf. Joiko & Wolff, 2010).

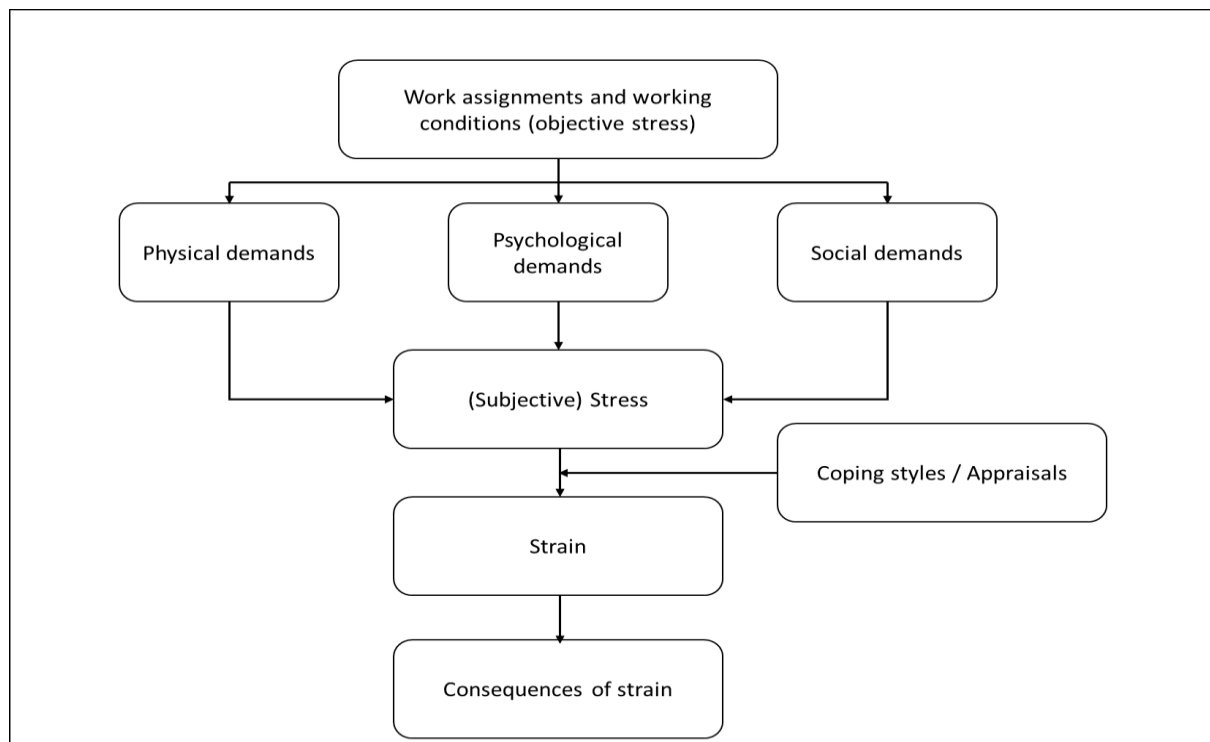
Psychological stress is the totality of all ascertainable influences that come from the outside and have a psychological effect on the person (DIN Deutsches Institut für Normung e.V., 2018).

Psychological strain is the immediate (not long-term) effect of psychological stress in the individual depending on her or his respective enduring and momentary conditions, including individual coping strategies (DIN Deutsches Institut für Normung e.V., 2018).

The stress-strain model (Rudow, 2000) appears to combine the maximal adaptability theory (Hancock & Warm, 1989, 2003) and the transactional stress model (Lazarus & Folkman, 1984): Environmental and task demands (objective stress) entail psychological, social, or physical demands to which the individual must adapt. High demands can lead to subjective stress, which can result in short-term strain and long-term strain consequences. Like the previously described theories, this model also assumes that appraisals and/or coping styles have an influence on the strain that results from the stress (Rudow, 2000). With regard to noise, the following can be concluded: Schools entail certain work assignments (e.g., break supervision) and working conditions (e.g., break noise). These pose primarily physical and psychological demands and lead to short-term subjective stress (e.g., threat appraisal). In the medium term, this subjective burden of noise leads to strain (e.g., hearing problems), which in the long term can lead to strain consequences (e.g., burnout) (Peeters & Rutte, 2005).

Figure 1.3

Stress-Strain Model based on Rudow (2000)



However, following the transactional stress model (Lazarus & Folkman, 1984), we assumed an influence of coping styles on all components (stress, strain, and strain consequences). Accordingly, we modified the stress-strain model (Rudow, 2000) shown in Figure 1.3. The model we used is described in more detail in the first part of the third study. Based on this modified model, the hypotheses of the first part of the third study were formulated.

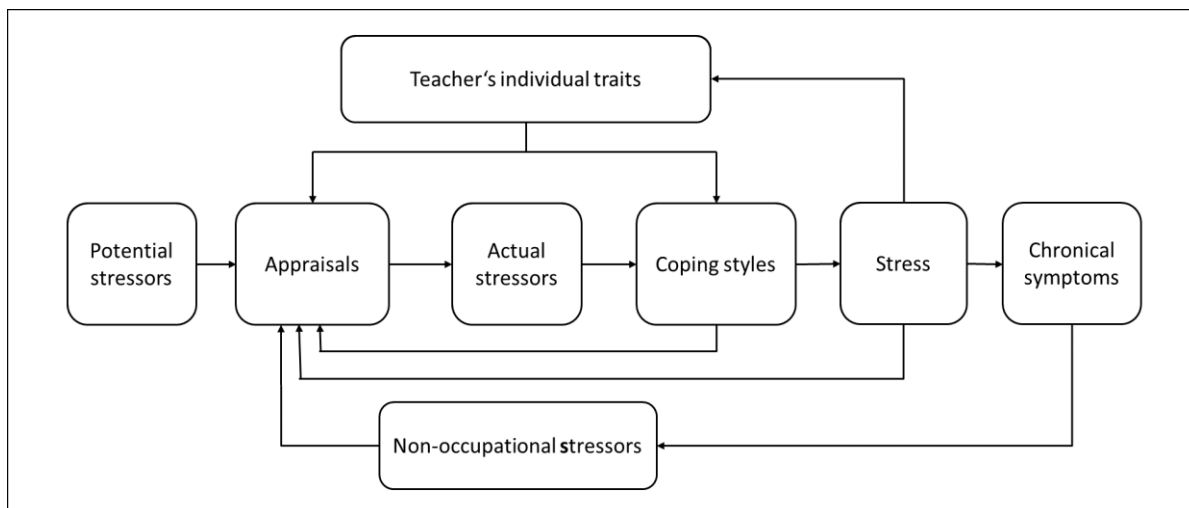
1.2.4. Model of Teacher Stress

Finally, the last model described (see Figure 1.4) is frequently used in the Anglo-American area. In this model, occupational stressors are distinguished from non-occupational stressors. Both types trigger appraisals (cf. Lazarus & Folkman, 1984), which can turn potential stressors into actual stressors. Mediated by individual coping mechanisms, the actual stressors can lead to stress and, in the long run, to chronic symptoms. Teachers'

characteristics influence both assessments and coping mechanisms in this process. In addition, feedback processes are hypothesized. Thus, chronic symptoms are assumed to have an influence on non-occupational stressors; experienced stress and coping mechanisms in turn affect appraisals. In addition, teachers' individual characteristics are influenced by perceived stress.

Figure 1.4

A Model of Teacher Stress based on Kyriacou (2001)



According to the model, noise is considered a potential stressor, which can become an acute stressor through the appraisals of the noise – influenced by teachers' individual characteristics, such as noise sensitivity. Teachers' coping styles have a critical influence on the degree to which stress, like vocal fatigue, is experienced. The resulting stress perception in turn is related to chronic symptoms, like noise-related burnout. Since the model of teacher stress is quite complex, we used the simplified form of van Dick and Wagner (2001) and adapted it to our research question. Based on this modified model, the hypotheses of the second part of the third study were formulated.

1.2.5. Interim Summary

Four models were presented from which hypotheses about the effects of school noise for (prospective) teachers were derived. To predict effects on teachers' work performance, the maximal adaptability theory was used (study 1 and 2). Hypotheses related to teachers' stress experience were derived based on the transactional stress model (studies 1, 2, and 3a). To make statements about influences of teachers' individual factors on noise effects, the stress-strain model (study 3a) and the model of teacher stress (study 3b) were used. In order to assess the impact of school noise on teachers, the following section takes a closer look at the teaching profession.

1.3. Teaching Profession

The teaching profession has always played a prominent role in society. No other occupational group has such a decisive importance for the education of our society (Shim, 2008). Therefore teachers have a major responsibility (Eacute & Esteve, 2000), which is also evident in their job description:

Teachers work at educational institutions, where they educate and teach students. In the context of education, they impart social behaviors and value systems and are contact persons for students in subject-related and personal matters. In teaching, they impart factual knowledge, subject knowledge as well as various skills and guide students to think and work independently. (Berufe-Lexikon, 2021)

An even more detailed description of teachers' responsibilities can be found in the Standards for Teacher Education from the Secretariat of the Standing Conference of the Ministers of Education and Cultural Affairs of the Länder in the Federal Republic of Germany (KMK, 2004/16.05.2019):

1. Based on scientific research, teachers have to plan, organize, reflect, assess, and evaluate teaching and learning processes.

2. Teachers have an educational task in school, should therefore cooperate with parents and find constructive solutions when educational problems arise or learning processes fail.
3. Teachers should be competent, fair, and responsible in their assessments and consultations.
4. Teachers should continuously develop their skills and participate in continuing education and training opportunities in order to incorporate new developments and scientific findings into their professional activities. In addition, teachers should maintain regular contact with other institutions.
5. Teachers should participate in school development, in shaping a school culture that is conducive to learning and in creating a motivating school climate. This also includes willingness to participate in evaluations.

From this description, it can be deduced that teachers, due to their duties, have to perform many different tasks in everyday school life, which by themselves can lead to stress (Brown et al., 2002).

1.3.1. Stress Responses

Therefore, teaching is considered a stressful profession (cf. Kyriacou & Sutcliffe, 1978), from which anger, anxiety, tension, frustration, or depression can arise (Kyriacou, 2001, p. 28). Such unpleasant, negative feelings, referred to as teacher stress (Kyriacou, 2001), are quite common in the teaching profession (Nübling et al., 2008; Nübling et al., 2012). For example, 20% of 257 teachers from England surveyed found their profession very stressful or even extremely stressful (Kyriacou & Sutcliffe, 1978). Due to this stress, approximately 66% suffered from chronic psychophysical complaints and regularly sought medical attention (Schönwälder et al., 2004). Furthermore, strong associations were found between self-reported stress in the teaching profession and somatic, depressive, and anxiety

symptoms (Kyriacou & Pratt, 1985). Long-term consequences of teacher stress include sick days (Howard & Howard, 2020), turnover (Harmsen et al., 2018), burnout (Ho, 2017; Kokkinos, 2007), and early retirement (Brown et al., 2006; Weber et al., 2005).

In addition to health, stress can also affect job performance at school (Asaloei et al., 2020). This manifests itself, for example, in the fact that stressed teachers' teaching ability is reduced (Blase, 1986), that teachers make more mistakes during work (Marwat et al., 2012), and that their teaching behavior (Harmsen et al., 2018) and productivity (Marwat et al., 2012) suffer. In the worst cases, teachers' stress or resulting impaired mental health even negatively impacts student-teacher relationships (Yoon, 2002), student achievements (McLean & McDonald Connor, 2015), and assessments of student behavior (Kokkinos et al., 2005). In addition, teacher stress also entails high financial costs, both to the economy and to the health care system (Wiley, 2000).

1.3.2. Stress Factors

As can already be surmised from the above-mentioned current job profile, the reasons for this teacher stress are manifold (cf. Kyriacou, 2001). Kyriacou and Sutcliffe (1978) earlier identified four overarching dimensions of teacher stressors in a factor analysis: Inappropriate student behavior, poor working conditions, time pressure, and low school ethos. These factors included, for example, too many lessons, too many organizational tasks, supervisory duties (e.g., break supervision), no recovery time between lessons, or maintaining discipline in the classroom (Kyriacou & Sutcliffe, 1978). Other more recent studies identified role conflicts, lack of materials, paperwork requirement, limited communication, heterogeneous learners, the urban setting, control of time or interference with instruction as subjects of stress in the teaching profession (Blase, 1986; Eacute & Esteve, 2000; Embich, 2001; Flores, 2018; Mérida-López et al., 2017; Shernoff et al., 2011).

One stressor that comes up repeatedly in both previous and more current research is school noise (Blase, 1986; Kyriacou & Sutcliffe, 1978; Shernoff et al., 2011). Therefore,

school noise, in addition to other occupational demands, seems to be a relevant stress factor. However, in order to address possible protective factors against school noise later on, teachers' general protecting factors will be briefly discussed first before turning to the topic of noise in detail.

1.3.3. Protective Factors

In addition to investigations on stress factors like noise, there is also increasing research on what factors can counteract them. Some of these protective factors, such as specific classroom management skills (Dicke et al., 2015) or the extent of pedagogical knowledge, that indirectly promotes mental health (Lauermaun & König, 2016), can be learned. In addition, it has been shown that satisfied basic needs (cf. Deci & Ryan, 1985), such as relationships with colleagues (Bottiani et al., 2019), the experience of social support by the teaching staff (Wolgast & Fischer, 2017), or perceived autonomy (Skaalvik & Skaalvik, 2014), can attenuate stress responses. Beyond that, individual characteristics, such as learning goal orientation (Nitsche et al., 2013), experienced self-efficacy (Tsouloupas et al., 2010), optimism (Desrumaux et al., 2015), appraisals (Lambert et al., 2009), and coping strategies (Montgomery & Rupp, 2005) act protectively against teacher stress.

1.3.4. Interim Summary

Teachers are confronted with various demands and stressors in their profession, which can lead to psychological, physical and behavioral impairments. However, teacher stress research also points to protective factors that can mitigate the consequences of stress factors. One important stress factor in the teaching profession is school noise. Its characteristics, possible protective factors, and effects will be discussed in more detail in the following section.

1.4.Noise

Since teachers are confronted with noise for a large part of their working time every day (Kristiansen et al., 2011), it is not surprising that a survey found 80% of German teachers feel stressed by student noise (Schönwälder et al., 2003). Noise refers not only to the actual loudness, but also to the subjective experience (cf. Stansfeld & Matheson, 2003). Thus, all sounds that are perceived as unpleasant and interfering are referred to as noise (Babisch, 2011; Stansfeld & Clark, 2019). Accordingly, the term noise includes all sounds that lead to annoyance, disturbance, impaired performance, special accident hazards or damage to health (Maue, 2009, p. 17).

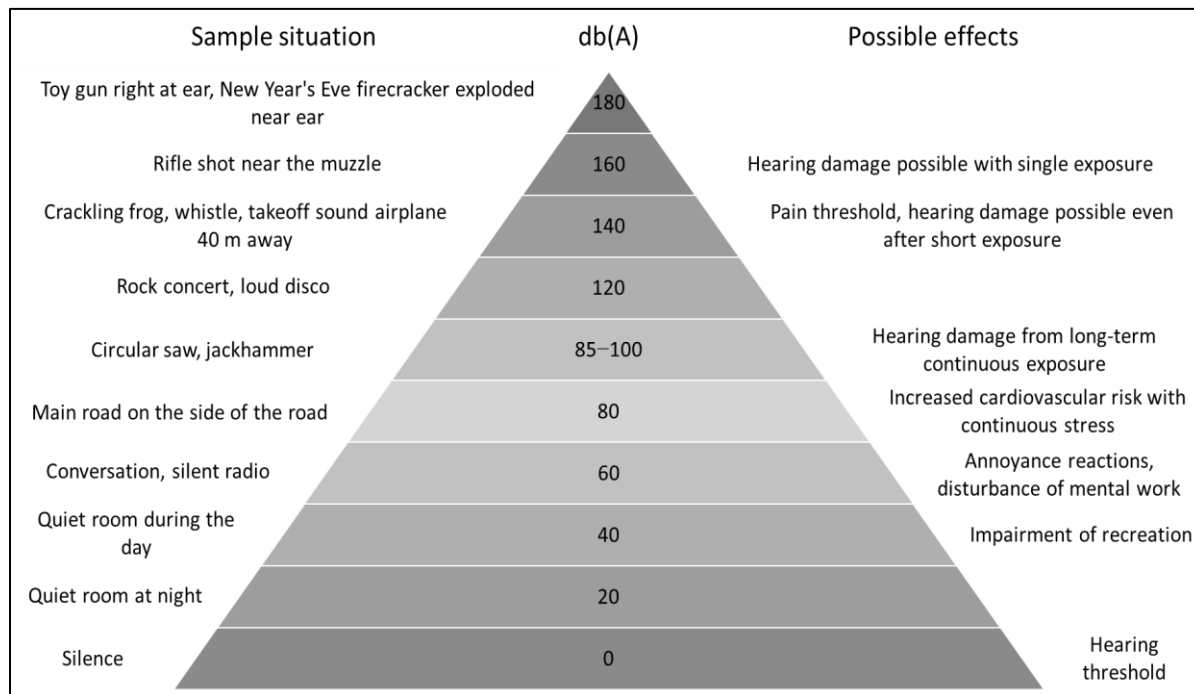
1.4.1. Noise Characteristics

General. In order to assess the extent of noise, the logarithmic unit of measurement decibel (db) is used. An increase of 3 db corresponds to a doubling of the noise source (Śliwińska-Kowalska & Zaborowski, 2017), like two students speaking instead of one. To the human ear, an increase of 10 db appears to be twice as loud (Suter, November / 1991). Since the human ear perceives low and high tones more quietly than medium frequencies, the determined sound pressure levels are converted and corrected that the subjective loudness is represented realistically. The resulting sound levels are given in db(A) (Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit, 2021).

Noise as a physical stressor can cause a variety of impairments (Clark & Paunovic, 2018). The duration and intensity are decisive for how and to what extent noise has a physical impact (Babisch, 2011). However, low sound levels can have psychological effects (cf. Ising & Kruppa, 2004). Figure 1.5 provides a good overview of exemplary noise sources and potential effects of various volume levels. It can already be seen that higher volume levels can lead to hearing damages and lower noise intensities are sufficient to cause cognitive as well as emotional impairments.

Figure 1.5

Volume Levels with Examples and Possible Effects, based on the German Federal Environment Agency (2005) (see Babisch et al., 2007)



School Noise. In schools, the noise pollution results from external sources (e.g., neighboring schools), and internal sources, such as school buildings (e.g., insulation), human activities (e.g., chatting, yelling during breaks), or equipment (e.g., air conditioners) (Åhlander et al., 2011; Koszarny & Goryński, 1990; Puglisi et al., 2015). Preschool teachers cited indoor activities due to bad weather, insufficient space, reverberation, excited or misbehaving students, noise from outside, diverse activities (e.g., playing music), air conditioning, and alarm systems as reasons for noise (Grebennikov & Wiggins, 2006). While activity noise (e.g., chatter, scrapping chairs) was identified as the most annoying source of noise (Enmarker & Boman, 2004), schoolyards, classrooms and school hallways are perceived as noisiest (Eysel-Gosepath et al., 2012). Since several noise sources contribute to the respective loudness in schools, the term school noise is used non-specifically in the following.

Depending on the study, sample, and school situation, the noise levels that were recorded vary significantly. Within the classrooms, the predominant noise comes from children, whose volume can vary by approximately 20 db(A) from the quietest to the loudest activity (Shield & Dockrell, 2004), and range from 56 db(A) to 77 db(A) (Shield & Dockrell, 2004; Skarlatos & Manatakis, 2003). The background sound level is related to the number of children in the classroom. The more children there are in the classroom, the higher the background noise (Shield & Dockrell, 2004). For instance, a value of about 65 db(A) could be measured for 20 children and about 70 db(A) for 30 children (Shield & Dockrell, 2004). For sports and music teachers, the volume can be even higher due to the activities performed in class. For example, in one case study, a peak of 119 db(A) was measured in a gymnasium (Jiang, 1997). In music classes, a peak of 98 db(A) was recorded (Behar et al., 2004). High noise levels can also be reached outside the classroom, i.e. during breaks. Depending on the study and location (break hall or schoolyard), the values vary between 75.9 db(A) and 78.89 db(A) (Sarantopoulos et al., 2014; Skarlatos & Manatakis, 2003).

In order to limit these noise levels and possible resulting consequences, guidelines have been developed for various occupational groups (cf. Schwela, 1999). In the school context, WHO recommends 35 db(A) during teaching in classrooms and 55 db(A) in schoolyards (Schwela, 1999). To protect the voice and maintain concentration and attention, a milder guideline recommends values below 55 db(A) in teaching and learning rooms (Schönwälder et al., 2004). Apparently, however, even this milder limit for classrooms is commonly exceeded (cf. Schönwälder et al., 2004; Shield & Dockrell, 2004; Skarlatos & Manatakis, 2003).

Considering that noise levels in schools can reach the volume of a noisy main street (cf. Babisch et al., 2007; Grebennikov & Wiggins, 2006) and teachers are exposed to noise for 25% of their working time (Kristiansen et al., 2011), it is not surprising that one third of

teachers reported severe occupational noise exposure (Rezende et al., 2019) as well as mental and physical health complaints (Augustyńska et al., 2010).

However, since the objective noise exposure per week is only weakly correlated with the subjective noise exposure (Sjödin, 2017), it can be inferred that the consequences teachers suffer from school noise are not only objective but also subjective in nature (cf. Stansfeld & Clark, 2019). Accordingly, personal characteristics, like attitudes and individual differences, also seem to play a decisive role (cf. Kjellberg et al., 1996).

1.4.2. Personal Characteristics

According to Stansfeld et al. (2000), in addition to the experienced controllability of noise, noise sensitivity and coping strategies are important personal characteristics that can influence the effects of noise. Because the experienced controllability of noise in an educational context is likely related to other factors such as appropriate classroom management, only noise sensitivity and coping strategies are presented below.

Noise Sensitivity. Noise sensitivity is defined as an individual physiological and psychological constitution that generally increases the degree of response to noise (Shepherd et al., 2015). It often has a stronger influence on health than objective noise exposure (Stansfeld et al., 2000) and accordingly influences psychological and physical stress responses (Nazneen et al., 2020). Noise-sensitive individuals generally perceive noise as more stressful than less sensitive individuals (Belojević et al., 1992) and experience higher levels of strain (Sandrock et al., 2009). Accordingly, positive correlations could be found between individual noise sensitivity and perceived stress, irritability, concentration problems, fatigue as well as headaches (Baliatsas et al., 2016). In addition, there is preliminary evidence that noise sensitivity is associated with an increased risk of mental illness (Stansfeld & Shipley, 2015), such as depression or anxiety (Baliatsas et al., 2016).

In the school context, the characteristic of noise sensitivity has received less attention, although it has certainly been demonstrated that teachers are on average more sensitive to

noise than students (Schönwälder et al., 2004) and noise-sensitive teachers experience school noise as more stressful than less noise-sensitive teachers (Enmarker & Boman, 2004). Since individual noise sensitivity is strongly related to physical and mental health (Baliatsas et al., 2016), and more noise-sensitive teachers experience higher stress due to noise (Enmarker & Boman, 2004), the second part of the third study was to investigate how teachers' noise sensitivity is related to physical and mental symptoms.

Coping Styles. Similar to noise sensitivity, it is possible that individual coping styles have an impact on how noise affects teachers. Coping styles are understood as intellectual and behavioral resources that an individual employs to respond to stressful situations (Lerias & Byrne, 2003). Many studies have been conducted on teachers' coping styles (e.g., Antoniou et al., 2006; Stoeber & Rennert, 2008). For example, it has been shown that stress disorders can be reduced by proactive strategies (e.g., Pietarinen et al., 2013), and that other coping styles, such as emotional suppression, negatively influence the experience of stress (Griffith et al., 1999).

A very well-established classification of coping styles is achieved by the questionnaire work-related behavior and experience patterns (Schaarschmidt & Fischer, 2008). With this instrument, four coping styles – the healthy type, the unambitious type, the burnout type, and the type A – can be derived from the three dimensions of occupational commitment, resilience, and emotions (Schaarschmidt, 2006). Commitment is made up of the importance of the occupation, professional ambition, the willingness to spend energy and the striving for perfection. Resilience refers to the ability to distance oneself, the tendency to resign in the face of failure, offensive problem-solving, inner calm as well as balance. The third dimension of emotions comprises the experience of success at work, life satisfaction and the experience of social support (Kieschke & Schaarschmidt, 2008). The healthy type is per definition healthy, willing to perform and feels well; it shows high, though not too high, commitment with high resilience. The unambitious type protects itself from stress, feels relatively well, and

exhibits low commitment with high resilience. Type A exhibits over-commitment; its resilience, ability to recover, and well-being are limited. The burnout type feels unwell, shows little commitment, tends to have low resilience, high resignation and suffers from chronic exhaustion (Kieschke & Schaarschmidt, 2008). A study among teachers was able to show that the healthy type and the ambitious type suffer from only a few physical and psychological problems, while the type A and the burnout type complain about many physical and psychological symptoms (Bauer et al., 2006). Although coping styles have been shown to influence teachers' stress reactions (Bauer et al., 2006), there is a lack of research on how coping styles affect noise-related stress symptoms. How teachers' coping styles are related to effects of school noise is discussed in more detail in the first part of the third study.

1.4.3. Noise Effects

Despite possible individual protective factors, noise is considered a psychosocial stressor that, even at low doses, can cause maladaptive psychological responses and affect physical health via interactions between the autonomic nervous system, neuroendocrine system, and immune system (Clark & Stansfeld, 2007; Rylander, 2004). With regard to the consequences of noise, aural effects can be distinguished from extra-aural effects (Ising et al., 1996; Robert Koch Institut, 2020). While aural effects, i.e., hearing damage, depend on the duration and strength of the noise, extra-aural effects are more common and independent of duration and strength (Ising et al., 1996). The latter include communication problems, cardiovascular and physiological, mental health, and performance effects (Schwela, 1999).

For teachers, a negative correlation between noise and individual well-being was shown (Karjalainen et al., 2020). Furthermore, 25% of interviewed teachers mentioned complaints in the in the ear-nose-throat area, 10% reported cardiovascular complaints, 10% psychological and 10% neurological problems (Schönwälder et al., 2004).

Hearing Impairments. Noise causes various hearing problems (Themann & Masterson, 2019). This includes complete hearing loss (Themann & Masterson, 2019), which

can result from a single exposure to noise (e.g., from a gunshot) or from long-term exposure to noise at levels between 75-85 db(A) (Basner et al., 2014). These types of noise exposure damage auditory sensory cells in the cochlea to such an extent that they can no longer regenerate (Basner et al., 2014). From this, unusual volume perception (Berglund & Lindvall, 1995), perceived distortion (paracusis), or tinnitus, which is the subjective perception of a sound in the absence of an auditory stimulus, can arise (Themann et al., 2013).

A study among teachers revealed that daily exposure to noise can lead to short-term and possibly long-term changes in the outer hair cells (Novanta et al., 2020). Accordingly, teachers – due to constant exposure to sound (Jiménez-Tejada et al., 2012) and high level of occupational stress (Eysel-Gosepath et al., 2012) – complain of hearing problems, such as tinnitus, hyperacusis, and hearing loss, independent of their age (Meuer & Hiller, 2015; Novanta et al., 2020). Although teachers are exposed to noise in many school situations (Kristiansen et al., 2011), not all teachers suffer from hearing problems (cf. Novanta et al., 2020). Therefore, the question arises whether there are also personal factors that promote hearing problems. This has not been sufficiently investigated so far, which is why the first part of the third study aimed at clarifying whether coping styles are associated with hearing problems.

Communication Problems. Since hearing damages or impairments cause speech to be less well understood, they represent a major social handicap (Ciorba et al., 2012). Even minor impairments can have an impact on language comprehension, which in turn is often the cause of irritations, misunderstandings and relationship problems (Berglund & Lindvall, 1995). But even without hearing impairment, difficulties in understanding occasionally occur (Lin et al., 2020; Schick et al., 1999).

Thinking about the modern school day, it is obvious how such impairments can arise in the classroom: For instance, due to the newly established open teaching, a volume is quickly reached in the classroom that causes problems in communication and comprehension (Sala &

Rantala, 2016). In only a few classrooms studied were teachers and students able to understand each other acoustically well (cf. Sala & Rantala, 2016). Accordingly, 12% of American teachers expressed difficulty understanding their students (Lin et al., 2020).

To avoid speech intelligibility problems for the students (Schick et al., 1999), teachers automatically raise their voices in order to be understood (Sala et al., 2002), which increases vocal strain (Berglund & Lindvall, 1995). This phenomenon is called *Lombard effect* (Brumm & Zollinger, 2011). Accordingly, loud background noise is considered a risk factor for voice problems (Devadas et al., 2017). Almost 13% of American teachers reported that they had to raise their voices to be heard due to noise in the classroom, and 8.4% that they had problems with their voice (Lin et al., 2020). Compared to the general population, teachers suffer more often from voice problems (Angelillo et al., 2009; Roy et al., 2004), which in some cases also leads to more days of absence (Medeiros et al., 2012).

In summary, teachers have to raise their voices quite often in order to be understood (Sala et al., 2002). Nevertheless, there seem to be teachers who suffer less from voice problems (cf. Lin et al., 2020). Consequently, the question arises whether there are also personal variables that have an influence on teachers' voice. To provide an answer to this question, the third study examined how teachers' coping styles and noise sensitivity are related to voice problems.

Cardiovascular and physiological effects. Although the exact mode of action is still unknown, studies suggest that noise – mediated by the autonomic nervous system and endocrine system – can affect cardiovascular health (Themann & Masterson, 2019). For example, a connection to blood pressure and cholesterol levels could be shown (Kerns et al., 2018). The most likely explanation for these findings is stress (Berglund et al., 1999): In the short term, noise as an environmental stressor activates the autonomic nervous and hormonal system. This causes an increase in blood pressure, heart rate, and vasoconstriction, which in

turn can lead to the development of hypertension or ischemic heart disease, especially in susceptible individuals (Berglund & Lindvall, 1995).

Accordingly, a positive correlation between the intensity of school noise and heart rate was shown for individual teachers (Schönwälder et al., 2004). In addition, a reduction in classroom volume resulted in teachers' lower heart rates (Tiesler & Oberdörster, 2008).

Mental Health. The effects that noise has on mental health are explained via the stress-vulnerability hypothesis. This means that predisposed people develop mental illness more easily under stress than people who are not predisposed (Basner et al., 2014; Stansfeld & Clark, 2019).

On the biological level, noise leads to stimulation of the endocrine and sympathetic nervous systems (Babisch, 2002), which causes a release of stress hormones (Basner et al., 2014). Sustained activation of these systems (Babisch, 2002) is associated with an increased risk of mental illness (Stansfeld & Clark, 2019).

On the psychological level, when confronted with noise, one often experiences a feeling of annoyance, which has been found to be relevant (Guski, 1999). Accordingly, Hammersen et al. (2016) found positive correlations between the extent of perceived noise annoyance and the impairment of mental health. Consistent with this, noise has been shown to decrease frustration tolerance (Glass & Singer, 1973) and to promote psychological symptoms (e.g., feelings of anxiety), poor appetite, crying easily (Sygna et al., 2014), or depressed mood, which again stimulates the release of stress hormones (Clark & Paunovic, 2018).

Derived from this, depression (Seidler et al., 2017) or anxiety disorders (Hardoy et al., 2005) may develop in the long term. There also seems to be a correlation between the burnout syndrome and noise pollution at the workplace (Madvari et al., 2019). Burnout is defined as a syndrome that occurs primarily in individuals who interact frequently with others for work-related reasons. It is composed of the three symptoms: depersonalization, decline in performance, and emotional exhaustion (Maslach et al., 2001). Whereas depersonalization

describes indifference to other people, decline in performance manifests as perceived inadequacy at work, and emotional exhaustion manifests as low energy and fatigue at work (Maslach, 2003).

As can be assumed from the definition (cf. Maslach et al., 2001), teachers suffer more often from burnout already for professional reasons (García-Carmona et al., 2019). Accordingly, there exist assumptions about links between school noise and teachers' burnout (Schönwälder et al., 2004). In one study, for example, the interaction of noise and voice stress was a significant predictor of teachers' burnout (Nübling et al., 2012).

To summarize, teachers vary in their noise sensitivity (Enmarker & Boman, 2004) and are frequently exposed to noise (Kristiansen et al., 2011), causing them to suffer from both psychological and physical problems (Devadas et al., 2017; Meuer & Hiller, 2015; Nübling et al., 2012). To date, there is a lack of research combining such relations in a well-founded model. Accordingly, the second part of the third study was to examine, by means of a theoretical model, how teachers' sensitivity to noise and their mental and physical health are related.

Behavior. Although behavioral effects tend to be subtle, there is evidence that noise also affects human behavior (Jariwala et al., 2017). Cohen and Lezak (1977), for example, could show that noise is negatively related to helpfulness, which may be explained by the fact that cues, such as people's emotional states, are not sufficiently observed under noise. In addition, there are experiments that showed that uncontrollable noise leads to more aggressive behavior in already angry subjects. However, if the test subjects were able to influence the noise exposure, they behaved similarly to the subjects who were not exposed to noise (Donnerstein & Wilson, 1976). In the case of teachers, it has so far only been possible to show that they behave differently in class and, for example, take more breaks to speak (Crook & Langdon, 1974) or try to avoid noise (Bulunuz et al., 2021).

Performance. The effects of noise on performance are particularly noteworthy, as quite different findings exist. Noise-induced effects in performance depend on the difficulty of the task to be processed, the type of noise, the sound pressure level, and the duration of noise exposure (Jahncke et al., 2011; Monteiro et al., 2018; Nassiri et al., 2013). According to a meta-analysis (Szalma & Hancock, 2011), noise impairs performance in more complex tasks, such as cognitive and communication tasks, and primarily affects accuracy and less the speed of processing. Irregular noise and speech noise have slightly more negative effects than continuous noise and noise without speech components. Loudness levels above 75 db(A) have a greater impact than lower noise levels because resources are diverted from the actual task to compensate. Regarding duration, the meta-analysis indicated more severe effects of a shorter duration. However, the median across all studies was 1.1 minutes, indicating a rather short exposure in all analyzed studies. In summary, the findings largely indicate that it is primarily the amount of resources to be used that determines how noise affects performance (Szalma & Hancock, 2011).

Thus, noise may also positively influence performance on certain tasks (e.g., Broadbent, 1979; Smith, 1985). For instance, this is the case with performance in short vigilance tasks (Helton et al., 2009), simple tasks (Harrison & Kelly, 1989), and in tasks with only a brief exposure to noise (Hartley & Adams, 1974).

For prolonged noise exposure (cf. Broadbent, 1954) and for more complex tasks, noise appears to impair performance (Wickens, 2002) because more capacity is required for processing (Berglund et al., 1999). In addition, noise has impairing effects when constant vigilance is required, errors should be avoided, or time pressure is perceived (Ising et al., 1996). It also appears that it is primarily the experienced uncontrollability of noise that is associated with impairments (Glass et al., 1971). Speech noise is more disruptive and, accordingly, is associated with greater impairments in reading comprehension as well as in

proofreading performance (Martin et al., 1988; Oswald et al., 2000). In addition, it leads to attention deficits and impairments in episodic and semantic memory (Hygge et al., 2003).

This effect has also been shown in teachers (Enmarker, 2004): Meaningful noise had a negative effect on episodic memory and impaired the recognition of a text. In addition, a quasi-experiment exists that indicates impaired cognitive performance due to school noise (Arezes et al., 2010). According to self-reports, teachers experience both their teaching (Lin et al., 2020) and their work efficiency affected by school noise (Yassin et al., 2016).

Although there are no explicit research findings on teachers' work performance under noise yet, it is reasonable to assume that all of the above characteristics play a role in the school context, where noise is seemingly ubiquitous: For instance, while teachers' cognitive functions are heavily taxed in the classroom, teachers must also be constantly alert to prevent accidents during recess supervision in the schoolyard. In both situations, students' sounds also include verbal components, which might increase the distress. At the same time, teachers should avoid mistakes – for example, in correcting exams – and often hurry because they have to change classrooms between lessons. To validate these assumptions, the effects of short- and long-term noise exposure on prospective teachers' performance on different tasks were investigated in the first two experiments.

After-effects. In addition, various experiments showed that noise exposure in a first task did not lead to performance degradation until the subsequent second task (Glass & Singer, 1973). In his review, Cohen (1980) pointed out that immediate effects of noise are often missing and impairments can only be recorded retrospectively. He justified this by the fact that many resources are consumed during task processing under noise, so that it is more difficult to adequately cope with the following task. Thus, noise subsequently led to reduced frustration tolerance (e.g., in a puzzle), to poorer performance in proofreading, to an increase in aggressive behavior, or to a reduced willingness to help (Cohen, 1980).

These findings are crucial because teachers have to fulfill different requirements one after the other in their daily routine and often there is no time for a break in between to recover from the strain of the noise (Schönwälder et al., 2004). Suppose a teacher has planned a lesson with group work, which automatically results in higher noise levels (Sala & Rantala, 2016). And although the teacher may still be attentive and concentrated during the lesson, the question arises whether this is still the case after the noisy lesson. After this lesson, is it still possible for the teacher to correct an exam without errors or to participate in the teacher conference in a concentrated manner? Since there are no research findings on this so far, the results of two experimental studies (study 1 and 2) on prospective teachers should provide a first answer to this question.

1.4.4. Interim Summary

Noise can affect mental and physical health as well as performance in a variety of ways. The resulting effects on performance seem to depend on different factors, such as the task, the volume, the duration and the type of noise. The consequences on mental and physical health depend, in part, on individual factors such as noise sensitivity and possibly on coping styles. In order to be able to examine these effects in the school context, four theoretical models have already been presented, on which the following studies are based.

1.5. Studies and Aims

As is evident from the above, noise can lead to many different effects. While mainly negative consequences appear for the psyche, both negative and positive consequences might appear for performance. There seem to be both immediate and delayed effects for performance variables. Such consequences are especially crucial for occupational groups that are frequently exposed to noise, such as teachers (Kristiansen et al., 2011). Due to their daily exposure, they report significant psychological and physical impairments (Enmarker & Boman, 2004; Smith et al., 1998). Since teachers shoulder a major responsibility for the next

generation and their health is correlated with several student variables (Kokkinos et al., 2005; McLean & McDonald Connor, 2015; Yoon, 2002), it is even more important to study the impact of noise exposure on teachers. Only then long-term prevention and intervention programs can be developed and established to help mitigate teachers' risk of mental and physical illness and thus a potential negative influence on students. Although a variety of studies on teachers already exist, they mainly dealt with correlative relationships between noise and psychological and physical well-being. To date, there has been little research on the effects of noise on teaching activities or on teachers' performance variables. In addition, symptoms resulting from school noise have not yet been linked to teachers' stable coping styles. There is also a lack of research on possible pathways between noise sensitivity and relevant symptoms. These gaps should be at least partially filled by the present work.

The overall aim of the three studies was therefore to investigate the objective and subjective effects of school noise on prospective teachers' work performance and stress experience, as well as on practicing teachers' mental and physical health. The focus of the first two studies was on performance and stress. Because student teachers' results are comparable to those of practicing teachers in certain areas (e.g., Bekle, 2004) and because there was little opportunity to recruit practicing teachers for the experiments, the sample of the first two studies consisted of student teachers. In these two experiments, the effects of different durations of noise exposure and different concentration tests on student teachers' stress experience, as well as on their concentration ability and error-correction performance, were investigated. The maximal adaptability theory (Hancock & Warm, 1989, 2003) and the transactional stress model (Lazarus & Folkman, 1984) formed the theoretical basis for these two studies.

While the first part of the third study focused on coping styles when dealing with school noise and the resulting symptoms, the second part of the third study was designed to complement the previous findings with specific associations between teachers' noise

sensitivity and various symptoms. Therefore, we queried teachers in an online survey about noise and its effects. In the first part, the aim was to elicit differences in the physical and psychological effects of noise among four coping patterns. This was examined based on the transactional stress model (Lazarus & Folkman, 1984) and the stress-strain model (Rudow, 2000). In the second part, a focus was placed on examining associations between individual noise sensitivity and short- and long-term psychological and physical symptoms. This was done on the basis of the simplified model of teacher stress (van Dick & Wagner, 2001).

**2. Study 1 and 2: Effects of Student Noise on Student Teachers' Stress Experiences,
Concentration and Error-Correction Performance**

The first two studies have been published together in the journal *Educational Psychology*:

Tomek, R., & Urhahne, D. (2021). Effects of student noise on student teachers' stress experiences, concentration and error–correction performance. *Educational Psychology, 12*(2), 1–19. <https://doi.org/10.1080/01443410.2021.2002819>*

The abstract of the study is presented in this chapter.

Abstract of Study 1 and 2

Student noise can affect teachers' stress experience and work performance. Two experimental studies were conducted to examine these effects in more detail. Based on Lazarus' transactional stress model and the maximal adaptability theory, we assumed an increase in stress experience due to noise and stimulating effects of noise up to a point of maximal adaption before performance drops. The first experiment comprised 74 and the second experiment included 104 student teachers from a German university that were randomly assigned to one of three noise conditions. Participants were asked to complete a concentration test and correct a dictation. Results from analyses of variance were in support of our hypotheses. In both experiments, noise exposure increased stress experience. The first experiment showed positive effects and the second experiment negative effects of noise on participants' error correction. The results are discussed with respect to school noise affecting teachers' mental health and work performance.

Now that I have examined how noise affects student teachers' concrete work performance, I aimed to focus on practicing teachers and their individual characteristics. The following study therefore examined how teachers' different coping styles affect their experience of stress.

3. Study 3a: Relating Teachers' Coping Styles to Student Noise and Perceived Stress

The first part of the third study has also been published in the journal *Educational Psychology*:

Tomek, R., & Urhahne, D. (2022). Relating teachers' coping styles to student noise and perceived stress. *Educational Psychology*, 26(6), 1–21.
<https://doi.org/10.1080/01443410.2022.2031892>*

The abstract of the study is presented in this chapter.

Abstract of Study 3a

School noise is a serious, inevitable problem that teachers experience as stress or strain. Coping styles have a huge impact on teachers' mental health and therefore might influence this daily stress experience. Based on the stress-strain model and the transactional stress model, we examined in an online study how 99 teachers with different coping styles reacted to school noise. Four professional coping styles were derived from the overarching dimensions of professional commitment and experience resilience. The healthy type, the unambitious type, type A, and type burnout differed in terms of threat appraisal, noise stress, voice and hearing problems as well as noise-related burnout. Compared to the healthy type, types A and burnout showed higher levels of stress. Teachers of the risk types turned out to be more vulnerable to school noise than teachers of the healthy type. Specific prevention programs may help to improve teacher resilience.

Now that I have examined teachers' individual coping styles, in the subsequent study I wanted to examine whether there are concrete pathways between teachers' individual noise sensitivity and negative psychological and physical consequences resulting from school noise.

4. Study 3b: Testing a Model of Noise-Related Stress in School Teachers

As already mentioned above, school noise to which teachers are exposed on a daily basis (Kristiansen et al., 2011) represents an objective and subjective risk factor (Berglund et al., 1999; Enmarker & Boman, 2004), from which both physical as well as psychological complaints can arise (Kristiansen et al., 2014; Medeiros et al., 2012). Although these negative effects partly depend on personal factors, such as noise sensitivity (Eysel-Gosepath et al., 2012), little is known about the concrete relationships between the variables involved in noise stress. One exception is a study by Fredriksson et al. (2017) who based their findings on a large sample of female preschool teachers and randomly selected women. Feelings of noise annoyance emerged as a significant mediator of the relationship between occupational noise exposure and auditory fatigue, while stress experience moderated this mediation process.

Apart from this, there is a lack of theoretically based studies on the relationships between teachers' individual characteristics and their physical and mental health. Based on the simplified *model of teacher stress* (van Dick & Wagner, 2001), we therefore intended to examine the way in which noise sensitivity, experienced stress, vocal fatigue, and burnout are related to each other.

A Model of Teacher Stress

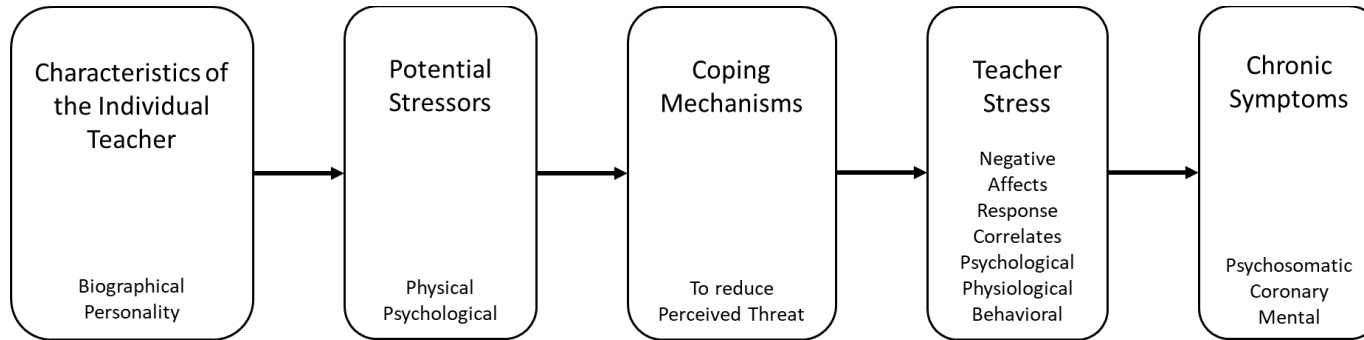
Some theories from general stress research have been transferred to the teaching profession and can explain teachers' stress experience (see e.g., Lazarus & Folkman, 1984). For our study, however, we selected a frequently cited model (e.g., Chan, 2006, 2011; Troesch & Bauer, 2017) that originates directly from teacher stress research. The model of teacher stress (Kyriacou & Sutcliffe, 1978) relies on the assumption that teachers' appraisals of potential occupational stressors become acute stressors and thus form the starting point of their stress response. Occupational stressors can be further divided into psychological (e.g., relationship with colleagues) and physical stressors (e.g., large class size, loudness). Both can trigger short-term psychological (e.g., negative affect), physiological (e.g., muscular tension), or behavioral stress reactions (e.g., days absent from work) as well as longer-lasting

psychosomatic or even chronic complaints. In addition to coping mechanisms, teachers' individual characteristics such as perceived support or self-efficacy may also have an influence on the experience of stress.

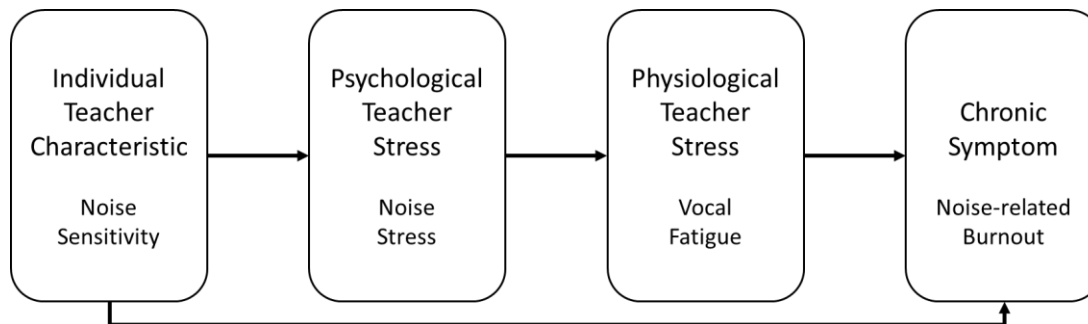
Since this model of teacher stress (Kyriacou & Sutcliffe, 1978) is not easily testable due to its complexity, the simplified model by van Dick and Wagner (2001; see Figure 4.1) served as our theoretical basis. This model shows a linear sequence of a just few factors: Individual teachers' characteristics take influence on occupational stressors, to which teachers respond by means of individual coping mechanisms to reduce their threat. In the long term, teacher stress may result in chronic psychosomatic or mental symptoms. Since the focus of the current study was purely on the relationships between sensitivity to school noise and short-term as well as long-term stress responses, we formed a model of teacher stress reduced to noise stress, that focused on the relationships important to us and left aside the component of coping strategies (see Figure 4.2). In agreement with van Dick and Wagner (2001), we assume that individual teacher characteristics contribute to psychological and physiological stress in response to school noise. Individual teacher characteristics may have an influence on the formation of chronic symptoms, either directly or mediated through the stress response, which may amount to permanent impairments of teacher health. In the following, the components of the model are described in more detail.

Figure 4.1

A Simplified Model of Teacher Stress (van Dick & Wagner, 2001)

**Figure 4.2**

Assumed Associations Between Noise Sensitivity, Stress, Vocal Fatigue and Noise-related Burnout (cf. van Dick & Wagner, 2001)



Noise Sensitivity

Noise sensitivity can be defined as an individual physiological and psychological constitution that generally increases the degree of reaction to noise (cf. Shepherd et al., 2015) and plays an important role in the individual stress process (Ellermeier et al., 2020). As an example, regardless of actual noise exposure, noise-sensitive individuals suffered more from psychological symptoms than individuals who rated themselves less sensitive (Baliatsas et al., 2016). In the school context, teachers' individual noise sensitivity is key to the frequency of stress symptoms and the expression of psychological complaints, such as noise annoyance or exhaustion (Enmarker & Boman, 2004; Nazneen et al., 2020).

Furthermore, according to Stansfeld and Clark (2019), links between noise sensitivity and mental illness can also be assumed. In a longitudinal study, noise sensitivity was found to be a significant predictor of mental illness (Stansfeld & Shipley, 2015). While this relationship is not directly applicable to the teaching profession, it underscores the importance of being sensitive to noise.

Noise Stress and Noise Symptoms

In the short term, noise triggers a feeling of annoyance with components of anxiety, helplessness, anger, and stress (Stansfeld & Clark, 2019), as has already become apparent in laboratory studies (Ljungberg & Neely, 2007), but also among teachers in everyday school life (Augustyńska et al., 2010). In the long term, perceived noise annoyance can result in psychological distress or even mental illness (Stansfeld & Clark, 2019).

In the medium term, physical complaints might be noticed (Stansfeld & Clark, 2019). For example, teachers complain of hearing (Sjödin et al., 2012) and voice problems (Munier & Kinsella, 2008), such as voice fatigue, sore or dry throat (Devadas et al., 2017). Psycho-emotional factors or psychological stress are considered risk factors for voice problems in this context (Devadas et al., 2017; Kooijman et al., 2006). Among Finnish teachers, stress had a stronger influence on the development of voice problems compared to physical illnesses (e.g.,

asthma) (Vertanen-Greis et al., 2020). In addition to the finding that voice problems in female teachers led to more days of absence (Medeiros et al., 2012), recent studies even suggested a link between teachers' voice problems and mental illnesses, such as burnout (Brito Mota et al., 2019; Marques da Rocha et al., 2015). According to our research, there is a lack of studies on how stress from school noise affects teachers' physical and mental health.

However, summarizing previous research, it is clear that day-to-day exposure to school noise is a stressor for teachers (Kristiansen et al., 2011), which can lead to psychological distress (Enmarker & Boman, 2004), physiological complaints (Devadas et al., 2017), and chronic health problems (Brito Mota et al., 2019). Individual sensitivity to noise forms an important basis that can have an impact on mental health in the short term (e.g., Nazneen et al., 2020) as well as in the long term (e.g., Brito Mota et al., 2019).

In view of potential connections between the serious effects that school noise can bring, the importance of studies on concrete relations increases. Since there has been little research on such relationships, the present study aims to fill this research gap based on the modified model by van Dick and Wagner (2001). We hypothesized relationships between teachers' noise sensitivity, experienced stress, vocal fatigue, and experienced burnout symptoms and formulated the following hypotheses:

H1: According to the model (van Dick & Wagner, 2001) and the relationships presented, we hypothesize that positive relationships can be found between noise sensitivity, experienced stress, vocal fatigue, and noise-related burnout.

H2: Since school noise can lead to psychological distress (Augustyńska et al., 2010) under the influence of noise sensitivity (Enmarker & Boman, 2004) and since this distress is associated with voice problems (Devadas et al., 2017; van Dick & Wagner, 2001), we hypothesize that experienced stress mediates the relationship between noise sensitivity and voice fatigue.

H3: While stress is a risk factor for voice problems (Vertanen-Greis et al., 2020), voice problems are positively associated with mental illness (Brito Mota et al., 2019). Accordingly, we hypothesize that voice fatigue mediates the relationship between stress and noise-related burnout.

H4: Concluding from Hypotheses 2 and 3, we speculate that stress and vocal fatigue sequentially mediate the relationship between noise sensitivity and noise-related burnout.

Method

Sample

One hundred and fifty-nine (80.5% female) German teachers participated in the online survey. The age of the 110 elementary and 49 middle school teachers ranged from 24 to 64 years ($M = 44.87$, $SD = 10.13$). Their average work experience ranged from one to 46 years ($M = 18.67$, $SD = 10.16$).

In the German school system, elementary school is compulsory for all students from the age of six and lasts four years. After elementary school, students can choose between middle school, junior high school and high school (secondary school), depending on their grades. In middle school, students are between 10 and 16 years old. Studies of potential noise differences at elementary and middle schools – likely due to differences in age and education – have yielded conflicting results (see Bhardwaj et al., 2013; Chan et al., 2015). To filter out whether elementary and middle school teachers differ with respect to school noise, we conducted an analysis of measurement invariance without formulating a specific hypothesis for it.

Materials

Noise Sensitivity

Noise sensitivity was measured according to the German version of Weinstein's noise sensitivity scale (Zimmer & Ellermeier, 1997). We selected three items and adapted them in the way that they related to student noise (e.g., 'I find it a burden when there is a lot of hustle

and bustle around me during break supervision’). The items were answered on a 5-point Likert scale from (1) *totally disagree* to (5) *totally agree* (see Appendix C; $\alpha = .85$).

Noise Stress

We measured noise stress according to Grebennikov and Wiggins (2006). For our study, however, we chose to focus on only one source of noise, that is, noise emanating from students (e.g., ‘In terms of noise, I feel very stressed by restless students.’). Therefore, we used three items, answered on a 5-point Likert scale from (1) *totally disagree* to (5) *totally agree* (see Appendix C; $\alpha = .82$).

Vocal Fatigue

Vocal fatigue was assessed with six content adapted items (e.g., ‘When I must speak against school noise, my voice feels quite stressed’, $\alpha = .87$; see Appendix C) from the vocal fatigue index (Stappenbeck et al., 2017). They were answered on a 5-point Likert scale from (1) *totally disagree* to (5) *totally agree*.

Noise-related Burnout

Noise-related burnout was surveyed using nine content adapted items (e.g., ‘Due to the high noise volume in my work, I’m emotionally ruined’, $\alpha = .93$; see Appendix C) from the teacher burnout questionnaire (Schwarzer & Jerusalem, 1999). As in previous studies (see Keller-Schneider, 2018), only items of the emotional exhaustion scale were applied that have been answered on a 5-point Likert scale from (1) *totally disagree* to (5) *totally agree*.

Procedure

After approval by the responsible Ministry of Education, we made contact to the directors of Lower Bavarian elementary and middle schools. After their agreement, they were asked to send a web link to their teachers. The link to the 20-minute survey, which could be canceled at any time, was available to interested teachers for a period of two months. At the end of the survey, teachers were thanked and educated about the purpose of the study.

Statistical Analysis

For the basic descriptive analyses, we used IBM SPSS version 25.0, and for the more complex data analysis, we used the AMOS 25.0 program (Arbuckle, 2014). To make statements about the relationships among variables, we computed a structural equation model (SEM), which makes it possible to corroborate relationships among variables (Bollen, 1989; Bollen & Long, 1993). We analyzed the data according to the 2-step procedure for structural equation models (Anderson & Gerbing, 1988): After developing our theoretical model, we checked in a first step the goodness of fit for our model using confirmatory factor analysis (CFA). From the results of the CFA, we calculated in a second step the structural equation model, which consisted of four latent variables and a total of 21 manifest variables (see Appendix C), by the use of Maximum likelihood estimation. Using bootstrap analyses with 500 iterations, we estimated 95% confidence intervals with bias correction for the direct and indirect effects. To test the model's goodness of fit, we used the goodness-of-fit criteria by Hu and Bentler (1999) and Marsh (2007), respectively. A non-significant chi-square test indicates a good fit of the model. However, as the index quickly becomes significant in larger samples, it has limited power (Gerbing et al., 1992). Due to this limited informative value of the chi-square test, we relied on additional parameters, as is customary: The Comparative Fit Index (CFI; Bentler, 1990) and the Tucker-Lewis Index (TLI; Tucker & Lewis, 1973) indicate acceptable fit at values $> .90$ and good fit at $> .95$. According to the interpretation of the Root Mean Square Error of Approximation (RMSEA; Steiger, 1990), model goodness of fit is considered acceptable at a value $< .08$ and excellent at $< .05$. The quotient of the chi-square value and its degrees of freedom indicates a good fit at values < 2 (Kline, 2016).

In order to be able to exclude differences between elementary and middle school teachers, we additionally checked the measurement invariance according to the recommendation of Byrne (2010) within the framework of the confirmatory factor analysis. In the first step, we conducted a theoretically based confirmatory factor analysis for the two types of schools (configural invariance). To test metric invariance, the second step was to

equate factor loadings between groups. In the third step, scalar invariance was tested by equating the factor loadings and intercepts in the two groups and using the middle school teachers as the reference group. Scalar invariance is seen as a necessary condition for comparing the means of different groups (Vandenberg & Lance, 2000). In the fourth step, residual invariance was calculated by equating factor loadings, intercepts, and residuals and using middle school teachers as the reference group. For interpretation, we relied on the chi-square difference test. A non-significant *p*-value suggests a non-significant change in model quality and, accordingly, the presence of measurement invariance. We used Socscistatistics (<https://www.socscistatistics.com>) to calculate the significance value. However, the chi-square difference test is considered to be very sensitive (Weiber & Mülhhaus, 2014), so we additionally based our decision on the change in CFI (Δ CFI) and RMSEA (Δ RMSEA). According to Cheung and Rensvold (2002), a change in CFI ≤ 0.010 and according to Chen (2007), a change in RMSEA of < 0.015 indicates the presence of measurement invariance.

Results

Descriptive Statistics

Table 4.1 shows the descriptive parameters and correlation coefficients of the relevant scales. The large differences between means can be explained by the number of items in the scales. Since skewness and kurtosis for all scales were close to 0, normal distribution of the data can be assumed. As indicated, significant moderate-to-high relationships among the variables are in line with the first hypothesis (H1).

Table 4.1*Descriptive Statistics and Intercorrelations*

Variables	(1)	(2)	(3)	(4)
(1) Noise sensitivity	1			
(2) Noise stress	.29**	1		
(3) Vocal fatigue	.24**	.43**	1	
(4) Burnout	.44**	.54**	.53**	1
Mean	10.20	11.35	16.03	22.39
Standard deviation	3.32	2.33	5.39	8.36
Skewness	-.23	-.09	.24	.31
Kurtosis	-.90	-.85	-.22	-.64

Note. ** $p < .01$.

Confirmatory Factor Analysis

Before calculating the structural equation model, we ran a confirmatory factor analysis to test the convergent and divergent validity of the four latent variables. The initial outcome, $\chi^2(183) = 323.128$, $p < .001$, $\chi^2/df = 1.766$, CFI = .931, TLI = .921, and RMSEA = .070, already indicated acceptable model fit. Although the chi-square test proved significant, the other statistical characteristics indicated a good model fit. However, the modification indices revealed potential for improving the model fit by considering the covariances between the error terms of the variables BO1 and BO2, BO4 and BO8, and VF2 and VF3. Accordingly, we added these bivariate relationships to our model and obtained a good model fit, $\chi^2(180) = 263.980$, $p < .001$, $\chi^2/df = 1.47$, CFI = .959, TLI = .952, and RMSEA = .054. Since our presumed model proved to be acceptable, we next checked if there were any differences between elementary and middle school teachers.

Testing for Measurement Invariance

To check the similarity of the model for elementary school teachers and middle school teachers, we ran the described procedure to test for measurement invariance. The overall and comparative fit indices of the models explored can be seen in Table 4.2. According to the results, there was no significant deterioration in model goodness of fit between configural invariance, metric invariance and scalar invariance. However, when comparing the scalar invariance model with the residual invariance model, we obtained a significant result of the chi-square difference test. Although this test indicated a significant result in residual invariance, the changes in RMSEA and CFI were not large enough to be considered significant. Thus, measurement invariance for elementary and middle school teachers regarding the model of teacher stress can be assumed.

Table 4.2*Results of Testing Measurement Invariance*

Model	Overall Fit Indices					Comparative Fit Indices					Model Comparison
	χ^2	<i>df</i>	<i>p</i>	CFI	RMSEA	χ^2_{diff}	<i>df</i> _{diff}	<i>p</i>	Δ CFI	Δ RMSEA	
(1) Configural invariance	538.618	360	< .001	0.917	0.056						-
(2) Metric invariance	560.799	377	< .001	0.914	0.056	22.181	17	.178	0.003	0.000	(1) vs. (2)
(3) Scalar invariance	583.295	394	< .001	0.912	0.055	22.496	17	.166	0.002	0.001	(2) vs. (3)
(4) Residual invariance	618.176	416	< .001	0.906	0.056	34.881	22	.040	0.006	0.001	(3) vs. (4)

Note. Configural invariance = The number of factors and the proposed indicators were kept constant across groups; Metric invariance = The factor loadings were kept constant across groups; Scalar invariance = The factor loadings and the intercepts were kept constant across groups and the middle school teachers served as a control group; Residual invariance = The factor loadings and the intercepts were kept constant across groups, the middle school teachers served as a control group and the residuals were kept constant across groups.

Structural Equation Modeling Analysis

Finally, to test whether noise stress is a significant mediator of the relationship between noise sensitivity and vocal fatigue and whether vocal fatigue is a significant mediator of the relationship between noise stress and noise-related burnout, we ran the hypothesized model, which was tested by SEM. It mapped our data well, $\chi^2(182) = 278.709$, $p < .001$, $\chi^2/df = 1.53$, CFI = .953, TLI = .945, and RMSEA = .058. Only the chi-square test was significant here as well, but the other more reliable statistical parameters indicated a good model fit. The total effect of each variable can be seen in Table 4.3.

Table 4.3

Total Effects of the SEM

Relationships of variables	<i>B</i>	<i>SE B</i>	β	95% CI	<i>p</i>
Noise sensitivity → noise stress	.18	.07	.28	[.06, .47]	.010
Noise sensitivity → vocal fatigue	.11	.05	.15	[.04, .29]	.006
Noise sensitivity → burnout	.37	.10	.40	[.21, .58]	.004
Noise stress → vocal fatigue	.59	.12	.54	[.34, .71]	.005
Noise stress → burnout	.45	.12	.31	[.15, .47]	.004
Vocal fatigue → burnout	.76	.16	.58	[.38, .71]	.006

Note. CI = confidence interval.

Figure 4.3 shows the standardized path coefficients. The results of the indirect paths are shown in Table 4.4. In accordance with our hypotheses, experienced stress turned out to be a significant mediator of the relationship between noise sensitivity and voice fatigue (H2). Voice fatigue mediated the positive relationship between stress and noise-related burnout (H3). Stress and voice fatigue serially mediated the positive relationship between noise sensitivity and noise-related burnout (H4). Table 4.5 shows the results of all direct paths, from which can be seen that there is still a positive direct relationship between noise sensitivity and noise-related burnout. According to the results, stress and vocal fatigue emerged individually and serially as significant mediators between individual noise sensitivity and noise-related burnout. Additional analyses revealed that stress contributed 7.80% ($p = .006$), voice fatigue 28.60% ($p = .005$), and noise-related burnout 48.00% ($p = .012$) to the explained variance of the hypothesized teacher stress model.

Figure 4.3

Structural Equation Model

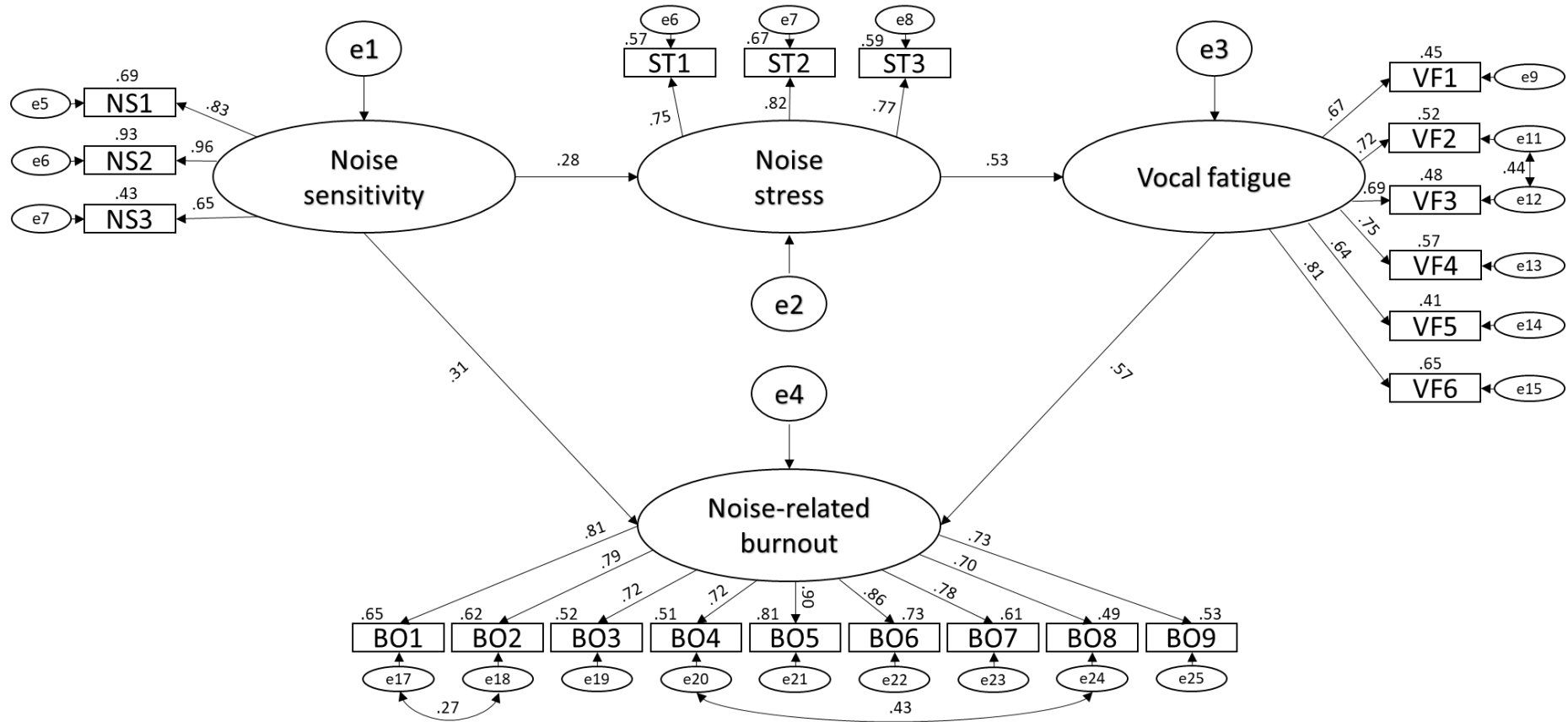


Table 4.4*Indirect Effects of the SEM*

	Relationship of variables	<i>B</i>	<i>SE B</i>	β	95% CI	<i>p</i>
Hypothesis 2	Noise sensitivity → noise stress → vocal fatigue	.10	.05	.15	[.04, .29]	.006
Hypothesis 3	Noise stress → vocal fatigue → burnout	.41	.12	.31	[.15, .47]	.004
Hypothesis 4	Noise sensitivity → noise stress → vocal fatigue → burnout	.07	.04	.09	[.02, .19]	.004

Note. CI = confidence interval.

Table 4.5*Direct Effects of the SEM*

Relationships of variables	<i>B</i>	<i>SE B</i>	β	95% CI	<i>p</i>
Noise sensitivity → noise stress	.18	.07	.28	[.06, .47]	.010
Noise stress → vocal fatigue	.57	.11	.53	[.34, .71]	.005
Vocal fatigue → burnout	.73	.14	.57	[.38, .71]	.006
Noise sensitivity → burnout	.27	.08	.31	[.16, .51]	.002

Note. CI = confidence interval.

Discussion

The aim of this online study was to use van Dick and Wagner's model (2001) to identify concrete pathways between teachers' individual sensitivity to noise and the negative physical and psychological consequences resulting from school noise. All four hypotheses were supported by the data. Our results contribute an important part to current research by approving a theoretical model of the relationship between noise sensitivity and noise-related burnout. We demonstrated that (1) noise sensitivity, stress, vocal fatigue, and experienced burnout were positively correlated, (2) stress mediated the relationship between noise sensitivity and vocal fatigue, (3) vocal fatigue mediated the association between stress and noise-related burnout, (4) stress and vocal fatigue serially mediated the relationship between noise sensitivity and noise-related burnout, and (5) that the direct and positive relationship between noise sensitivity and noise-related burnout persisted. Taken together, these results provide empirical evidence for the relationship between elementary and middle school teachers' individual noise sensitivity and their experienced burnout.

As expected due to the theoretical model of teacher stress (van Dick & Wagner, 2001) and in accordance with our hypothesis, noise sensitivity, stress, voice fatigue, and noise-related burnout correlated positively with each other (H1). This finding is consistent with previous findings (cf. Brito Mota et al., 2019; Devadas et al., 2017; Enmarker & Boman, 2004; Nazneen et al., 2020; Stansfeld & Clark, 2019) and formed the basic premise for our further analyses.

Experienced stress acted as a significant mediator of the positive relationship between noise sensitivity and vocal fatigue (H2). Presumably, noise-sensitive teachers in contrast to less noise-sensitive teachers feel more stressed by student noise, which may contribute to more pronounced vocal fatigue. Previous research also found that individual noise sensitivity has an influence on noise annoyance or stress symptoms (Enmarker & Boman, 2004; Nazneen et al., 2020). Apparently, noise-sensitive individuals experience sounds as interfering and

unpleasant more quickly (cf. Stansfeld & Clark, 2019) than less sensitive individuals, which presumably also makes them feel stressed more quickly. In addition, earlier findings identified emotional and psychological factors as risk factors for the development of voice problems (Devadas et al., 2017; Kooijman et al., 2006; Vertanen-Greis et al., 2020). Teachers' voices are already under above-average stress due to their job (Bovo et al., 2007), which is why additional mental stress – triggered by school noise – further increases stress levels and subsequently has a negative impact on their voice.

As suspected and in line with earlier findings that stress causes voice problems (Devadas et al., 2017) and voice problems are related to mental illness (Brito Mota et al., 2019), voice fatigue was found to be a significant mediator of the positive relationship between stress and noise-related burnout (H3). Therefore, teachers who feel stressed by student noise seem to suffer more from voice problems, which in turn can contribute to their emotional exhaustion. Based on the diathesis-stress model (cf. Stansfeld & Clark, 2019), it is clear that impaired voice operates as a vulnerability factor and therefore can lead to other more serious complaints, such as burnout.

Merging the second and third hypotheses and in agreement with the original theoretical model (van Dick & Wagner, 2001), the assumed serial mediation also showed significantly: Stress and voice fatigue mediated successively the positive relationship between noise sensitivity and noise-related burnout (H4). This means that noise-sensitive teachers experience more stress due to school noise, thus have more voice problems, which in turn are associated with greater emotional exhaustion.

In addition to this indirect pathway, the positive direct relationship between teachers' noise sensitivity and their noise-related burnout remained. Accordingly, noise-sensitive teachers appear to be more prone to noise-related burnout in general, independent of noise stress and vocal fatigue. This direct relationship is meaningful because it is missing from the illustrations of previous models (cf. Kyriacou & Sutcliffe, 1978; van Dick & Wagner, 2001).

According to the diathesis-stress model, traits such as noise sensitivity can form a diathesis that can make people more susceptible to various ailments. The effects that noise can have on noise-sensitive individuals have been documented many times (e.g., Baliatsas et al., 2016; Nazneen et al., 2020), including reference to the possibility of developing mental illness (see Stansfeld & Clark, 2019). However, more detailed research is needed here to determine the direction of this association and other potential mediators or moderators.

From previous conflicting results (Bhardwaj et al., 2013; Chan et al., 2015), it was difficult to infer whether elementary and middle schools would differ with respect to noise. In our data, we found no differences between elementary and middle school teachers, suggesting similar impact pathways of elementary and middle school noise. The existing measurement invariance thus indicates a potential generalizability of our model, which should also be tested in future studies on junior high and high school teachers.

The simplified model of van Dick and Wagner (2001) was suitable for the construction of our structural equation model, which again underpins its importance in teacher stress research. Building on our model, future studies should use the full theoretical model as a foundation and include the variable of coping mechanisms as a mediator or moderator.

The elicited relations are of substantial importance for everyday school life, as they suggest for the first time that student noise appears to affect teachers' physical and mental health through different pathways. On this basis, future studies should analyze the exact effect mechanisms of the single pathways in order to gain even more detailed insights into the stress process triggered by school noise.

Although the results of our study help to explain the development of negative consequences due to school noise, there are still some limitations. First, the study was based on a cross-sectional design. Although theoretical derivation and computation of structural equation models make unidirectional associations likely (Bollen, 1989; Bollen & Long, 1993), causal statements about the associations are nevertheless limited. With the help of a

longitudinal study, it could be clarified whether the stress experience actually preceded the voice problems and the voice problems preceded the noise-related burnout. Second, our survey took place during a phase of the Corona epidemic when schools were just reopening. Prior to that time, the majority of teachers were working in their home offices and, consequently, had little exposure to student noise. This fact may have biased our results. Even if teachers were able to remember the times of school noise stress, they lacked current impressions that could ease to answer the items of the scales. Third, our study design only allowed to collect self-report data. Therefore, it could not be tested whether the reported voice problems corresponded to objective criteria such as hoarseness. Studies suggest a low correlation between perceived and actual voice problems (Cutiva & Burdorf, 2015). Accordingly, additional objective data should be collected in further studies in order to create a more holistic picture and highlight any limitations to the validity of our model. Fourth, as noted above, the validity of our model has only been demonstrated on elementary and middle school teachers, so future studies will need to test the model on junior high and high school teachers.

Conclusion

In summary, our results suggest that individual factors, such as noise sensitivity, play an important role in teachers' experience of psychological and physical stress and even in their mental health. In order to prevent teachers from health problems and to mitigate complaints, intervention and prevention measures are needed in the fight against school noise.

Basically, measures against the objective noise level can be distinguished from measures against the subjectively experienced noise level. With regard to objective school noise, school buildings form a first starting point. By making structural changes to classrooms and break halls, it would be possible to reduce the objectively measurable noise levels (Shield et al., 2015). Students themselves can also contribute to a quieter school day (Norlander et al., 2005): In an intervention study, relaxation training of students led to reduced classroom

loudness. In addition, there are already prevention programs aimed at increasing the noise awareness of student teachers in order to prevent, for example, physical complaints in their later professional life (e.g., Jiménez-Tejada et al., 2012). Improved classroom management skills could also help to prevent high levels of classroom noise (cf. Dockrell & Shield, 2006), which in turn could have a positive impact on teachers' stress experience and voice fatigue.

Beyond the objective reduction of school noise and with regard to subjectively perceived noise levels, the stress experience, especially for noise-sensitive teachers, should be reduced. For this purpose, mindfulness trainings (Roeser et al., 2013) or stress intervention programs (Ansley et al., 2021) are suitable. For example, in one online stress prevention program (Ansley et al., 2021), teachers were able to increase their use of functional coping strategies, like mindfulness and cognitive restructuring. In addition, this intervention helped increase their self-efficacy. Since it seems that both coping strategies and self-efficacy have a buffering effect on stress (cf. Lazarus & Folkman, 1984; Zee & Koomen, 2016), it would be quite conceivable to use such programs in the fight against noise stress as well. With the help of such programs, teachers can improve the way they deal with their daily professional demands and thereby maintain their mental and physical health.

5. General Discussion

5.1. Summary of Results

5.1.1. Study 1 and 2: Effects of Student Noise on Student Teachers' Stress Experiences, Concentration and Error-Correction Performance

The first two experimental studies were designed to investigate whether and to what extent noise during breaks affects student teachers' stress experience and performance. In the first study, 74 student teachers from the University of Passau were assigned in advance to one of three groups (no noise, brief noise, and continuous noise). They consecutively completed the short concentration test d2 (Brickenkamp, 2002) and corrected a dictation (Birkel, 2009). In between, the stress experience was recorded (Jacobs, 2014). The second study was similar to the first study, with the exception that more student teachers, numbering 104, attended and completed the longer concentration test KLT (Düker & Lienert, 2001). Our data were analyzed using ANOVAs, MANOVAs and t-tests. The findings were consistent with the transactional stress model (cf. Lazarus & Folkman, 1984) and the maximal adaptability theory (cf. Hancock & Warm, 1989, 2003) and are therefore in line with our hypotheses. In both experiments, there were no differences in performance on the concentration test, i.e., concentration performance was not significantly affected by the noise conditions. Nevertheless, in both experiments, subjects in the continuous noise group experienced more stress than the other groups. In dictation correction, the results differed between experiment 1 and 2. While in the first experiment a short concentration test under continuous noise led to improved performance in dictation correction, a long concentration test in the second experiment led to poorer correction performance in the short and continuous noise group. On the one hand, it was experimentally shown for the first time that under noise, the processing of tasks that occur in the teaching profession has a negative influence on the subjective stress experience. On the other hand, noise seems to have a positive and negative influence on the performance, depending on the context. These findings show the importance of research in this area, as noise might affect teachers' performance differently, but always has a negative

impact on the experience of stress. This could imply that it is reasonable for teachers to take a short break after a noisy task to recover and then continue working in a concentrated way.

5.1.2. Study 3a: Relating Teachers' Coping Styles to Student Noise and Perceived Stress

The first part of the third study aimed to examine whether there are differences between teachers with varying coping styles in terms of stress symptoms. For this purpose, 99 Bavarian elementary and middle school teachers participated in a 20-minute online survey. Using a short version of the questionnaire work-related behavior and experience patterns (cf. Menge & Schaeper, 2019) the teachers could be assigned to four different coping patterns by means of a latent profile analysis. Generally, the findings were consistent with the transactional stress model (cf. Lazarus & Folkman, 1984) and the stress-strain model (cf. Rudow, 2000) and therefore in line with our hypotheses. ANOVAs indicated significant differences between the professional coping patterns in terms of stress symptoms. The burnout type experienced more noise stress than the healthy type and felt more threatened by noise than the other three types. The at-risk types reported higher vocal fatigue than the two healthy types and more hearing problems than the healthy type. Type A, type burnout, and the unambitious type experienced more noise-related burnout than the healthy type. Moreover, our results suggest that short- and long-term effects of school noise are interrelated, and that these effects interact with teachers' individual coping styles. In summary, this is the first study to show that occupational coping styles may have an impact on short- and long-term stress symptoms caused by school noise. Therefore, they should not go unnoticed. The findings imply that teachers with risky coping styles are less able to cope with school noise than teachers with healthy coping styles. Therefore, it would be necessary to offer special trainings and interventions to teachers at high risk in order to prevent or avoid health impairments caused by noise.

5.1.3. Study 3b: Testing a Model of Noise-related Stress in School Teachers

The second part of the third study aimed to investigate how teachers' sensitivity to noise is related to psychological and physical stress symptoms due to school noise. Online data from a total of 159 Bavarian elementary and middle school teachers were used for the analyses. The findings were in line with our hypotheses and thus consistent with the simplified model of teacher stress (cf. van Dick & Wagner, 2001). By means of a structural equation model, it was shown that the variables noise sensitivity, noise stress, vocal fatigue, and burnout were positively correlated with each other. Furthermore, noise stress mediated the relationship between noise sensitivity and voice fatigue; voice fatigue mediated the relationship between noise stress and noise-related burnout; noise stress and voice fatigue serially mediated the relationship between noise sensitivity and noise-related burnout. Additionally, it was shown that the direct association between individual noise sensitivity and noise-related burnout remained significant. In conclusion, this is the first study to show effect pathways between individual teachers' noise sensitivity and psychological and physical stress symptoms. Teachers' noise sensitivity seems to play a larger role than perhaps previously suspected. The findings imply, similar to the antecedent study, that there might be sensitive teachers who suffer more from school noise. From our model, it can be inferred that there are different ways to support teachers. On the one hand, it would be possible to identify teachers at risk and offer special support programs. On the other hand, it would be plausible to reduce the experienced noise stress or to prevent vocal fatigue. These aspects are possible starting points for intervention and prevention to reduce the risk of long-term illnesses such as burnout.

5.2. Implications

School noise continues to be a major stressor in the teaching profession. Daily exposure to noise can lead to short- and long-term impairments in teachers, which need to be studied more closely. To contribute to this effort, a total of three studies were conducted. The first two

studies took a closer look at the effects of noise during breaks on prospective teachers' stress experience and performance. The third study focused on potential preventive factors, namely coping styles and noise sensitivity. First, teachers' different coping styles were related to the effects of school noise. Second, effect relationships between individual noise sensitivity and psychological and physical symptoms were investigated. From the findings of the individual studies, implications for school practice and for future research emerge.

5.2.1. Implications for School Practice

The results of the first two experimental studies suggest that school noise has no immediate effects on teachers' (concentrative) performance. However, inferred from our findings, prolonged school noise may lead to after-effects in teachers' performance. For simple visual or short tasks, school noise might have stimulating and thus positive effects on teachers' performance (cf. Hancock & Warm, 1989, 2003). However, for more complicated tasks during prolonged noise exposure, teachers' performance may become increasingly impaired (cf. Hancock & Warm, 1989, 2003). While it seems that noise only subsequently affects objective work performance, it has an immediate and negative impact on the individual's stress experience (cf. Lazarus & Folkman, 1984).

In relation to the example explained in the theory section, it can be assumed that during a noisy but not very demanding group work in class, teachers work with concentration during the lesson. Depending on the task they have to perform within the lesson and the task that follows after the lesson, their performance might even improve after the lesson. However, if the lesson is noisy and persistently demanding, there is a high probability that the teacher will still be performing at full capacity during the lesson, but will have limited performance after the lesson. After a noisy and demanding lesson, for example, the individual will have more trouble correcting an exam without errors or listening attentively to the discussion in a teachers' conference.

Through the experiments, it became clear that the student teachers – even though no objective changes were yet apparent – felt stressed primarily by the continuous noise. Accordingly, school noise seems to have a negative impact on both objective behavior and subjective experience. On the subjective level, however, noise stress seems to manifest itself more quickly than on the objective level (cf. Matthews, 2001). In order to prevent such negative effects on teachers' experience and performance, it is essential to raise teachers' awareness of school noise and its consequences (cf. Jiménez-Tejada et al., 2012) and to develop ways to reduce noise exposure at school, both objectively and subjectively (cf. Norlander et al., 2005). In addition, breaks between classes and break supervisions should become mandatory for teaching staff.

The results of the first part of the third study imply that teachers with healthy coping styles suffer less from the psychological and physical negative effects and consequences of school noise than teachers with risky coping styles. Accordingly, risk-types should be identified and trained in more functional ways of coping with (noise-related) stress already during apprenticeship. This could help mitigate noise-related mental and physical illnesses.

The findings of the second part of the third study point to concrete effect pathways between teachers' individual noise sensitivity and various noise-related symptoms. There are several implications here. First, screenings could help to identify teachers at risk for burnout more quickly. This could be accomplished by regularly surveying noise stress and voice problems. Second, it would be possible to provide classroom management trainings to more noise-sensitive teachers to help them learn strategies to avoid agitation and noise in the classroom. Third, schools should provide prevention and intervention services especially for teachers at higher risk to prevent protracted or permanent impairments.

In summary, legislators, school administrators, and teachers must work together to reduce objective and subjective negative effects of school noise and prevent long-term impairments. This can be achieved by objectively reducing noise in educational settings and

improving teachers' classroom management and their individual coping with subjective noise-related stress. This could reduce the likelihood of noise-related mental and physical illness in later working life and potentially reduce costs to the economy and healthcare system.

5.2.2. Implications for Future Research

Since it has been shown that prolonged exposure to noise has a negative effect on subsequent task performance in student teachers, it would first be important to replicate these findings in a larger sample of student teachers. Thereafter, this experiment should be conducted on practicing teachers to determine if the results can be transferred from prospective teachers to practicing teachers. In the long run, field studies would also be needed. Here, teachers could be asked to correct exams after a noisy lesson or to reproduce the contents of a recorded teacher conference. In addition, one could also focus on other performance variables, such as teachers' classroom behavior or their performance during parent conferences. If similar results are found, mandatory breaks between school hours or break supervisions, for example, could contribute to a reduction of such negative effects. Studies on this would also be useful, for instance, to be able to determine the duration of the breaks. To make the stress experience objectifiable, cortisol concentrations using saliva measurements or other physiological stress parameters, such as skin conductance, could be measured during a school day.

The findings of the third study also require replication with a larger sample. After that, longitudinal studies would be necessary to determine possible risk or protective factors, such as coping styles and sensitivity to noise, even before entering the profession. Surveys at multiple measurement time points might reveal whether our findings are merely correlative or whether there are indeed causal relationships between teachers' individual factors and psychological and physical symptoms. Again, other indicators of stress, such as cortisol, pulse, or skin conductance, and also objective data on vocal strain or hearing problems (e.g., hoarseness, tinnitus, hearing loss) would be of interest. In addition, other risk or protective

factors may also contribute to the consequences of noise exposure. From the totality of these research results, it would then be possible to derive a unified theoretical model, on the basis of which more precise statements about the consequences of noise in the educational context would be possible. Individual characteristics such as coping styles and sensitivity to noise should also be integrated into this theoretical model. This allows predictions to be made about which teachers can identify with the statement quoted in the introduction (cf. Blase, 1986, p. 32) and thus have a higher probability of suffering physical or mental illness in the future. Identifying such at-risk teachers is, in turn, an important first step toward improving their health and ability to work.

References

- Åhlander, V. L., Rydell, R., & Löfqvist, A. (2011). Speaker's comfort in teaching environments: Voice problems in Swedish teaching staff. *Journal of Voice: Official Journal of the Voice Foundation*, 25(4), 430–440.
<https://doi.org/10.1016/j.jvoice.2009.12.006>
- Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, 103(3), 411–423.
<https://doi.org/10.1037/0033-2909.103.3.411>
- Angelillo, M., Di Maio, G., Costa, G., Angelillo, N., & Barillari, U. (2009). Prevalence of occupational voice disorders in teachers. *Journal of Preventive Medicine and Hygiene*, 50(1), 26–32.
- Ansley, B. M., Houchins, D. E., Varjas, K., Roach, A., Patterson, D., & Hendrick, R. (2021). The impact of an online stress intervention on burnout and teacher efficacy. *Teaching and Teacher Education*, 98(2), Article 103251. <https://doi.org/10.1016/j.tate.2020.103251>
- Antoniou, A.-S., Polychroni, F., & Vlachakis, A.-N. (2006). Gender and age differences in occupational stress and professional burnout between primary and high-school teachers in Greece. *Journal of Managerial Psychology*, 21(7), 682–690.
<https://doi.org/10.1108/02683940610690213>
- Arbuckle, J. L. *Amos* (Version 25.0) [Computer software]. (2014). IBM SPSS.
- Arezes, P. M., Barbosa, S., & Miguel, A. S. (2010, August 23-27). *Noise as a cognitive impairment factor: A case study amongst teachers* [Paper presentation]. Proceedings of 20th International Congress on Acoustics, Sydney, Australia.
- Asaloei, S. I., Wolomasi, A. K., & Werang, B. R. (2020). Work-related stress and performance among primary school teachers. *International Journal of Evaluation and Research in Education*, 9(2), 352–358. <https://doi.org/10.11591/ijere.v9i2.20335>

- Augustyńska, D., Kaczmarska, A., Mikulski, W., & Radosz, J. (2010). Assessment of teachers' exposure to noise in selected primary schools. *Archives of Acoustics*, 35(4), 521–542. <https://doi.org/10.2478/v10168-010-0040-2>
- Babisch, W. (2011). Quantifizierung des Einflusses von Lärm auf Lebensqualität und Gesundheit [Quantification of the impact of noise on quality of life and health]. *Umwelt und Mensch–Informationsdienst*, 1, 28–36.
- Babisch, W., Greye, S., & Schreiber, H. (April 2007). *Lärm - das unterschätzte Risiko!* [Noise - the underestimated risk!]. <https://www.umweltbundesamt.de/sites/default/files/medien/publikation/long/3203.pdf>
- Babisch, W. (2002). The noise/stress concept, risk assessment and research needs. *Noise & Health*, 4(16), 1–11.
- Baliatsas, C., van Kamp, I., Swart, W., Hooiveld, M., & Yzermans, J. (2016). Noise sensitivity: Symptoms, health status, illness behavior and co-occurring environmental sensitivities. *Environmental Research*, 150, 8–13. <https://doi.org/10.1016/j.envres.2016.05.029>
- Basner, M., Babisch, W., Davis, A., Brink, M., Clark, C., Janssen, S., & Stansfeld, S. (2014). Auditory and non-auditory effects of noise on health. *The Lancet*, 383(9925), 1325–1332. [https://doi.org/10.1016/S0140-6736\(13\)61613-X](https://doi.org/10.1016/S0140-6736(13)61613-X)
- Bauer, J., Stamm, A., Virnich, K., Wissing, K., Müller, U., Wirsching, M., & Schaarschmidt, U. (2006). Correlation between burnout syndrome and psychological and psychosomatic symptoms among teachers. *International Archives of Occupational and Environmental Health*, 79(3), 199–204. <https://doi.org/10.1007/s00420-005-0050-y>
- Behar, A., MacDonald, E., Lee, J., Cui, J., Kunov, H., & Wong, W. (2004). Noise exposure of music teachers. *Journal of Occupational and Environmental Hygiene*, 1(4), 243–247. <https://doi.org/10.1080/15459620490432178>

- Bekle, B. (2004). Knowledge and attitudes about attention-deficit hyperactivity disorder (ADHD): A comparison between practicing teachers and undergraduate education students. *Journal of Attention Disorders*, 7(3), 151–161.
<https://doi.org/10.1177/108705470400700303>
- Belojević, G., Ohrström, E., & Rylander, R. (1992). Effects of noise on mental performance with regard to subjective noise sensitivity. *International Archives of Occupational and Environmental Health*, 64(4), 293–301. <https://doi.org/10.1007/BF00378288>
- Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, 107(2), 238–246. <https://doi.org/10.1037/0033-2909.107.2.238>
- Berglund, B., & Lindvall, T. (1995). *Community Noise: Document prepared for the World Health Organization. Archives of the Center for Sensory Research: Vol. 2,1*. Center for Sensory Research.
- Berglund, B., Lindvall, T., & Schwela, D. H. (1999). *Guidelines for community noise*. <https://apps.who.int/iris/handle/10665/66217>
- Berufe-Lexikon. (2021). *Berufsbild Lehrer/in* [Career profile teacher]. <http://www.berufelexikon.de/berufsbild-beruf-lehrer.htm#:~:text=Lehrer%20erziehen%20und%20unterrichten%20Sch%C3%BCler,in%20fachlichen%20und%20pers%C3%B6nlichen%20Angelegenheiten>.
- Bhardwaj, M., Baum, U., Markevych, I., Mohamed, A., Weinmann, T., Nowak, D., & Radon, K. (2013). Are primary school students exposed to higher noise levels than secondary school students in Germany? *The International Journal of Occupational and Environmental Medicine*, 4(1), 2–11.
- Birkel, P. (2009). Rechtschreibleistung im Diktat – Eine objektiv beurteilbare Leistung [Spelling performance in dictation - An objectively assessable performance]. *Diktat Deutsch*, 15, 5–30.

- Blase, J. J. (1986). A qualitative analysis of sources of teacher stress: Consequences for performance. *American Educational Research Journal*, 23(1), 13–40.
<https://doi.org/10.3102/00028312023001013>
- Bollen, K. A. (1989). *Structural equations with latent variables*. John Wiley & Sons.
- Bollen, K. A., & Long, J. S. (1993). *Structural equations with latent variables*. John Wiley & Sons.
- Bottiani, J. H., Duran, C. A. K., Pas, E. T., & Bradshaw, C. P. (2019). Teacher stress and burnout in urban middle schools: Associations with job demands, resources, and effective classroom practices. *Journal of School Psychology*, 77, 36–51.
<https://doi.org/10.1016/j.jsp.2019.10.002>
- Bovo, R., Galceran, M., Petruccelli, J., & Hatzopoulos, S. (2007). Vocal problems among teachers: Evaluation of a preventive voice program. *Journal of Voice*, 21(6), 705–722.
<https://doi.org/10.1016/j.jvoice.2006.07.002>
- Brickenkamp, R. (2002). *Test d2: Aufmerksamkeits-Belastungs-Test: Manual [D2-test of attention: Manual]*. Hogrefe.
- Brito Mota, A. F. de, Giannini, S. P. P., Oliveira, I. B. de, Paparelli, R., Dornelas, R., & Ferreira, L. P. (2019). Voice disorder and burnout syndrome in teachers. *Journal of Voice: Official Journal of the Voice Foundation*, 33(4), 581.e7-581.e16.
<https://doi.org/10.1016/j.jvoice.2018.01.022>
- Broadbent, D. E. (1954). Some effects of noise on visual performance. *Quarterly Journal of Experimental Psychology*, 6(1), 1–5. <https://doi.org/10.1080/17470215408416643>
- Broadbent, D. E. (1979). Human performance and noise. In C. M. Harris (Ed.), *Handbook of noise control* (pp. 2066–2085). McGraw-Hill.

- Brown, J., Gilmour, W. H., & Macdonald, E. B. (2006). Ill health retirement in Scottish teachers: Process, outcomes and re-employment. *International Archives of Occupational and Environmental Health*, 79(5), 433–440. <https://doi.org/10.1007/s00420-005-0060-9>
- Brown, M., Ralph, S., & Brember, I. (2002). Change-linked work-related stress in British teachers. *Research in Education*, 67(1), 1–12. <https://doi.org/10.7227/RIE.67.1>
- Brumm, H., & Zollinger, S. A. (2011). The evolution of the Lombard effect: 100 years of psychoacoustic research. *Behaviour*, 148(11-13), 1173–1198. <https://doi.org/10.1163/000579511X605759>
- Bulunuz, N., Coskun Onan, B., & Bulunuz, M. (2021). Teachers' noise sensitivity and efforts to prevent noise pollution in school. *Journal of Qualitative Research in Education*, 26, 171–197. <https://doi.org/10.14689/enad.26.8>
- Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit. (2021). *Was ist Lärm?* [What is noise?]. [https://www.bmu.de/themen/luft-laerm-verkehr/laermschutz/laermschutz-im-ueberblick/was-ist-laerm/#:~:text=Ger%C3%A4usche%20entstehen%20durch%20Schwingungen%20und,in%20Dezibel%20\(dB\)%20angegeben.](https://www.bmu.de/themen/luft-laerm-verkehr/laermschutz/laermschutz-im-ueberblick/was-ist-laerm/#:~:text=Ger%C3%A4usche%20entstehen%20durch%20Schwingungen%20und,in%20Dezibel%20(dB)%20angegeben.)
- Byrne, B. M. (2010). *Structural equation modeling with AMOS: Basic concepts, applications, and programming* (2nd ed.). Routledge.
- Campbell, J. M. (1983). Ambient Stressors. *Environment & Behavior*, 15(3), 355–380. <https://doi.org/10.1177/0013916583153005>
- Chan, D. W. (2006). Emotional intelligence and components of burnout among Chinese secondary school teachers in Hong Kong. *Teaching and Teacher Education*, 22(8), 1042–1054. <https://doi.org/10.1016/j.tate.2006.04.005>

- Chan, D. W. (2011). Burnout and life satisfaction: Does gratitude intervention make a difference among Chinese school teachers in Hong Kong? *Educational Psychology, 31*(7), 809–823. <https://doi.org/10.1080/01443410.2011.608525>
- Chan, K. M. K., Li, C. M., Ma, E. P. M., Yiu, E. M. L., & McPherson, B. (2015). Noise levels in an urban Asian school environment. *Noise & Health, 17*(74), 48–55. <https://doi.org/10.4103/1463-1741.149580>
- Chen, F. F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance. *Structural Equation Modeling: A Multidisciplinary Journal, 14*(3), 464–504. <https://doi.org/10.1080/10705510701301834>
- Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling: A Multidisciplinary Journal, 9*(2), 233–255. https://doi.org/10.1207/S15328007SEM0902_5
- Ciorba, A., Bianchini, C., Pelucchi, S., & Pastore, A. (2012). The impact of hearing loss on the quality of life of elderly adults. *Clinical Interventions in Aging, 7*, 159–163. <https://doi.org/10.2147/CIA.S26059>
- Clark, C., & Stansfeld, S.A. (2007). The effect of transportation noise on health and cognitive development: A review of recent evidence. *International Journal of Comparative Psychology, 20*(2), 145–158. <https://escholarship.org/uc/item/8434889m>
- Clark, C., & Paunovic, K. (2018). WHO environmental noise guidelines for the European region: A systematic review on environmental noise and quality of life, wellbeing and mental health. *International Journal of Environmental Research and Public Health, 15*(11), Article 2400. <https://doi.org/10.3390/ijerph15112400>
- Cohen, S. (1980). Aftereffects of stress on human performance and social behavior: A review of research and theory. *Psychological Bulletin, 88*(1), 82–108. <https://doi.org/10.1037/0033-2909.88.1.82>

- Cohen, S., & Lezak, A. (1977). Noise and inattentiveness to social cues. *Environment & Behavior*, 9(4), 559–572. <https://doi.org/10.1177/001391657794007>
- Collani, G. von, & Herzberg, P. Y. (2003). Eine revidierte Fassung der deutschsprachigen Skala zum Selbstwertgefühl von Rosenberg. *Zeitschrift für Differentielle und Diagnostische Psychologie*, 24(1), 3–7. <https://doi.org/10.1024//0170-1789.24.1.3>
- Crichton, F., Dodd, G., Schmid, G., & Petrie, K. J. (2015). Framing sound: Using expectations to reduce environmental noise annoyance. *Environmental Research*, 142, 609–614. <https://doi.org/10.1016/j.envres.2015.08.016>
- Crook, M. A., & Langdon, F. J. (1974). The effects of aircraft noise in schools around London airport. *Journal of Sound and Vibration*, 34(2), 221–232. [https://doi.org/10.1016/S0022-460X\(74\)80306-8](https://doi.org/10.1016/S0022-460X(74)80306-8)
- Cutiva, C. C., & Burdorf, A. (2015). Effects of noise and acoustics in schools on vocal health in teachers. *Noise & Health*, 17(74), 17–22. <https://doi.org/10.4103/1463-1741.149569>
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic Motivation and Self-Determination in Human Behavior*. Springer US. <https://doi.org/10.1007/978-1-4899-2271-7>
- Delahaye, M., Stieglitz, R. D., Graf, M., Keppler, C., Maes, J., & Pflueger, M. (2015). Deutsche Übersetzung und Validierung des Stress Appraisal Measure (SAM) [German translation and validation of the Stress Appraisal Measure (SAM)]. *Fortschritte der Neurologie-Psychiatrie*, 83(5), 276–285. <https://doi.org/10.1055/s-0034-1399727>
- Desrumaux, P., Lapointe, D., Ntsame Sima, M., Boudrias, J.-S., Savoie, A., & Brunet, L. (2015). The impact of job demands, climate, and optimism on well-being and distress at work: What are the mediating effects of basic psychological need satisfaction? *European Review of Applied Psychology*, 65(4), 179–188. <https://doi.org/10.1016/j.erap.2015.06.003>

- Devadas, U., Bellur, R., & Maruthy, S. (2017). Prevalence and risk factors of voice problems among primary school teachers in India. *Journal of Voice*, *31*(1), 117.e1-117.e10.
<https://doi.org/10.1016/j.jvoice.2016.03.006>
- Dicke, T., Elling, J., Schmeck, A., & Leutner, D. (2015). Reducing reality shock: The effects of classroom management skills training on beginning teachers. *Teaching and Teacher Education*, *48*(3), 1–12. <https://doi.org/10.1016/j.tate.2015.01.013>
- DIN Deutsches Institut für Normung e.V. (2018-01). *Ergonomische Grundlagen bezüglich psychischer Arbeitsbelastung - Teil 1: Allgemeine Aspekte und Konzepte und Begriffe (ISO 10075-1:2017); Deutsche Fassung EN ISO 10075-1:2017* [Ergonomic principles related to mental workload - Part 1: General issues and concepts, terms and definitions (ISO 10075-1:2017); German version EN ISO 10075-1:2017].
- Dockrell, J. E., & Shield, B. M. (2006). Acoustical barriers in classrooms: The impact of noise on performance in the classroom. *British Educational Research Journal*, *32*(3), 509–525. <https://doi.org/10.1080/01411920600635494>
- Donnerstein, E., & Wilson, D. W. (1976). Effects of noise and perceived control on ongoing and subsequent aggressive behavior. *Journal of Personality and Social Psychology*, *34*(5), 774–781. <https://doi.org/10.1037/0022-3514.34.5.774>
- Düker, H., & Lienert, G. A. (2001). *KLT-R: Konzentrations-Leistungs-Test – Revidierte Fassung* [KLT-R: Concentration Performance Test – Revised Version]. Hogrefe.
- Eacute, J., & Esteve, M. (2000). The transformation of the teachers' role at the end of the twentieth century: New challenges for the future. *Educational Review*, *52*(2), 197–207.
<https://doi.org/10.1080/713664040>
- Eisenmann, A. (2006). *Verkehrslärm, lärmbezogene Gestörtheit, kognitive Leistung, Schlafqualität und Wohlbefinden bei Volksschulkindern im alpinen Raum* [Traffic noise, noise-related disturbance, cognitive performance, sleep quality, and well-being in

- elementary school children in alpine areas] [Ph.D. Thesis]. Leopold-Franzens-Universität, Innsbruck.
- Ellermeier, W., Kattner, F., Klippenstein, E., Kreis, M., & Marquis-Favre, C. (2020). Short-term noise annoyance and electrodermal response as a function of sound-pressure level, cognitive task load, and noise sensitivity. *Noise & Health*, *22*(105), 46–55.
- Embich, J. L. (2001). The relationship of secondary special education teachers' roles and factors that lead to professional burnout. *Teacher Education and Special Education*, *24*(1), 58–69. <https://doi.org/10.1177/088840640102400109>
- Enmarker, I. (2004). The effects of meaningful irrelevant speech and road traffic noise on teachers' attention, episodic and semantic memory. *Scandinavian Journal of Psychology*, *45*(5), 393–405. <https://doi.org/10.1111/j.1467-9450.2004.00421.x>
- Enmarker, I., & Boman, E. (2004). Noise annoyance responses of middle school pupils and teachers. *Journal of Environmental Psychology*, *24*(4), 527–536. <https://doi.org/10.1016/j.jenvp.2004.09.005>
- Evans, G. W., & Johnson, D. (2000). Stress and open-office noise. *The Journal of Applied Psychology*, *85*(5), 779–783. <https://doi.org/10.1037/0021-9010.85.5.779>
- Eysel-Gosepath, K., Daut, T., Pinger, A., Lehmacher, W., & Erren, T. (2012). Effects of noise in primary schools on health facets in German teachers. *Noise & Health*, *14*(58), 129–134. <https://doi.org/10.4103/1463-1741.97258>
- Flores, M. A. (2018). Tensions and possibilities in teacher educators' roles and professional development. *European Journal of Teacher Education*, *41*(1), 1–3. <https://doi.org/10.1080/02619768.2018.1402984>
- Fredriksson, S., Hussain-Alkhateeb, L., & Persson Waye, K. (2017, June 18-22). *The effect of occupational noise on hearing-related symptoms-exploring mediating and modifying effect of annoyance and stress* [Paper presentation]. 12. IC BEN Congress on Noise as a Public

Health Problem, Zurich, Switzerland.

http://www.icben.org/2017/ICBEN%202017%20Papers/SubjectArea01_Fredriksson_0113_3941.pdf

Galaterou, J., & Antoniou, A. S. (2017). Teachers' attitudes towards inclusive education: The role of job stressors and demographic parameters. *International Journal of Special Education*, 32(4), 643–658.

García-Carmona, M., Marín, M. D., & Aguayo, R. (2019). Burnout syndrome in secondary school teachers: A systematic review and meta-analysis. *Social Psychology of Education*, 22(1), 189–208. <https://doi.org/10.1007/s11218-018-9471-9>

Gerbing, D. W., Anderson, J. C., Gerbing, D. W., & Anderson, J. C. (1992). Monte Carlo evaluations of goodness of fit indices for structural equation models. *Sociological Methods & Research*, 21(2), 132–160. <https://doi.org/10.1177/0049124192021002002>

Glass, D. C., & Singer, J. E. (1973). Experimental studies of uncontrollable and unpredictable noise. *Representative Research in Social Psychology*, 4(1), 165–183.

Glass, D. C., Reim, B., & Singer, J. E. (1971). Behavioral consequences of adaptation to controllable and uncontrollable noise. *Journal of Experimental Social Psychology*, 7(2), 244–257. [https://doi.org/10.1016/0022-1031\(71\)90070-9](https://doi.org/10.1016/0022-1031(71)90070-9)

Golmohammadi, R., Darvishi, E., Shafiee Motlagh, M., & Faradmal, J. (2021). Role of individual and personality traits in occupational noise-induced psychological effects. *Applied Acoustics*, 173, Article 107699. <https://doi.org/10.1016/j.apacoust.2020.107699>

Grebennikov, L., & Wiggins, M. (2006). Psychological effects of classroom noise on early childhood teachers. *The Australian Educational Researcher*, 33(3), 35–53. <https://doi.org/10.1007/BF03216841>

- Griffith, J., Steptoe, A., & Cropley, M. (1999). An investigation of coping strategies associated with job stress in teachers. *The British Journal of Educational Psychology*, 69(4), 517–531. <https://doi.org/10.1348/000709999157879>
- Guski, R. (1999). Personal and social variables as co-determinants of noise annoyance. *Noise & Health*, 1(3), 45–56.
- Hacker, W., Hubrich, A., Morgenroth, T., & Stab, N. (2012). Schätzskalen zum kurzfristigen Beanspruchungserleben (SKB-Verfahren)—modifiziert nach Plath & Richter (1984). *Journal Psychologie des Alltagshandelns*, 5(1), 27–37.
- Hammersen, F., Niemann, H., & Hoebel, J. (2016). Environmental noise annoyance and mental health in adults: Findings from the cross-sectional German health update (GEDA) study 2012. *International Journal of Environmental Research and Public Health*, 13(10), Article 954. <https://doi.org/10.3390/ijerph13100954>
- Hancock, P. A., & Warm, J. S. (1989, 2003). A dynamic model of stress and sustained attention. *Human Factors*, 31(5), 519–537. <https://doi.org/10.1177/001872088903100503>
- Hardoy, M. C., Carta, M. G., Marci, A. R., Carbone, F., Cadeddu, M., Kovess, V., Dell'Osso, L., & Carpiello, B. (2005). Exposure to aircraft noise and risk of psychiatric disorders: The Elmas survey-Aircraft noise and psychiatric disorders. *Social Psychiatry and Psychiatric Epidemiology*, 40(1), 24–26. <https://doi.org/10.1007/s00127-005-0837-x>.
- Harmsen, R., Helms-Lorenz, M., Maulana, R., & van Veen, K. (2018). The relationship between beginning teachers' stress causes, stress responses, teaching behaviour and attrition. *Teachers and Teaching*, 24(6), 626–643. <https://doi.org/10.1080/13540602.2018.1465404>
- Harrison, D. W., & Kelly, P. L. (1989). Age differences in cardiovascular and cognitive performance under noise conditions. *Perceptual and Motor Skills*, 69(2), 547–554. <https://doi.org/10.2466/pms.1989.69.2.547>

- Hartley, L. R., & Adams, R. G. (1974). Effect of noise on the Stroop Test. *Journal of Experimental Psychology*, *102*(1), 62–66. <https://doi.org/10.1037/h0035695>
- Helton, W. S., Matthews, G., & Warm, J. S. (2009). Stress state mediation between environmental variables and performance: The case of noise and vigilance. *Acta Psychologica*, *130*(3), 204–213. <https://doi.org/10.1016/j.actpsy.2008.12.006>
- Hendriks, A. (2007). UN Convention on the Rights of Persons with Disabilities. *European Journal of Health Law*, *14*(3), 273–280. <https://doi.org/10.1163/092902707X240620>
- Ho, S. K. (2017). The relationship between teacher stress and burnout in Hong Kong: Positive humour and gender as moderators. *Educational Psychology*, *37*(3), 272–286. <https://doi.org/10.1080/01443410.2015.1120859>
- Howard, J. T., & Howard, K. J. (2020). The effect of perceived stress on absenteeism and presenteeism in public school teachers. *Journal of Workplace Behavioral Health*, *35*(2), 100–116. <https://doi.org/10.1080/15555240.2020.1724794>
- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55. <https://doi.org/10.1080/10705519909540118>
- Hygge, S., Boman, E., & Enmarker, I. (2003). The effects of road traffic noise and meaningful irrelevant speech on different memory systems. *Scandinavian Journal of Psychology*, *44*(1), 13–21. <https://doi.org/10.1111/1467-9450.00316>
- Ising, H., & Kruppa, B. (2004). Health effects caused by noise: Evidence in the literature from the past 25 years. *Noise & Health*, *6*(22), 5–13. <https://www.noiseandhealth.org/text.asp?2004/6/22/5/31678>
- Ising, H., Sust, C. A., & Rebentisch, E. (Eds.). (1996). *Arbeitswissenschaftliche Erkenntnisse: Vol. 98. Lärmbeurteilung – Extra-aurale Wirkungen* [Noise assessment - Extra-aural effects].

- Jacobs, B. (2014). *Der Einfluss akustischer Störreize und der Lärmempfindlichkeit auf die Leistung in einem Konzentrationstest* [The influence of acoustic stimuli and noise sensitivity on performance in a concentration test] [Unpublished manuscript]. University of Saarland. <http://psydok.sulb.uni-saarland.de/volltexte/2014/5121/>
- Jahncke, H., Hygge, S., Halin, N., Green, A. M., & Dimberg, K. (2011). Open-plan office noise: Cognitive performance and restoration. *Journal of Environmental Psychology*, 31(4), 373–382. <https://doi.org/10.1016/j.jenvp.2011.07.002>
- Jariwala, H. J., Syed, H. S., Pandya, M. J., & Gajera, Y. M. (2017). *Noise Pollution & Human Health: A Review*. <https://www.researchgate.net/publication/319329633>
- Jiang, T. (1997). Can noise levels at school gymnasias cause a hearing loss: A case study of a physical education teacher. *The Journal of the Acoustical Society of America*, 101(5), Article 3069. <https://doi.org/10.1121/1.418754>
- Jiménez-Tejada, M.-P., Hódar, J. A., & González-García, F. (2012). Noise, what noise? Raising awareness of auditory health among future primary-school teachers. *Teaching and Teacher Education*, 28(8), 1083–1090. <https://doi.org/10.1016/j.tate.2012.06.002>
- Joiko, K., & Wolff, G. (2010). *Psychische Belastung und Beanspruchung im Berufsleben: Erkennen - gestalten* (5. Aufl.). Bundesanst. für Arbeitsschutz u. Arbeitsmedizin.
- Karjalainen, S., Brännström, J. K., Christensson, J., Sahlén, B., & Lyberg-Åhlander, V. (2020). A pilot study on the relationship between primary school teachers' well-being and the acoustics of their classrooms. *International Journal of Environmental Research and Public Health*, 17(6). <https://doi.org/10.3390/ijerph17062083>
- Keller-Schneider, M. (2018). Job demands appraisals, classroom climate, and team support predict changes in emotional exhaustion among teachers after two years: A sequential mediation model. *Journal of Teacher Education and Educators*, 7(3), 233–242. <https://dergipark.org.tr/en/pub/jtee/issue/43443/530201>

- Kerns, E., Masterson, E. A., Themann, C. L., & Calvert, G. M. (2018). Cardiovascular conditions, hearing difficulty, and occupational noise exposure within US industries and occupations. *American Journal of Industrial Medicine*, *61*(6), 477–491.
<https://doi.org/10.1002/ajim.22833>
- Kieschke, U., & Schaarschmidt, U. (2008). Professional commitment and health among teachers in Germany: A typological approach. *Learning and Instruction*, *18*(5), 429–437.
<https://doi.org/10.1016/j.learninstruc.2008.06.005>
- Kjellberg, A., Landström, U. L. F., Tesarz, M., Söderberg, L., & Akerlund, E. (1996). The effects of nonphysical noise characteristics, ongoing task and noise sensitivity on annoyance and distraction due to noise at work. *Journal of Environmental Psychology*, *16*(2), 123–136. <https://doi.org/10.1006/jevp.1996.0010>
- Kjellberg, A., Muhr, P., & Skoldstrom, B. (1998). Fatigue after work in noise-an epidemiological survey study and three quasi-experimental field studies. *Noise & Health*, *1*(1), 47–55. <https://www.noiseandhealth.org/text.asp?1998/1/1/47/31778>
- Klatte, M., Bergström, K., & Lachmann, T. (2013). Does noise affect learning? A short review on noise effects on cognitive performance in children. *Frontiers in Psychology*, *4*, Article 578. <https://doi.org/10.3389/fpsyg.2013.00578>
- Klatte, M., Hellbrück, J., Seidel, J., & Leistner, P. (2010). Effects of classroom acoustics on performance and well-being in elementary school children: A field study. *Environment & Behavior*, *42*(5), 659–692. <https://doi.org/10.1177/0013916509336813>
- Klatte, M., Spilski, J., Mayerl, J., Möhler, U., Lachmann, T., & Bergström, K. (2017). Effects of aircraft noise on reading and quality of life in primary school children in Germany: Results from the NORAH study. *Environment & Behavior*, *49*(4), 390–424.
<https://doi.org/10.1177/0013916516642580>

- Klein, E. M., Brähler, E., Dreier, M., Reinecke, L., Müller, K. W., Schmutzer, G., Wölfling, K., & Beutel, M. E. (2016). The German version of the Perceived Stress Scale - psychometric characteristics in a representative German community sample. *BMC Psychiatry, 16*, 159. <https://doi.org/10.1186/s12888-016-0875-9>
- Kline, R. B. (2016). *Principles and practice of structural equation modeling* (4th ed.). Guilford Press.
- Kokkinos, C. M. (2007). Job stressors, personality and burnout in primary school teachers. *The British Journal of Educational Psychology, 77*(1), 229–243. <https://doi.org/10.1348/000709905X90344>
- Kokkinos, C. M., Panayiotou, G., & Davazoglou, A. M. (2004). Perceived seriousness of pupils' undesirable behaviours: The student teachers' perspective. *Educational Psychology, 24*(1), 109–120. <https://doi.org/10.1080/0144341032000146458>
- Kokkinos, C. M., Panayiotou, G., & Davazoglou, A. M. (2005). Correlates of teacher appraisals of student behaviors. *Psychology in the Schools, 42*(1), 79–89. <https://doi.org/10.1002/pits.20031>
- Kooijman, P. G. C., Jong, F. I. C. R. S. de, Thomas, G., Huinck, W., Donders, R., Graamans, K., & Schutte, H. K. (2006). Risk factors for voice problems in teachers. *Folia phoniatica et logopaedica: Official organ of the International Association of Logopedics and Phoniatics (IALP), 58*(3), 159–174. <https://doi.org/10.1159/000091730>
- Koszarny, Z., & Goryński, P. (1990). Narazenie uczniów i nauczycieli na hałas w szkole [Exposure of schoolchildren and teachers to noise at school]. *Roczniki Państwowego Zakładu Higieny, 41*(5-6), 297–310.
- Kristiansen, J., Lund, S. P., Nielsen, P. M., Persson, R., & Shibuya, H. (2011). Determinants of noise annoyance in teachers from schools with different classroom reverberation times.

Journal of Environmental Psychology, 31(4), 383–392.

<https://doi.org/10.1016/j.jenvp.2011.08.005>

Kristiansen, J., Lund, S. P., Persson, R., Shibuya, H., Nielsen, P. M., & Scholz, M. (2014). A study of classroom acoustics and school teachers' noise exposure, voice load and speaking time during teaching, and the effects on vocal and mental fatigue development.

International Archives of Occupational and Environmental Health, 87(8), 851–860.

<https://doi.org/10.1007/s00420-014-0927-8>

Kunter, M., Tsai, Y.-M., Klusmann, U., Brunner, M., Krauss, S., & Baumert, J. (2008).

Students' and mathematics teachers' perceptions of teacher enthusiasm and instruction.

Learning and Instruction, 18(5), 468–482.

<https://doi.org/10.1016/j.learninstruc.2008.06.008>

Kyriacou, C., & Pratt, J. (1985). Teacher stress and psychoneurotic symptoms. *The British*

Journal of Educational Psychology, 55(1), 61–64. [https://doi.org/10.1111/j.2044-](https://doi.org/10.1111/j.2044-8279.1985.tb02607.x)

[8279.1985.tb02607.x](https://doi.org/10.1111/j.2044-8279.1985.tb02607.x)

Kyriacou, C., & Sutcliffe, J. (1978). Teacher stress: Prevalence, sources, and symptoms. *The*

British Journal of Educational Psychology, 48(2), 159–167. [https://doi.org/10.1111/j.2044-](https://doi.org/10.1111/j.2044-8279.1978.tb02381.x)

[8279.1978.tb02381.x](https://doi.org/10.1111/j.2044-8279.1978.tb02381.x)

Kyriacou, C. (2001). Teacher Stress: Directions for future research. *Educational Review*,

53(1), 27–35. <https://doi.org/10.1080/00131910120033628>

Laal, M., & Ghodsi, S. M. (2012). Benefits of collaborative learning. *Procedia - Social and*

Behavioral Sciences, 31, 486–490. <https://doi.org/10.1016/j.sbspro.2011.12.091>

Laal, M., Khattami-Kermanshahi, Z., & Laal, M. (2014). Teaching and education;

collaborative style. *Procedia - Social and Behavioral Sciences*, 116, 4057–4061.

<https://doi.org/10.1016/j.sbspro.2014.01.890>

- Lambert, R. G., McCarthy, C., O'Donnell, M., & Wang, C. (2009). Measuring elementary teacher stress and coping in the classroom: Validity evidence for the classroom appraisal of resources and demands. *Psychology in the Schools, 46*(10), 973–988.
<https://doi.org/10.1002/pits.20438>
- Lane, R. N. (1957). Noise control in schools. *Noise Control, 3*(4), 27–34.
<https://doi.org/10.1121/1.2369269>
- Laueremann, F., & König, J. (2016). Teachers' professional competence and wellbeing: Understanding the links between general pedagogical knowledge, self-efficacy and burnout. *Learning and Instruction, 45*(1), 9–19.
<https://doi.org/10.1016/j.learninstruc.2016.06.006>
- Lazarus, R. S., & Folkman, S. (1984). *Stress, Appraisal and Coping*. Springer.
- Lercher, P., Widmann, U., & Kofler, W. (2000, August 27-30). *Transportation noise and blood pressure: The importance of modifying factors* [Paper presentation]. In Proceedings of the 29th International Congress and Exhibition on Noise Control Engineering, Nizza, France.
- Lercher, P., Evans, G. W., & Meis, M. (2003). Ambient noise and cognitive processes among primary schoolchildren. *Environment & Behavior, 35*(6), 725–735.
<https://doi.org/10.1177/0013916503256260>
- Lerias, D., & Byrne, M. K. (2003). Vicarious traumatization: Symptoms and predictors. *Stress & Health, 19*(3), 129–138. <https://doi.org/10.1002/smi.969>
- Lin, S., Lipton, E., Lu, Y., & Kielb, C. (2020). Are classroom thermal conditions, lighting, and acoustics related to teacher health symptoms? *Indoor Air, 30*(3), 544–552.
<https://doi.org/10.1111/ina.12640>

- Ljungberg, J. K., & Neely, G. (2007). Stress, subjective experience and cognitive performance during exposure to noise and vibration. *Journal of Environmental Psychology, 27*(1), 44–54. <https://doi.org/10.1016/j.jenvp.2006.12.003>
- Madvari, R. F., Dehghan, S. F., Bidel, H., Laal, F., Halvani, G., Kordmiri, H. M., & Abbasi, F. (2019). Relationship between noise annoyance and job burnout among exposed worker to noise pollution: A case study in ceramic industry. *Journal of Safety Promotion and Injury Prevention, 7*(3), 151–158.
- Marques da Rocha, L., Behlau, M., & Dias de Mattos Souza, L. (2015). Behavioral dysphonia and depression in elementary school teachers. *Journal of Voice: Official Journal of the Voice Foundation, 29*(6), 712–717. <https://doi.org/10.1016/j.jvoice.2014.10.011>
- Marsh, H. W. (2007). Application of confirmatory factor analysis and structural equation modeling in sport/exercise psychology. In G. Tenenbaum & R. C. Eklund (Eds.), *Handbook of sport psychology* (3rd ed., pp. 774–798). Wiley.
- Martin, R. C., Wogalter, M. S., & Forlano, J. G. (1988). Reading comprehension in the presence of unattended speech and music. *Journal of Memory and Language, 27*(4), 382–398. [https://doi.org/10.1016/0749-596X\(88\)90063-0](https://doi.org/10.1016/0749-596X(88)90063-0)
- Marwat, A. K., Shah, I., Khan, S., & Gul, S. (2012). Teachers' stress, performance & resources: The moderating effects of resources on stress & performance. *International Review of Social Sciences and Humanities, 2*(2), 21–29.
- Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job burnout. *Annual Review of Psychology, 52*, 397–422. <https://doi.org/10.1146/annurev.psych.52.1.397>
- Maslach, C. (2003). Job burnout. *Current Directions in Psychological Science, 12*(5), 189–192. <https://doi.org/10.1111/1467-8721.01258>

- Matthews, G. (2001). Levels of transaction: A cognitive science framework for operator stress. In P. A. Hancock & P. A. Desmond (Eds.), *Stress, Workload and Fatigue* (pp. 5–33). Lawrence Erlbaum.
- Maue, J. H. (2009). *0 Dezibel [plus] 0 Dezibel [gleich] 3 Dezibel: Einführung in die Grundbegriffe und die quantitative Erfassung des Lärms [0 decibels [plus] 0 decibels [equal] 3 decibels: Introduction to the basic concepts and quantitative measurement of noise]* (9., neu bearbeitete und erweiterte Auflage). Erich Schmidt Verlag.
- McLean, L., & McDonald Connor, C. (2015). Depressive symptoms in third-grade teachers: Relations to classroom quality and student achievement. *Child Development, 86*(3), 945–954. <https://doi.org/10.1111/cdev.12344>
- Medeiros, A. M. de, Assunção, A. Á., & Barreto, S. M. (2012). Absenteeism due to voice disorders in female teachers: A public health problem. *International Archives of Occupational and Environmental Health, 85*(8), 853–864. <https://doi.org/10.1007/s00420-011-0729-1>
- Menge, C., & Schaeper, H. (2019). Berufliche Selbstregulation von Lehrkräften: Überprüfung eines Kurzinstruments [Professional self-regulation of teachers: Review of a brief instrument]. *Zeitschrift für Erziehungswissenschaft, 22*(6), 1489–1513. <https://doi.org/10.1007/s11618-018-0851-x>
- Mérida-López, S., Extremera, N., & Rey, L. (2017). Emotion-regulation ability, role stress and teachers' mental health. *Occupational Medicine (Oxford, England), 67*(7), 540–545. <https://doi.org/10.1093/occmed/kqx125>
- Meuer, S. P., & Hiller, W. (2015). The impact of hyperacusis and hearing loss on tinnitus perception in German teachers. *Noise & Health, 17*(77), 182–190. <https://doi.org/10.4103/1463-1741.160682>

- Monteiro, R., Tomé, D., Neves, P., Silva, D., & Rodrigues, M. A. (2018). The interactive effect of occupational noise on attention and short-term memory: A pilot study. *Noise & Health, 20*(96), 190–198. https://doi.org/10.4103/nah.NAH_3_18
- Montgomery, C., & Rupp, A. A. (2005). A meta-analysis for exploring the diverse causes and effects of stress in teachers. *Canadian Journal of Education / Revue canadienne de l'éducation, 28*(3), 458–486. <https://doi.org/10.2307/4126479>
- Munier, C., & Kinsella, R. (2008). The prevalence and impact of voice problems in primary school teachers. *Occupational Medicine (Oxford, England), 58*(1), 74–76. <https://doi.org/10.1093/occmed/kqm104>
- Nassiri, P., Monazam, M., Fouladi Dehaghi, B., Ibrahim Ghavam Abadi, L., Zakerian, S. A., & Azam, K. (2013). The effect of noise on human performance: A clinical trial. *The International Journal of Occupational and Environmental Medicine, 4*(2), 87–95.
- Nazneen, S., Raza, A., & Khan, S. (2020). Assessment of noise pollution and associated subjective health complaints and psychological symptoms: Analysis through structure equation model. *Environmental Science and Pollution Research International, 27*(17), 21570–21580. <https://doi.org/10.1007/s11356-020-08655-x>
- Norlander, T., Moås, L., & Archer, T. (2005). Noise and stress in primary and secondary school children: Noise reduction and increased concentration ability through a short but regular exercise and relaxation program. *School Effectiveness and School Improvement, 16*(1), 91–99. <https://doi.org/10.1080/092434505000114173>
- Novanta, G. G. R., Garavelli, S. L., & Sampaio, A. L. L. (2020). Is the level of noise in a school environment be harmful to the hearing of teachers? *International Archives of Otorhinolaryngology, 24*(4), e503–e507. <https://doi.org/10.1055/s-0040-1702969>
- Nübling, M., Vomstein, M., Haug, A., & Nübling, T. (2012). *Personenbezogene Gefährdungsbeurteilung an öffentlichen Schulen in Baden-Württemberg - Erhebung*

- psychosozialer Faktoren bei der Arbeit* [Person-related risk assessment at public schools in Baden-Württemberg - Survey of psychosocial factors at work]. Freiburg. Freiburger Forschungsstelle Arbeits- und Sozialmedizin. https://www.praevention-schule-bw.de/fileadmin/media/Dokumente/Personenbezogen/Abschlussbericht_FFAS.pdf
- Nübling, M., Wirtz, M., Neuner, R., & Krause, A. (2008). Ermittlung psychischer Belastungen bei Lehrkräften — Entwicklung eines Instruments für die Vollerhebung in Baden-Württemberg [Determination of mental stress among teachers - Development of an instrument for the full survey in Baden-Württemberg]. *Zentralblatt für Arbeitsmedizin, Arbeitsschutz und Ergonomie*, 58(10), 312–313. <https://doi.org/10.1007/BF03346233>
- Oswald, C. J., Tremblay, S., & Jones, D. M. (2000). Disruption of comprehension by the meaning of irrelevant sound. *Memory (Hove, England)*, 8(5), 345–350. <https://doi.org/10.1080/09658210050117762>
- Peeters, M. A. G., & Rutte, C. G. (2005). Time management behavior as a moderator for the job demand-control interaction. *Journal of Occupational Health Psychology*, 10(1), 64–75. <https://doi.org/10.1037/1076-8998.10.1.64>
- Perkhofer-Czapek, M., & Potzmann, R. (2016). *Begleiten, Beraten und Coachen: Der Lehrberuf im Wandel* [Accompanying, advising and coaching: The teaching profession in transition] (1. Auflage). Springer Fachmedien Wiesbaden GmbH.
- Pietarinen, J., Pyhältö, K., Soini, T., & Salmela-Aro, K. (2013). Reducing teacher burnout: A socio-contextual approach. *Teaching and Teacher Education*, 35, 62–72. <https://doi.org/10.1016/j.tate.2013.05.003>
- Puglisi, G. E., Astolfi, A., Cantor Cutiva, L. C., & Carullo, A. (2015, May 31-June 03). *Assessment of indoor ambient noise level in school classrooms* [Paper presentation]. In Proceedings of the Conference on Noise Control. EuroNoise, Maastricht, Netherlands.

- Rafferty, Y., Piscitelli, V., & Boettcher, C. (2003). The impact of inclusion on language development and social competence among preschoolers with disabilities. *Exceptional Children*, 69(4), 467–479. <https://doi.org/10.1177/001440290306900405>
- Rezende, B. A., Medeiros, A. M. de, Silva, A. M. d., & Assunção, A. Á. (2019). Fatores associados à percepção de ruído ocupacional intenso pelos professores da educação básica no Brasil [Factors associated with perception of loud occupational noise by school teachers in basic education in Brazil]. *Revista brasileira de epidemiologia = Brazilian Journal of Epidemiology*, 22, Article e190063. <https://doi.org/10.1590/1980-549720190063>
- Rheinberg, F., Vollmeyer, R., & Engeser, S. (2003). *Die Erfassung des Flow-Erlebens* [Measurement of flow experience]. Universität Potsdam, Potsdam.
- Robert Koch Institut. (2020). *Lärm* [Noise]. https://www.rki.de/DE/Content/GesundAZ/L/Laerm/Laerm_node.html
- Roeser, R. W., Schonert-Reichl, K. A., Jha, A., Cullen, M., Wallace, L., Wilensky, R., Oberle, E., Thomson, K., Taylor, C., & Harrison, J. (2013). Mindfulness training and reductions in teacher stress and burnout: Results from two randomized, waitlist-control field trials. *Journal of Educational Psychology*, 105(3), 787–804. <https://doi.org/10.1037/a0032093>
- Roy, N., Merrill, R. M., Thibeault, S., Parsa, R. A., Gray, S. D., & Smith, E. M. (2004). Prevalence of voice disorders in teachers and the general population. *Journal of Speech, Language, and Hearing Research*, 47(2), 281–293. [https://doi.org/10.1044/1092-4388\(2004/023\)](https://doi.org/10.1044/1092-4388(2004/023))
- Rudow, B. (2000). *Der Arbeits- und Gesundheitsschutz im Lehrerberuf: Gefährdungsbeurteilung der Arbeit von Lehrerinnen und Lehrern* [Occupational health and safety in the teaching profession: Risk assessment of teachers' work]. Süddeutscher Pädagogischer Verlag.

- Rylander, R. (2004). Physiological aspects of noise-induced stress and annoyance. *Journal of Sound and Vibration*, 277(3), 471–478. <https://doi.org/10.1016/j.jsv.2004.03.008>
- Sala, E., Airo, E., Olkinuora, P., Simberg, S., Ström, U., Laine, A., Pentti, J., & Suonpää, J. (2002). Vocal loading among day care center teachers. *Logopedics, Phoniatics, Vocology*, 27(1), 21–28. <https://doi.org/10.1080/140154302760146943>
- Sala, E., & Rantala, L. (2016). Acoustics and activity noise in school classrooms in Finland. *Applied Acoustics*, 114(3), 252–259. <https://doi.org/10.1016/j.apacoust.2016.08.009>
- Sanders, D. A. (1965). Noise conditions in normal school classrooms. *Exceptional Children*, 31, 344–353. <https://doi.org/10.1177/001440296503100703>
- Sandrock, S., Schütte, M., & Griefahn, B. (2009). Impairing effects of noise in high and low noise sensitive persons working on different mental tasks. *International Archives of Occupational and Environmental Health*, 82(6), 779–785. <https://doi.org/10.1007/s00420-008-0379-0>
- Sarantopoulos, G., Lykoudis, S., & Kassomenos, P. (2014). Noise levels in primary schools of medium sized city in Greece. *The Science of the Total Environment*, 482-483, 493–500. <https://doi.org/10.1016/j.scitotenv.2013.09.010>
- Schaarschmidt, U. (2006). *AVEM – Ein persönlichkeitsdiagnostisches Instrument für die berufsbezogene Rehabilitation* [AVEM - A personality diagnostic instrument for work-related rehabilitation] (Psychologische Diagnostik - Weichenstellung für den Reha-Verlauf). Deutscher Psychologen Verlag GmbH, pp. 59–82.
- Schaarschmidt, U., & Fischer, A. W. (2008). *AVEM - Arbeitsbezogenes Verhaltens- und Erlebensmuster* [AVEM - Work-related behavior and experience pattern]. Pearson.
- Schick, A., Klatt, M., & Meis, M. (1999). Die Lärmbelastung von Lehrern und Schülern — ein Forschungsstandbericht [The noise exposure of teachers and students - A research status report]. *Zeitschrift für Lärmbekämpfung*, 46(3), 77–87.

- Schönwälder, H. G., Berndt, J., Ströver, F., & Tiesler, G. (2003). *Belastung und Beanspruchung von Lehrerinnen und Lehrern* [Stress and strain on teachers]. *Schriftenreihe der Bundesanstalt für Arbeitsschutz und Arbeitsmedizin Forschung Arbeitsschutz: Vol. 989*. Wirtschaftsverlag N. W. Verlag für neue Wissenschaft.
- Schönwälder, H. G., Berndt, J., Ströver, F., & Tiesler, G. (2004). Lärm in Bildungsstätten - Ursachen und Minderung [Noise in educational facilities - Causes and mitigation]. In Bundesanstalt für Arbeitsschutz und Arbeitsmedizin (Ed.), *Lärm in Bildungsstätten - Ursachen und mögliche Maßnahmen zur Vermeidung der Folgen*.
- Schulte, K., Bögeholz, S., & Watermann, R. (2008). Selbstwirksamkeitserwartungen und Pädagogisches Professionswissen im Verlauf des Lehramtsstudiums. *Zeitschrift für Erziehungswissenschaft, 11*(2), 268–287. <https://doi.org/10.1007/s11618-008-0020-8>
- Schwarzer, R., & Jerusalem, M. (1999). *Skalen zur Erfassung von Lehrer- und Schülermerkmalen. Dokumentation der psychometrischen Verfahren im Rahmen der wissenschaftlichen Begleitung des Modellversuchs selbstwirksame Schulen* [Scales for investigating teachers' and students' characteristics. Documentation of the psychometric procedures in the context of the scientific support of the pilot project self-effective schools]. <http://www.psyc.de/skalendoku.pdf>
- Schwela, D. H. (1999). *The World Health Organization guidelines for environmental noise*. <https://doi.org/10.3397/1.3703044>
- Seidler, A., Hegewald, J., Seidler, A. L., Schubert, M., Wagner, M., Dröge, P., Haufe, E., Schmitt, J., Swart, E., & Zeeb, H. (2017). Association between aircraft, road and railway traffic noise and depression in a large case-control study based on secondary data. *Environmental Research, 152*, 263–271. <https://doi.org/10.1016/j.envres.2016.10.017>

- Shepherd, D., Heinonen-Guzejev, M., Hautus, M. J., & Heikkilä, K. (2015). Elucidating the relationship between noise sensitivity and personality. *Noise & Health, 17*(76), 165–171. <https://doi.org/10.4103/1463-1741.155850>
- Shernoff, E. S., Mehta, T. G., Atkins, M. S., Torf, R., & Spencer, J. (2011). A qualitative study of the sources and impact of stress among urban teachers. *School Mental Health, 3*(2), 59–69. <https://doi.org/10.1007/s12310-011-9051-z>
- Shield, B., & Dockrell, J. (2008, July 21-25). *The Effects of classroom and environmental noise on children's academic performance* [Paper presentation]. 9th International Congress on Noise as a Public Health Problem (ICBEN), Foxwoods, CT, USA.
- Shield, B., Conetta, R., Dockrell, J., Connolly, D., Cox, T., & Mydlarz, C. (2015). A survey of acoustic conditions and noise levels in secondary school classrooms in England. *The Journal of the Acoustical Society of America, 137*(1), 177–188. <https://doi.org/10.1121/1.4904528>
- Shield, B., & Dockrell, J. E. (2004). External and internal noise surveys of London primary schools. *The Journal of the Acoustical Society of America, 115*(2), 730–738. <https://doi.org/10.1121/1.1635837>
- Shim, S. H. (2008). A philosophical investigation of the role of teachers: A synthesis of Plato, Confucius, Buber, and Freire. *Teaching and Teacher Education, 24*(3), 515–535. <https://doi.org/10.1016/j.tate.2007.09.014>
- Sjödin, F. (2017). Individual factors and its association with experience noise annoyance in Swedish preschools. *The Journal of the Acoustical Society of America, 141*(5), Article 3541. <https://doi.org/10.1121/1.4987485>
- Sjödin, F., Kjellberg, A., Knutsson, A., Landström, U., & Lindberg, L. (2012). Noise and stress effects on preschool personnel. *Noise & Health, 14*(59), 166–178. <https://doi.org/10.4103/1463-1741.99892>

- Skaalvik, E. M., & Skaalvik, S. (2014). Teacher self-efficacy and perceived autonomy: Relations with teacher engagement, job satisfaction, and emotional exhaustion. *Psychological Reports, 114*(1), 68–77. <https://doi.org/10.2466/14.02.PR0.114k14w0>
- Skarlatos, D., & Manatakis, M. (2003). Effects of classroom noise on students and teachers in Greece. *Perceptual and Motor Skills, 96*(2), 539–544. <https://doi.org/10.2466/pms.2003.96.2.539>
- Śliwińska-Kowalska, M., & Zaborowski, K. (2017). WHO environmental noise guidelines for the European region: A systematic review on environmental noise and permanent hearing loss and tinnitus. *International Journal of Environmental Research and Public Health, 14*(10), Article 1139. <https://doi.org/10.3390/ijerph14101139>
- Smith, A. P. (1985). The effects of noise on the processing of global shape and local detail. *Psychological Research, 47*(2), 103–108. <https://doi.org/10.1007/BF00309124>
- Smith, E., Lemke, J., Taylor, M., Kirchner, H. L., & Hoffman, H. (1998). Frequency of voice problems among teachers and other occupations. *Journal of Voice, 12*(4), 480–488. [https://doi.org/10.1016/S0892-1997\(98\)80057-X](https://doi.org/10.1016/S0892-1997(98)80057-X)
- Standards für die Lehrerbildung: Bildungswissenschaften [Standards for teacher education: Educational sciences], December 16, 2004. https://www.kmk.org/fileadmin/veroeffentlichungen_beschluesse/2004/2004_12_16-Standards-Lehrerbildung-Bildungswissenschaften.pdf
- Stansfeld, S., Haines, M., & Brown, B. (2000). Noise and health in the urban environment. *Reviews on Environmental Health, 15*(1-2), 43–82. <https://doi.org/10.1515/REVEH.2000.15.1-2.43>
- Stansfeld, S. A., & Clark, C. (2019). Mental health effects of noise. In J. Nriagu (Ed.), *Encyclopedia of Environmental Health* (2nd ed., pp. 287–294). Elsevier.

- Stansfeld, S. A., & Shipley, M. (2015). Noise sensitivity and future risk of illness and mortality. *The Science of the Total Environment*, *520*, 114–119.
<https://doi.org/10.1016/j.scitotenv.2015.03.053>
- Stansfeld, S. A., & Matheson, M. P. (2003). Noise pollution: Non-auditory effects on health. *British Medical Bulletin*, *68*, 243–257. <https://doi.org/10.1093/bmb/ldg033>
- Stappenbeck, L. E., Bohlender, J. E., & Brockmann-Bauser, M. (2017, September 14-17). *Prävalidierung der ersten deutschen Version des Vocal Fatigue Index* [Pre-validation of the first German version of the Vocal Fatigue Index] [Paper presentation]. Deutsche Gesellschaft für Phoniatrie und Pädaudiologie, Bern, Switzerland.
<https://doi.org/10.3205/17dgpp50>
- Steiger, J. H. (1990). Structural model evaluation and modification: An interval estimation approach. *Multivariate Behavioral Research*, *25*(2), 173–180.
https://doi.org/10.1207/s15327906mbr2502_4
- Stoeber, J., & Rennert, D. (2008). Perfectionism in school teachers: Relations with stress appraisals, coping styles, and burnout. *Anxiety, Stress, and Coping*, *21*(1), 37–53.
<https://doi.org/10.1080/10615800701742461>
- Suter, A. H. (November / 1991). *Noise and its effects*. Administrative conference of the United States.
- Sygna, K., Aasvang, G. M., Aamodt, G., Oftedal, B., & Krog, N. H. (2014). Road traffic noise, sleep and mental health. *Environmental Research*, *131*, 17–24.
<https://doi.org/10.1016/j.envres.2014.02.010>
- Szalma, J. L., & Hancock, P. A. (2011). Noise effects on human performance: A meta-analytic synthesis. *Psychological Bulletin*, *137*(4), 682–707.
<https://doi.org/10.1037/a0023987>

- Themann, C., Suter, A., & Stephenson, M. (2013). National research agenda for the prevention of occupational hearing loss—Part 2. *Seminars in Hearing, 34*(03), 208–252. <https://doi.org/10.1055/s-0033-1349352>
- Themann, C. L., & Masterson, E. A. (2019). Occupational noise exposure: A review of its effects, epidemiology, and impact with recommendations for reducing its burden. *The Journal of the Acoustical Society of America, 146*(5), Article 3879. <https://doi.org/10.1121/1.5134465>
- Tiesler, G., & Oberdörster, M. (2008). Noise — A stressor? Acoustic ergonomics of schools. *Building Acoustics, 15*(3), 249–261. <https://doi.org/10.1260/135101008786348690>
- Tolmie, A. K., Topping, K. J., Christie, D., Donaldson, C., Howe, C., Jessiman, E., Livingston, K., & Thurston, A. (2010). Social effects of collaborative learning in primary schools. *Learning and Instruction, 20*(3), 177–191. <https://doi.org/10.1016/j.learninstruc.2009.01.005>
- Tomek, R., & Urhahne, D. (2021). Effects of student noise on student teachers' stress experiences, concentration and error–correction performance. *Educational Psychology, 12*(2), 1–19. <https://doi.org/10.1080/01443410.2021.2002819>
- Tomek, R., & Urhahne, D. (2022). Relating teachers' coping styles to student noise and perceived stress. *Educational Psychology, 26*(6), 1–21. <https://doi.org/10.1080/01443410.2022.2031892>
- Troesch, L. M., & Bauer, C. E. (2017). Second career teachers: Job satisfaction, job stress, and the role of self-efficacy. *Teaching and Teacher Education, 67*(3), 389–398. <https://doi.org/10.1016/j.tate.2017.07.006>
- Tsouloupas, C. N., Carson, R. L., Matthews, R., Grawitch, M. J., & Barber, L. K. (2010). Exploring the association between teachers' perceived student misbehaviour and emotional

- exhaustion: The importance of teacher efficacy beliefs and emotion regulation. *Educational Psychology*, 30(2), 173–189. <https://doi.org/10.1080/01443410903494460>
- Tucker, L. R., & Lewis, C. (1973). A reliability coefficient for maximum likelihood factor analysis. *Psychometrika*, 38(1), 1–10. <https://doi.org/10.1007/BF02291170>
- van Dick, R., & Wagner, U. (2001). Stress and strain in teaching: A structural equation approach. *The British Journal of Educational Psychology*, 71(2), 243–259. <https://doi.org/10.1348/000709901158505>
- van Droogenbroeck, F., Spruyt, B., & Vanroelen, C. (2014). Burnout among senior teachers: Investigating the role of workload and interpersonal relationships at work. *Teaching and Teacher Education*, 43(2), 99–109. <https://doi.org/10.1016/j.tate.2014.07.005>
- Vandenberg, R. J., & Lance, C. E. (2000). A review and synthesis of the measurement invariance literature: Suggestions, practices, and recommendations for organizational research. *Organizational Research Methods*, 3(1), 4–70. <https://doi.org/10.1177/109442810031002>
- Vertanen-Greis, H., Löyttyniemi, E., & Uitti, J. (2020). Voice disorders are associated with stress among teachers: A cross-sectional study in Finland. *Journal of Voice: Official Journal of the Voice Foundation*, 34(3), 488.e1-488.e8. <https://doi.org/10.1016/j.jvoice.2018.08.021>
- Weber, A., Weltle, D., & Lederer, P. (2005). Ill health and early retirement among school principals in Bavaria. *International Archives of Occupational and Environmental Health*, 78(4), 325–331. <https://doi.org/10.1007/s00420-004-0555-9>
- Weiber, R., & Mülhhaus, D. (2014). *Strukturgleichungsmodellierung: Eine anwendungsorientierte Einführung in die Kausalanalyse mit Hilfe von AMOS, SmartPLS und SPSS* [Structural equation modeling: An application-oriented introduction to causal analysis using AMOS, SmartPLS, and SPSS] (2nd ed.). Springer Gabler.

- Werning, R. (2010). Inklusion zwischen Innovation und Überforderung [Inclusion between innovation and excessive demands]. *Zeitschrift für Heilpädagogik*, 61(8), 284–291.
- Wickens, C. D. (2002). Multiple resources and performance prediction. *Theoretical Issues in Ergonomics Science*, 3(2), 159–177. <https://doi.org/10.1080/14639220210123806>
- Wiley, C. (2000). A synthesis of research on the causes, effects, and reduction of strategies of teacher stress. *Journal of Instructional Psychology*, 27, 80–87.
- Wolgast, A., & Fischer, N. (2017). You are not alone: Colleague support and goal-oriented cooperation as resources to reduce teachers' stress. *Social Psychology of Education*, 20(1), 97–114. <https://doi.org/10.1007/s11218-017-9366-1>
- Yassin, M. F., Almutairi, H., Alhajeri, N., Al-Fadhli, F., Al Rashidi, M. S., & Shatti, T. (2016). Assessment of noise exposure and associated health risk in school environment. *International Journal of Environmental Science and Technology*, 13(8), 2011–2024. <https://doi.org/10.1007/s13762-016-1035-y>
- Yoon, J. S. (2002). Teacher characteristics as predictors of teacher-student relationships: Stress, negative affect, and self-efficacy. *Social Behavior and Personality: An International Journal*, 30(5), 485–493. <https://doi.org/10.2224/sbp.2002.30.5.485>
- Zee, M., & Koomen, H. M. Y. (2016). Teacher self-efficacy and its effects on classroom processes, student academic adjustment, and teacher well-being. *Review of Educational Research*, 86(4), 981–1015. <https://doi.org/10.3102/0034654315626801>
- Zimmer, K., & Ellermeier, W. (1997). Eine deutsche Version der Lärmempfindlichkeitsskala von Weinstein [A German version of Weinstein's noise sensitivity scale]. *Zeitschrift für Lärmbekämpfung*, 44, 107–110.

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Appendices

Appendix A: Materials of Study 1

Informed Consent

Einverständniserklärung

Liebe Teilnehmende,

in der folgenden Untersuchung werden Sie gebeten, unterschiedliche Aufgaben unter dem Einfluss von Pausenhoflärm zu bearbeiten. Für Lehrkräfte, die Schülerinnen und Schüler während der Pause beaufsichtigen, ist ein Lärmpegel von ca. 80 dB(A) völlig normal. Er ist mit einer lauten Hauptverkehrsstraße vergleichbar, aber deutlich geringer als bei einem Diskothekenbesuch und hat aufgrund der begrenzten Dauer keine negativen Auswirkungen auf Ihre Gesundheit oder Ihr Hörvermögen (vgl. Tabelle).

Lärmpegel in Dezibel (dB(A))

Spielzeugpistole direkt am Ohr Silvesterknaller in Ohrnähe explodiert	180	
Gewehrschuss in Mündungs- nähe	160	Gehörschäden bei einmaliger Ein- wirkung möglich (Spitzenpegel)
Knackfrosch, Trillerpfeife Startgeräusch von Flugzeugen, 40 m entfernt	140	Schmerzschwelle, Gehörschäden schon bei kürzerer Einwirkung möglich
Martinshorn, 10 m entfernt Maximalpegel am Walkman Rockkonzert Laute Diskothek	120	
Kreissäge, Presslufthammer Fahrender Lkw, 5 m entfernt	100 85	Gehörschäden bei langjähriger Dauerbelastung
Hauptverkehrsstraße am Straßenrand	80	Erhöhtes Herz-Kreislauf-Risiko bei dauernder Belastung der Wohnung am Tage
Gespräch Leises Radio (Zimmerlautstärke)	60	Belästigungsreaktionen bei dauern- der Befastung der Wohnung am Tage; Störung von konzentrierter, geistiger Arbeit (Dauerschallpegel)
Ruhiges Zimmer am Tage Flüstern	40	Beeinträchtigung von Erholung, Ruhe, Schlaf (Dauerschallpegel)
Leises Blätterrauschen Ruhiges Zimmer in der Nacht	20	
Stille	0	Hörschwelle

Quelle: Umweltbundesamt 2005

Falls Sie jedoch bereits vorher Probleme mit dem Hören hatten oder aktuell noch haben, bitten wir Sie nun, sich beim Versuchsleiter zu melden und vom Versuch zurückzutreten. Auch ist es Ihnen gestattet, zu jeder anderen Zeit den Versuch abubrechen. Nachfolgend finden Sie eine Einverständniserklärung, mit der Sie bestätigen, über den Inhalt, die Auswirkungen und den Zweck der Untersuchung aufgeklärt worden zu sein.

Hiermit bestätige ich, _____, ein gesundes Hörvermögen zu haben und freiwillig an der Untersuchung teilzunehmen.

Datum, Unterschrift

Instructions

Continuous Noise

- *„Herzlich willkommen zur Studie!“ „Diese besteht aus verschiedenen Teilen. Bitte beantworten Sie zunächst die Fragebögen bis einschließlich Seite 3. Wenn Sie fertig sind, warten Sie bitte auf weitere Instruktionen.“*
- *„Sind alle fertig? Blättern Sie nun bitte um und nehmen die Seite 4 quer.“*
- *„Neben der Überschrift ‚Beispiele‘ sehen Sie drei Buchstaben. Es handelt sich um den Buchstaben d. Jeder dieser drei Buchstaben hat zwei Striche.“ „Das erste d hat zwei Striche oben, das zweite d hat zwei Striche unten, und das dritte d hat oben und unten je einen Strich – zusammengezählt sind das also auch zwei Striche! Jedes d, das zwei Striche hat wie diese Beispiele, sollen Sie jetzt durchstreichen. Zunächst die Beispiele; dann jedes d mit zwei Strichen, das Sie in der Übungszeile finden. Alle anderen Zeichen dürfen nicht durchgestrichen werden. Außer dem d kommt noch der Buchstabe p vor. Ein p darf niemals durchgestrichen werden – ganz gleich, wieviel Striche es hat. Sollten Sie einen Fehler machen, beachten Sie diesen nicht weiter, sondern machen Sie bitte einfach weiter. Gibt es noch Fragen?“*
- *„Bearbeiten Sie nun bitte die Beispielzeile“*
- *„Sind alle fertig? Blättern Sie bitte noch nicht um. Lassen Sie das Blatt quer liegen. Legen Sie den Stift hin und passen gut auf. Auf der folgenden Seite befinden sich 14 Zeilen mit den gleichen Zeichen, die Sie eben in der Übungszeile bearbeitet haben. Aus jeder Zeile sollen Sie von links nach rechts jedes d, das zwei Striche hat, durchstreichen. Das ist genau dasselbe, was Sie eben geübt haben. Sie fangen mit der ersten Zeile an. Nach einigen Sekunden hören Sie: „Nächste Zeile!“ Dann fangen Sie sofort mit der nächsten Zeile an. Arbeiten Sie so schnell wie möglich – aber auch ohne Fehler!“*
- *„Sobald ich Ihnen ein Zeichen gebe, blättern Sie um und beginnen mit der Bearbeitung der Aufgaben. Wenn Sie „Stop!“ hören, legen Sie bitte die Stifte weg und warten auf weitere Instruktionen.“*
- *„Blättern Sie nun um.“ (Lärm)*
- *„Bitte beantworten Sie nun den Fragen auf Seite 6 und warten auf weitere Instruktionen.“*
- *„Sind alle fertig? Sie haben nun 10 Minuten Zeit, um das Diktat eines Schülers zu verbessern und die Leistung des Schülers zu beurteilen und zu benoten. Sie sage Ihnen an, wie viele Minuten noch bleiben und wann die Benotung abgeschlossen sein soll! Bitte blättern Sie nun um!“ (Lärm)*
- *Diktat verbessern, Zeiten ansagen*
- *„Bitte beantworten Sie nun die Fragen auf Seite 10.“ (Lärm) Sind alle fertig?“*
- *„Bitte beantworten Sie die Fragen auf Seite 11.“*
- *„Sie haben es geschafft!“*
- *„Vielen Dank, dass Sie an der Studie teilgenommen haben! Sollten Sie Interesse an Details oder den Ergebnissen haben, schreiben Sie mir bitte eine Email. Sollten Sie das Lehrbuch gewonnen haben, werden Sie per Mail benachrichtigt. Bitte tragen Sie dazu noch kurz Ihre Emailadresse, Ihren Code und Ihren Namen auf dem Zettel ein.“*

Questionnaire Continuous Noise

Vielen Dank, dass Sie an unserer Studie teilnehmen!

Diese dauert ca. 30 Minuten und ist in drei Bereiche gegliedert. Zunächst bitten wir Sie, folgende Fragebögen auszufüllen. Versuchen Sie dabei, sich spontan für eine Antwort bzw. ein Kästchen zu entscheiden!

Bitte tragen Sie zunächst Ihre Versuchspersonennummer ein. Diese setzt sich aus dem Anfangsbuchstaben des Namens Ihres Vaters, Ihrer Mutter und Ihrem eigenen Geburtsdatum zusammen. Z.B. Andreas, Claudia, 15.12.1993 = AC151293

Ihre Versuchspersonennummer: _____

Bitte beantworten Sie die nachfolgenden Fragen.

1. Wie alt sind Sie? _____

2. Welches Geschlecht haben Sie? weiblich männlich

3. Welche Schulart und welche Fächer studieren Sie? _____

4. In welchem Semester sind Sie? _____

5. Haben Sie Hörprobleme? ja nein

Bitte kreuzen Sie an, wie Sie sich jetzt gerade fühlen.

	Sehr	Ziemlich	Etwas	Weder noch	Etwas	Ziemlich	Sehr	
Frisch ¹	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Erschöpft
Entspannt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Angespannt
Gut gelaunt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Verstimmt
Gelassen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reizbar
Motiviert	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Unmotiviert
Wohl	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Unwohl

Bitte kreuzen Sie an, welche Aussage am besten auf Sie zutrifft.

	Stimme gar nicht zu	Stimme eher nicht zu	Stimme zum Teil zu	Stimme eher zu	Stimme sehr zu
1. Alles in allem bin ich mit mir selbst zufrieden. ²	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Ich besitze eine Reihe guter Eigenschaften.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Ich kann vieles genauso gut wie die meisten anderen auch.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Ich halte mich für einen wertvollen Menschen, jedenfalls bin ich nicht weniger wertvoll als andere auch.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Ich habe eine positive Einstellung zu mir selbst gefunden.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

¹ Cf. Hacker et al. (2012)

² Cf. Collani and Herzberg (2003)

	Stimme gar nicht zu	Stimme eher nicht zu	Stimme zum Teil zu	Stimme eher zu	Stimme sehr zu
1. Auch unter schwierigen Bedingungen kann ich Schülerleistungen zielsicher beurteilen. ³	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Auch unter schwierigen Bedingungen kann ich Schülerleistungen genauso gut beurteilen wie andere Lehrer.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Auch unter schwierigen Bedingungen kann ich gleiche Schülerleistungen immer gleich gut beurteilen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Auch unter schwierigen Bedingungen lasse ich mich bei der Leistungsbeurteilung nicht von meinen eigenen Gemütszuständen beeinflussen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Auch wenn die Schule besonders stressig ist, weiß ich, wie ich mich schützen kann.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Ich habe geeignete Methoden, um mich vor Stress in der Schule zu schützen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Ich glaube nicht, dass meine Methoden ausreichen, um mich vor Stress im Schulalltag zu schützen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Auch im Schulalltag kann ich eigene schwierige Gemütszustände gut beherrschen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Bitte kreuzen Sie an, welche Aussage am besten auf Sie zutrifft.

	Stimme gar nicht zu	Stimme eher nicht zu	Stimme zum Teil zu	Stimme eher zu	Stimme sehr zu
1. Ich bin immer noch enthusiastisch, was den Lehrerberuf betrifft. ⁴	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Ich finde den Lehrerberuf interessant und werde versuchen, meinen Enthusiasmus auf die Schüler	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

³ Cf. Schulte et al. (2008)

⁴ Cf. Kunter et al. (2008)

zu übertragen.

3. Ich werde im Beruf als Lehrer mit großem Enthusiasmus unterrichten.

4. Ich werde es genießen, im Beruf als Lehrer zu unterrichten.

	Stimme gar nicht zu	Stimme eher nicht zu	Stimme zum Teil zu	Stimme eher zu	Stimme sehr zu
1. Im Unterricht stören mich Flüstern, leises Kichern und das Knistern von Papier. ⁵	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Wenn es in der Schule laut ist, versuche ich, Türen und Fenster zu schließen oder anderswo weiterzuarbeiten.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Es würde mich belasten, in einem Klassenraum zu unterrichten, in dem man die Schüler der Nachbarklasse hört.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Es würde mir etwas ausmachen, im lauten Schulbus zur Arbeit zu fahren.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Manchmal gehen mir Geräusche in der Schule auf die Nerven und ärgern mich.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. In der Schule stört es mich, wenn sich Kinder vor dem Klassenzimmer unterhalten.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Wenn im Unterricht großer Rummel um mich herum ist, kann ich mich nicht mehr konzentrieren.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. In der Schule wünschte ich mir manches Mal völlige Stille.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Ich werde wütend auf Schüler, die Lärm machen, der mich beim Fortkommen in der Arbeit abhält.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Bei Schülerlärm bin ich geräuschempfindlich.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Bitte noch nicht umblättern! Startzeichen abwarten!

⁵ Cf. Zimmer and Ellermeier (1997)

D2⁶

Bitte noch nicht umblättern! Startzeichen abwarten!

⁶ Brickenkamp (2002)

Bitte kreuzen Sie an, wie Sie sich jetzt gerade fühlen.

	Sehr	Ziemlich	Etwas	Weder noch	Etwas	Ziemlich	Sehr	
Frisch	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Erschöpft
Entspannt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Angespannt
Gut gelaunt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Verstimmt
Gelassen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reizbar
Motiviert	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Unmotiviert
Wohl	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Unwohl

Ich empfand die Bearbeitung der Aufgaben als ⁷ ...	Stimmt gar nicht	Stimmt eher nicht	Stimmt zum Teil	Stimmt eher	Stimmt ganz genau
1. schwierig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. stressig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. anstrengend	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. belastend	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Stimmt gar nicht	Stimmt eher nicht	Stimmt zum Teil	Stimmt eher	Stimmt ganz genau
1. Die Testbearbeitung mit dem Pausenlärm hat mich ziemlich genervt. ⁸	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Meine Konzentration wurde durch den Pausenlärm deutlich beeinträchtigt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Es ist wesentlich anstrengender, den Test zu bearbeiten, wenn gleichzeitig Pausenlärm zu hören ist.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

⁷ Cf. Jacobs (2014)

⁸ Cf. Jacobs (2014)

	Stimmt gar nicht	Stimmt eher nicht	Stimmt zum Teil	Stimmt eher	Stimmt ganz genau
1. Lärm macht mir kaum etwas aus, wenn ich mich wirklich konzentrieren will. ⁹	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Ich kann mich nur in einer ruhigen Umgebung richtig konzentrieren.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Wenn eine Aufgabe volle Konzentration verlangt, kann ich mich innerlich von störenden Umweltreizen abschirmen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Bitte noch nicht umblättern! Startzeichen abwarten!

⁹ Cf. Jacobs (2014)

Vorbereitungen zum Diktat:

Den Schülern der 7. Klasse Hauptschule wird ein Textblatt ausgehändigt unter dem Titel „Preußen kämpft tapfer und verliert doch“. Ihnen wird erklärt, dass ein Diktattext aus dieser Vorlage erarbeitet wird. Ein Fokus liegt dabei auf der Kleinschreibung der Adjektive, auf einer möglichen Substantivierung der Adjektive sowie auf deren Großschreibung als Bestandteil eines Namens.¹⁰

Es folgt ein Übungsdiktat. Bereits während des Diktierens werden „problematische“ Schreibweisen besprochen und geklärt.

Nach den Ferien werden die Texte erneut in der Klasse 7b gelesen. Schreibregeln werden von den Schülern vorgetragen und anhand von Beispielen aus dem Text demonstriert. Neu hinzu kommt der Themenbereich Zeichensetzung, vor allem die Kommasetzung beim Infinitiv mit zu, die auch in den folgenden Tagen an Beispielen geübt wird. Die Schüler wissen, dass sie im Diktat die Zeichen selbständig setzen müssen. Am 16.11. wird ein Diktat geschrieben, das auf dem ausgehändigten Textblatt basiert (ca. 160 Wörter).

- Bitte korrigieren und beurteilen Sie nun das beigefügte Diktat von Schüler 2 der Klasse 7b (Hauptschule). Überlegen Sie sich dazu, ob Sie neben ganzen auch halbe Fehler vergeben wollen.

- Teilen Sie uns mit, wie Sie zu der Note gekommen sind.

Bitte umblättern!

¹⁰ Cf. Birkel (2009)

Schüler 2

16.11.18

Unser Dämel sitzt in Memel

Am 14.10.1806 kam es zwischen Jena und Auerstedt, zu einer der größten Schlachten des 19. Jahrhunderts, die mit einem Sieg napoleonischer Truppen endete. An beiden Orten zusammengekommen, standen sich damals 130.000 französische und 100.000 preussisch-sächsische Soldaten gegenüber. Es wird Preußen sein, das sich in diesem Duell als hoffnungslos unterlegen zeigt. Seit dem siebenjährigen Krieg, hat es keinen bedeutenden Feldzug absolvieren müssen. Die Armee zum Großteil Söldner, wird angeführt und ausgebildet von berrückten Offizieren, die mit drakonischen Strafen eiserne Disziplin durchsetzen. Die Ausrüstung ist so mangelhaft, dass viele Soldaten im Winterfeldzug 1806, ohne Mantel marschieren müssen.

Gleichzeitig herrscht pure Arroganz. Als nun der Krieg gegen Napoleon naherrückt, laufen junge preussische Offiziere zur französischen Botschaft in Berlin und wetzen an den Treppentufen provozierend ihre Degen.

Der Krieg zieht sich noch einige Monate

hin, dann ist Preußen am Ende. Der König ist zeitweilig nach Memel geflohen; die Berliner Gassenjungen singen höhnisch „unser Däumel sitzt in Memel.“

Bitte tragen Sie die Anzahl der korrigierten Fehler, die Schwierigkeit sowie die Note ein, die Sie dem Schüler geben, und begründen Sie Ihre Notengebung kurz.

Beurteilung Schüler 2	
Ganze Fehler:	
Halbe Fehler:	
Gesamtzahl Fehler:	
Schwierigkeit des Diktats: (1 = „sehr leicht; 2 = „leicht“; 3 = „mittelschwer“; 4 = „schwer“ 5 = „sehr schwer“)	
Note:	
Begründung der Note:	
Ich studiere selbst das Fach Deutsch: Ja <input type="checkbox"/> Nein <input type="checkbox"/>	

Bitte noch nicht umblättern! Startzeichen abwarten!

Bitte kreuzen Sie an, welche Aussage am besten auf Sie zutrifft.

Ich finde es schwerwiegend, wenn ein Schüler/eine Schülerin ...	Stimmt gar nicht	Stimmt eher nicht	Stimmt zum Teil	Stimmt eher	Stimmt ganz genau
1. etwas stiehlt? ¹¹	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Schulkameraden hänselt?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. die Schule schwänzt?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Lehrer verbal angreift?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. in der Klasse schwätzt?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. während des Unterrichts unnötig in den Sachen rumstöbert?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. seine/ihre Schulaufgaben unordentlich macht?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. unkonzentriert ist?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. schnell enttäuscht über etwas ist?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. sehr empfindlich gegenüber Kritik ist?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. schnell wütend wird?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. komische Klamotten trägt?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. unangenehm riecht?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Bitte noch nicht umblättern! Startzeichen abwarten!

¹¹ Cf. Kokkinos et al. (2004)

Bitte kreuzen Sie an, wie Sie sich jetzt gerade fühlen.

	Sehr	Ziemlich	Etwas	Weder noch	Etwas	Ziemlich	Sehr	
Frisch	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Erschöpft
Entspannt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Angespannt
Gut gelaunt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Verstimmt
Gelassen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reizbar
Motiviert	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Unmotiviert
Wohl	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Unwohl

Ich empfand die Bearbeitung der Aufgaben als ...	Stimmt gar nicht	Stimmt eher nicht	Stimmt zum Teil	Stimmt eher	Stimmt ganz genau
1. schwierig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. stressig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. anstrengend	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. belastend	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Stimmt gar nicht	Stimmt eher nicht	Stimmt zum Teil	Stimmt eher	Stimmt ganz genau
1. Die Testbearbeitung mit dem Pausenlärm hat mich ziemlich genervt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Meine Konzentration wurde durch den Pausenlärm deutlich beeinträchtigt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Es ist wesentlich anstrengender, den Test zu bearbeiten, wenn	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

gleichzeitig Pausenlärm zu hören ist.

	Stimmt gar nicht	Stimmt eher nicht	Stimmt zum Teil	Stimmt eher	Stimmt ganz genau
1. Lärm macht mir kaum etwas aus, wenn ich mich wirklich konzentrieren will.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Ich kann mich nur in einer ruhigen Umgebung richtig konzentrieren.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Wenn eine Aufgabe volle Konzentration verlangt, kann ich mich innerlich von störenden Umweltreizen abschirmen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix B: Materials of Study 2

Informed consent

(see Appendix A)

Instructions

Continuous Noise

- *„Herzlich willkommen zur Studie!“ „Diese besteht aus verschiedenen Teilen. Bitte beantworten Sie zunächst die Fragebögen bis einschließlich Seite 4. Wenn Sie fertig sind, warten Sie bitte auf weitere Instruktionen.“*
- *„Sind alle fertig? Blättern Sie nun bitte um und lesen Sie sich die Instruktionen auf Seite 5 durch.“*
- *„Gibt es noch Fragen?“*
- *„Blättern Sie nun bitte auf Seite 6 um, und beantworten noch ein paar Fragen, bevor Sie den eigentlichen Test bearbeiten.“*
- *„Sind alle fertig? Dann blättern Sie bitte auf Seite 7 und beginnen mit der ersten Spalte.“ (Lärm)*
- *„Bitte beantworten Sie die Seiten 9 bis einschließlich 11 und warten auf weitere Instruktionen.“*
- *„Sind alle fertig? Sie haben nun 10 Minuten Zeit, um das Diktat eines Schülers zu verbessern und die Leistung des Schülers zu beurteilen und zu benoten. Sie sage Ihnen an, wie viele Minuten noch bleiben und wann die Benotung abgeschlossen sein soll! Bitte blättern Sie nun um und korrigieren das Diktat auf Seite 12 und 13!“ (Lärm)*
- *Diktat verbessern, Zeiten ansagen*
- *„Bitte beantworten Sie nun die Fragen auf Seite 14 bis einschließlich 16.“ „Sind alle fertig?“*
- *„Sie haben es geschafft!“*
- *„Vielen Dank, dass Sie an der Studie teilgenommen haben! Sollten Sie Interesse an Details oder den Ergebnissen haben, schreiben Sie mir bitte eine Email. Sollten Sie einen Gutschein gewonnen haben, werden Sie per Mail benachrichtigt. Bitte tragen Sie dazu noch kurz Ihre Emailadresse und Ihren Namen auf dem Zettel ein. Jeder darf sich nun Gummibären oder Schokolade und Kaubonbons nehmen.“*
-
-

Questionnaire Continuous Noise

Vielen Dank, dass Sie an unserer Studie teilnehmen!

Diese dauert ca. 45 Minuten und ist in verschiedene Bereiche gegliedert. Versuchen Sie bitte, alle Instruktionen zu befolgen und, sich bei den Fragen spontan für eine Antwort bzw. ein Kästchen zu entscheiden!

Bitte beantworten Sie die nachfolgenden Fragen.

1. Wie alt sind Sie?	_____	
2. Welches Geschlecht haben Sie?	<input type="checkbox"/> weiblich	<input type="checkbox"/> männlich
3. Welche Schulform studieren Sie?	<input type="checkbox"/> Grundschule <input type="checkbox"/> Realschule	<input type="checkbox"/> Mittelschule <input type="checkbox"/> Gymnasium
4. In welchem Semester sind Sie?	_____	
5. Haben Sie Hörprobleme?	<input type="checkbox"/> ja	<input type="checkbox"/> nein
6. Studieren Sie Deutsch als Haupt- oder Didaktikfach?	<input type="checkbox"/> ja	<input type="checkbox"/> nein
7. Studieren Sie Mathematik als Haupt- oder Didaktikfach?	<input type="checkbox"/> ja	<input type="checkbox"/> nein

Bitte kreuzen Sie an, wie Sie sich jetzt gerade fühlen.

	sehr				weder noch		sehr		
zufrieden ¹²	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	unzufrieden
voller Energie	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	energielos
gestresst	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	entspannt
müde	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	hellwach
friedlich	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	verärgert

¹² Cf. Hacker et al. (2012)

unglücklich	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	glücklich
lustlos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	hoch motiviert
ruhig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	nervös
begeistert	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	gelangweilt
besorgt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	sorgenfrei

Sie werden im folgenden Experiment einige anspruchsvolle Aufgaben zu erledigen haben, die Ihre volle Aufmerksamkeit und Konzentration erfordern und die Sie u.U. als eine Belastung empfinden werden.

	Stimme gar nicht zu	Stimme eher nicht zu	Stimme zum Teil zu	Stimme eher zu	Stimme sehr zu
Bitte kreuzen Sie an, wie Sie sich <u>jetzt gerade</u> fühlen.					
1. Ich fühle mich verärgert. ¹³	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Ich habe das Gefühl, die Situation nicht kontrollieren zu können.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Ich fühle mich nervös und „gestresst“.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Ich habe das Gefühl, mit der Situation nicht richtig fertig zu werden.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Ich habe das Gefühl, dass die Dinge nicht in meine Richtung laufen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Ich habe das Gefühl, dass ich nicht mit allen Aufgaben fertig werde.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Ich habe das Gefühl, meine Aufregung unter Kontrolle zu kriegen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Ich habe das Gefühl, die Situation im Griff zu haben.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Ich ärgere mich über Dinge, die außerhalb meiner Kontrolle liegen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Ich habe das Gefühl, nicht alle Schwierigkeiten meistern zu können.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

¹³ Cf. Klein et al. (2016)

Ich empfinde es als große Belastung, wenn ...	Stimme gar nicht zu	Stimme eher nicht zu	Stimme zum Teil zu	Stimme eher zu	Stimme sehr zu
1. im Klassenzimmer Tische und Stühle laut verrückt werden. ¹⁴	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. im Unterricht geflüstert, leise gekichert oder mit Papier geraschelt wird.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Geräusche aus der Nachbarklasse zu hören sind.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. ich im lärmenden Schulbus mitfahren muss.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Schüler sich im Klassenzimmer laut unterhalten.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. wenn bei der Pausenaufsicht großer Rummel um mich herum ist.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. ich die Unterrichtsvorbereitungen im lauten Schulhaus erledigen muss.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. ich durch Schülerlärm am Fortkommen in meiner Arbeit abgehalten werde.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. ich Schülerlärm auf dem Pausenhof ausgesetzt bin.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. ich Schüler kreischen, schreien oder brüllen höre.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

¹⁴ Cf. Zimmer and Ellermeier (1997)

	Stimme gar nicht zu	Stimme eher nicht zu	Stimme zum Teil zu	Stimme eher zu	Stimme sehr zu
Bitte kreuzen Sie an, welche Aussage <u>am besten</u> auf Sie zutrifft.					
1. In meinem Lehramtsstudium hat das sachgemäße Lösen komplexer Grundrechenaufgaben im Kopf eine hohe Bedeutung. ¹⁵	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Eine typische Anforderung des Lehrerberufs ist es, Prüfungsleistungen von Schülerinnen und Schülern zu korrigieren.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Prüfungsleistungen von Schülerinnen und Schülern konzentriert zu korrigieren, könnte mich überfordern.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Komplexe Grundrechenaufgaben im Kopf konzentriert zu lösen, könnte mich überfordern.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Für den Lehrerberuf ist es wichtig, Prüfungsleistungen von Schülerinnen und Schülern berichtigen zu können.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Ich fühle mich gut darauf vorbereitet, Prüfungsleistungen von Schülerinnen und Schülern zu korrigieren.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Für den Lehrerberuf ist es wichtig, komplexe Grundrechenaufgaben im Kopf lösen zu können.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Ich schätze meine Kompetenzen, Prüfungsleistungen von Schülerinnen und Schülern zu berichtigen, als hoch ein.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Eine typische Anforderung des Lehrerberufs ist es, komplexe Grundrechenaufgaben im Kopf zu lösen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Ich schätze meine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

¹⁵ Cf. Schulte et al. (2008)

Kompetenzen, komplexe

Grundrechenaufgaben im Kopf zu
lösen, als hoch ein.

11. In meinem Lehramtsstudium hat
das sachgemäße Korrigieren von
Prüfungsleistungen eine hohe
Bedeutung.

12. Ich fühle mich gut darauf
vorbereitet, komplexe
Grundrechenaufgaben im Kopf zu
lösen.

Bitte noch nicht umblättern! Startzeichen abwarten!

KLT¹⁶

Bitte kreuzen Sie an, welche Aussage <u>am besten</u> auf Sie zutrifft.	Stimme gar nicht zu	Stimme eher nicht zu	Stimme zum Teil zu	Stimme eher zu	Stimme sehr zu
1. Mir bereitet diese Aufgabe Sorgen. ¹⁷	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Ich bin bereit, die Aufgabe zu bearbeiten.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Die Bearbeitung der Aufgabe beunruhigt mich.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Ich glaube, dass ich die Fähigkeit habe, diese Aufgabe gut zu meistern.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Ich sehe dem Ausgang der Aufgabe positiv entgegen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Ich glaube, dass ich die Aufgabe bewältigen kann.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Das Aufgabenergebnis könnte negativ ausfallen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Ich glaube, dass ich Fertigkeiten besitze, um die Aufgabe erfolgreich zu lösen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Ich bin motiviert, die Aufgabe zu lösen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Ich glaube, die nötigen Voraussetzungen mitzubringen, um diese Aufgabe gut zu bearbeiten.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Ich finde die Aufgabe besorgniserregend.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Ich bin optimistisch, was den Ausgang der Aufgabe betrifft.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

¹⁶ Düker and Lienert (2001)¹⁷ Cf. Delahaye et al. (2015)

	Stimme gar nicht zu	Stimme eher nicht zu	Stimme zum Teil zu	Stimme eher zu	Stimme sehr zu
Bitte kreuzen Sie an, wie Sie sich <u>bei der Bearbeitung der Aufgabe</u> fühlten.					
1. Ich fühlte mich optimal beansprucht. ¹⁸	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Meine Gedanken bzw. Aktivitäten liefen flüssig und glatt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Ich merkte gar nicht, wie die Zeit verging.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Ich hatte keine Mühe mich zu konzentrieren.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Mein Kopf war völlig klar.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Ich war ganz vertieft in das, was ich gerade machte.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Die richtigen Gedanken kamen wie von selbst.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Ich wusste bei jedem Schritt, was ich zu tun hatte.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Ich hatte das Gefühl, den Ablauf unter Kontrolle zu haben.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Ich war völlig selbstvergessen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Es stand etwas für mich Wichtiges auf dem Spiel.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Ich durfte in der Aufgabe keine Fehler machen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Ich machte mir Sorgen über einen Misserfolg.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Für mich persönlich waren die Anforderungen ...									
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
zu gering			gerade richtig				zu hoch		

¹⁸ Cf. Rheinberg et al. (2003)

Bitte kreuzen Sie an, wie Sie sich <u>jetzt gerade</u> fühlen.	Stimme gar nicht zu	Stimme eher nicht zu	Stimme zum Teil zu	Stimme eher zu	Stimme sehr zu
1. Die Testbearbeitung hat mich ziemlich genervt. ¹⁹	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Meine Konzentration wurde deutlich beeinträchtigt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Es war anstrengend, den Test zu bearbeiten.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Bitte kreuzen Sie an, wie Sie sich <u>jetzt gerade</u> fühlen.	Stimme gar nicht zu	Stimme eher nicht zu	Stimme zum Teil zu	Stimme eher zu	Stimme sehr zu
1. Ich fühle mich verärgert.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Ich habe das Gefühl, die Situation nicht kontrollieren zu können.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Ich fühle mich nervös und „gestresst“.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Ich habe das Gefühl, mit der Situation nicht richtig fertig zu werden.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Ich habe das Gefühl, dass die Dinge nicht in meine Richtung laufen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Ich habe das Gefühl, dass ich nicht mit allen Aufgaben fertig werde.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Ich habe das Gefühl, meine Aufregung unter Kontrolle zu kriegen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Ich habe das Gefühl, die Situation im Griff zu haben.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Ich ärgere mich über Dinge, die außerhalb meiner Kontrolle liegen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Ich habe das Gefühl, nicht alle Schwierigkeiten meistern zu können.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

¹⁹ Cf. Jacobs (2014)

Vorbereitungen zum Diktat:

Den Schülern der 7. Klasse Mittelschule wird ein Textblatt ausgehändigt unter dem Titel „Preußen kämpft tapfer und verliert doch“. Ihnen wird erklärt, dass ein Diktattext aus dieser Vorlage erarbeitet wird. Ein Fokus liegt dabei auf der Kleinschreibung der Adjektive, auf einer möglichen Substantivierung der Adjektive sowie auf deren Großschreibung als Bestandteil eines Namens.

Es folgt ein Übungsdiktat. Bereits während des Diktierens werden „problematische“ Schreibweisen besprochen und geklärt. Nach den Ferien werden die Texte erneut in der Klasse 7b gelesen. Schreibregeln werden von den Schülern vorgetragen und anhand von Beispielen aus dem Text demonstriert. Neu hinzu kommt der Themenbereich Zeichensetzung, vor allem die Kommasetzung beim Infinitiv mit zu, die auch in den folgenden Tagen an Beispielen geübt wird. Die Schüler wissen, dass sie im Diktat die Zeichen selbständig setzen müssen.

Es wird ein Diktat geschrieben, das auf dem ausgehändigten Textblatt basiert (ca. 160 Wörter). Sie sollen nun in 10 Minuten das beigegefügte Diktat eines Schülers der Klasse 7b korrigieren und beurteilen. Überlegen Sie sich auch, ob Sie neben ganzen auch halbe Fehler vergeben. Im Anschluss sollen Sie uns mitteilen, wie Sie zu der Note gekommen sind.

Bitte kreuzen Sie an, welche Aussage <u>am besten</u> auf Sie zutrifft.	Stimme gar nicht zu	Stimme eher nicht zu	Stimme zum Teil zu	Stimme eher zu	Stimme sehr zu
1. Mir bereitet diese Aufgabe Sorgen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Ich bin bereit, die Aufgabe zu bearbeiten.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Die Bearbeitung der Aufgabe beunruhigt mich.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Ich glaube, dass ich die Fähigkeit habe, diese Aufgabe gut zu meistern.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Ich sehe dem Ausgang der Aufgabe positiv entgegen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Ich glaube, dass ich die Aufgabe bewältigen kann.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Das Aufgabenergebnis könnte negativ ausfallen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Ich glaube, dass ich Fertigkeiten besitze, um die Aufgabe erfolgreich zu	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

lösen.					
9. Ich bin motiviert, die Aufgabe zu lösen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Ich glaube, die nötigen Voraussetzungen mitzubringen, um diese Aufgabe gut zu bearbeiten.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Ich finde die Aufgabe besorgniserregend.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Ich bin optimistisch, was den Ausgang der Aufgabe betrifft.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- Sie haben nun 10 Minuten Zeit, um das nachfolgende Diktat zu korrigieren. Die Zeit wird Ihnen dabei angesagt.
- Bitte korrigieren und beurteilen Sie nun das nachfolgende Diktat von einem Siebtklässler (Mittelschule). Überlegen Sie sich dazu, ob Sie neben ganzen auch halbe Fehler vergeben wollen.
- Teilen Sie uns mit, wie Sie zu der Note gekommen sind.²⁰

Bitte noch nicht umblättern! Startzeichen abwarten!

²⁰ Cf. Birkel (2009)

Unser Dämel sitzt in Memel

Am 14.10.1806 kam es zwischen Jena und Auerstedt, zu einer der größten Schlachten des 19. Jahrhunderts, die mit einem Sieg napoleonischer Truppen endete. An beiden Orten zusammengekommen, standen sich damals 130.000 französische und 100.000 preussisch-sächsische Soldaten gegenüber. Es wird Preußen sein, das sich in diesem Duell als hoffnungslos unterlegen zeigt. Seit dem siebenjährigen Krieg, hat es keinen bedeutenden Feldzug absolvieren müssen. Die Armee zum Großteil Söldner, wird angeführt und ausgebildet von berrückten Offizieren, die mit draconischen Strafen eiserne Disziplin durchsetzen. Die Ausrüstung ist so mangelhaft, dass viele Soldaten im Winterfeldzug 1806, ohne Mantel marschieren müssen.

Gleichzeitig herrscht pure Arroganz. Als nun der Krieg gegen Napoleon naherrückt, laufen junge preussische Offiziere zur französischen Botschaft in Berlin und wetzen an den Treppentufen provozierend ihre Degen.

Der Krieg zieht sich noch einige Monate

hin, dann ist Preußen am Ende. Der König ist zeitweilig nach Memel geflohen; die Berliner Gassenjungen singen königlich „unser Dämml sitzt in Memel.“

Bitte tragen Sie die Anzahl der korrigierten Fehler, die Schwierigkeit sowie die Note ein, die Sie dem Schüler geben, und begründen Sie Ihre Notengebung kurz.

Beurteilung

Ganze Fehler:

Halbe Fehler:

Gesamtzahl Fehler:

Schwierigkeit des Diktats:

(1 = „sehr leicht; 2 = „leicht“; 3 = „mittelschwer“; 4 = „schwer“ 5 = „sehr schwer“)

Note:

Begründung der Note:

Bitte noch nicht umblättern! Startzeichen abwarten!

	Stimme gar nicht zu	Stimme eher nicht zu	Stimme zum Teil zu	Stimme eher zu	Stimme sehr zu
Bitte kreuzen Sie an, wie Sie sich bei der Bearbeitung der Aufgabe fühlten.					
1. Ich fühlte mich optimal beansprucht. ²¹	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Meine Gedanken bzw. Aktivitäten liefen flüssig und glatt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Ich merkte gar nicht, wie die Zeit verging.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Ich hatte keine Mühe mich zu konzentrieren.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Mein Kopf war völlig klar.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Ich war ganz vertieft in das, was ich gerade machte.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Die richtigen Gedanken kamen wie von selbst.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Ich wusste bei jedem Schritt, was ich zu tun hatte.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Ich hatte das Gefühl, den Ablauf unter Kontrolle zu haben.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Ich war völlig selbstvergessen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Es stand etwas für mich Wichtiges auf dem Spiel.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Ich durfte in der Aufgabe keine Fehler machen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Ich machte mir Sorgen über einen Misserfolg.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

²¹ Cf. Rheinberg et al. (2003)

Für mich persönlich waren die Anforderungen ...									
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
zu gering			gerade richtig				zu hoch		

	Stimme gar nicht zu	Stimme eher nicht zu	Stimme zum Teil zu	Stimme eher zu	Stimme sehr zu
Bitte kreuzen Sie an, wie Sie sich <u>jetzt gerade</u> fühlen.					
1. Die Testbearbeitung hat mich ziemlich genervt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Meine Konzentration wurde deutlich beeinträchtigt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Es war anstrengend, den Test zu bearbeiten. ²²	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Stimme gar nicht zu	Stimme eher nicht zu	Stimme zum Teil zu	Stimme eher zu	Stimme sehr zu
Bitte kreuzen Sie an, wie Sie sich <u>jetzt gerade</u> fühlen.					
1. Ich fühle mich verärgert.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Ich habe das Gefühl, die Situation nicht kontrollieren zu können.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Ich fühle mich nervös und „gestresst“.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Ich habe das Gefühl, mit der Situation nicht richtig fertig zu werden.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Ich habe das Gefühl, dass die Dinge nicht in meine Richtung laufen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Ich habe das Gefühl, dass ich nicht mit allen Aufgaben fertig werde.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Ich habe das Gefühl, meine Aufregung unter Kontrolle zu kriegen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Ich habe das Gefühl, die Situation im Griff zu haben.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Ich ärgere mich über Dinge, die außerhalb meiner Kontrolle liegen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Ich habe das Gefühl, nicht alle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

²² Cf. Jacobs (2014)

 Schwierigkeiten meistern zu können.

	Stimme gar nicht zu	Stimme eher nicht zu	Stimme zum Teil zu	Stimme eher zu	Stimme sehr zu
Bitte kreuzen Sie an, welche Aussage <u>am besten</u> auf Sie zutrifft.					
Ich finde es schwerwiegend, wenn ein Schüler ...					
1. etwas stiehlt. ²³	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Schulkameraden hänselt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. die Schule schwänzt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Lehrer verbal angreift.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. in der Klasse schwätzt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. während des Unterrichts unnötig in den Sachen rumstöbert.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. seine Schulaufgaben unordentlich macht.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. unkonzentriert ist.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. schnell enttäuscht über etwas ist.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. sehr empfindlich gegenüber Kritik ist.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. schnell wütend wird.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. komische Klamotten trägt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. unangenehm riecht.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Bitte kreuzen Sie an, wie Sie sich jetzt gerade fühlen.

²³ Cf. Kokkinos et al. (2004)

	sehr			weder noch			sehr		
zufrieden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	unzufrieden
voller Energie	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	energielos
gestresst	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	entspannt
müde	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	hellwach
friedlich	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	verärgert
unglücklich	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	glücklich
lustlos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	hoch motiviert
ruhig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	nervös
begeistert	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	gelangweilt
besorgt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	sorgenfrei

Vielen Dank für Ihre Teilnahme!

Appendix C: Materials of Study 3

Cover Letter to Directors

Sehr geehrte/-r Frau/Herr Rektor(-in),

im Rahmen eines von der Bezirksregierung Niederbayern genehmigten Forschungsprojekts untersucht die Abteilung für Pädagogische Psychologie der Universität Passau die Auswirkungen von Schullärm auf die Arbeit sowie auf das psychische Erleben der Lehrkräfte. Hierbei handelt es sich um eine Online-Studie, an der interessierte Lehrpersonen freiwillig und anonym Angaben über ihre Erfahrungen machen. Durch die Ergebnisse erhoffen wir uns Aufschluss über die subjektiven Folgen, die Lärm auf die Lehrerschaft haben kann. Dadurch wird es möglich, Interventionen zur Belastungsreduktion zu entwickeln und Empfehlungen für den Berufsalltag auszusprechen. Die Erhebung der Daten erfolgt über einen Online-Fragebogen. Interessierte Lehrkräfte werden gebeten den Fragebogen, der ca. 20 Minuten Zeit in Anspruch nimmt, gewissenhaft auszufüllen. Dazu würden wir Sie bitten, folgenden Weblink an das Lehrerkollegium weiterzusenden:

Der Link wird zwischen Mai 2020 und Ende Juli 2020 zur Verfügung stehen. Nach diesem Zeitraum gilt die Erhebung als beendet und es kann kein Zugriff mehr auf die Umfrage erfolgen.

Sie haben die Möglichkeit, wenn Sie es wünschen, vorab alle Fragen einzusehen, die von der Bezirksregierung Niederbayern bereits überprüft worden sind. Kontaktieren Sie dazu bitte meine Mitarbeiterin Frau Raphaela Fenzl (raphaela.fenzl@uni-passau.de).

Die gesamte Erhebung wird unter sorgfältiger Einhaltung der datenschutzrechtlichen Bestimmungen durchgeführt. Die erhobenen Daten werden in anonymisierter Form verwahrt, ausschließlich für Ausbildungs- und Forschungszwecke genutzt und nach der Veröffentlichung der Forschungsergebnisse im Oktober 2022 wieder gelöscht.

Des Weiteren planen wir im kommenden Schuljahr, wenn wieder alle Schülerinnen und Schüler zur Schule gehen können, kurze Schallpegelmessungen an ausgewählten Schulen vorzunehmen. Dafür wird eine Lehrkraft, die sich freiwillig zur Verfügung stellt, ein Schallpegelmessgerät für ca. 1,5 Stunden (ab der großen Pause bis zur 4. Unterrichtsstunde) an einem vereinbarten Tag mit sich zu führen. Die dadurch gewonnenen objektiven Daten unterstützen uns dabei, ein vollständiges und unverzerrtes Bild vom Schulalltag zu erhalten. Das von uns zur Verfügung gestellte Schallmessgerät (AMGAZE, Digital Sound Level Meter, Model GM1356) wurde speziell für Schallpegelmessungen in unterschiedlichen Umgebungen entwickelt. Das Gerät ist einfach zu handhaben. Es schneidet keine Gespräche mit, sondern zeichnet lediglich die Lautstärke auf. Somit sind keine Rückschlüsse auf die Beteiligten möglich.

Bei weiteren Fragen stehen wir Ihnen gerne zur Verfügung und kämen ggf. im kommenden Schuljahr noch einmal auf Sie zu.

Wir bedanken uns für Ihre tatkräftige Unterstützung der Bildungswissenschaften.

Mit freundlichen Grüßen

Cover Letter to Teachers

Sehr geehrte Lehrerin, sehr geehrter Lehrer,

im Rahmen eines Forschungsprojekts, das von der Bezirksregierung Niederbayern genehmigt wurde, untersucht die Abteilung für Pädagogische Psychologie der Universität Passau die Auswirkungen von Lärm auf die Ihre Arbeit sowie auf Ihr persönliches Wohlbefinden. Durch die Ergebnisse erhoffen wir uns Aufschluss über die subjektiven Folgen, die Lärm auf Sie als Lehrpersonen haben kann. Erst dadurch wird es möglich, Interventionen zur Reduktion einer möglichen Belastung zu entwickeln und Empfehlungen für den Berufsalltag auszusprechen. Die Erhebung der Daten erfolgt über einen Online-Fragebogen.

Die Untersuchung umfasst einen Erhebungszeitraum von Mai 2020 bis Ende Juli 2020. In diesem Zeitraum wird Ihnen der Link zum Aufrufen einer Website zur Verfügung stehen.

Wir bitten Sie trotz der aktuellen Umstände sehr herzlich, einen kleinen Teil Ihrer Zeit der Wissenschaft zu widmen und sich an der Forschungsstudie zu den Auswirkungen von Lärm zu beteiligen. Dazu bitten wir lediglich um 20 Minuten Zeit für eine kurze Online-Studie. In dieser Studie werden Ihre persönlichen Erfahrungen im Schulalltag und Ihr persönliches Erleben von Schüllärm abgefragt. Den Link für die Teilnahme an der Erhebung erhalten Sie von Ihrer Schulleiterin bzw. Ihrem Schulleiter. Dieser Link steht Ihnen während des gesamten Erhebungszeitraums zur Verfügung. Selbstverständlich können Sie die Studie auch während der Bearbeitung jederzeit ohne Angabe von Gründen abbrechen. Bis dahin von Ihnen erhobene Daten werden vollständig gelöscht.

Die Teilnahme an der Erhebung ist freiwillig und aus einer Nichtteilnahme entstehen Ihnen keine Nachteile. Die Einwilligung zur Teilnahme an der Erhebung erfolgt ganz einfach über die Nutzung des Links und die Bearbeitung der Online-Studie.

Damit Ihre Daten anonymisiert sind, werden durch Ihre Teilnahme automatisch Codes generiert, die keine Zuordnung Ihrer Angaben zu Ihrer Person erlauben. Alle erhobenen Daten werden streng vertraulich behandelt, ausschließlich für Ausbildungs- und Forschungszwecke genutzt und nach der Veröffentlichung der Forschungsergebnisse im Oktober 2022 wieder gelöscht.

Wie Sie wissen, ist die Wissenschaft neben subjektiven auch auf objektive Daten angewiesen. Nur die Kombination beider Datenarten ermöglicht uns ein vollständiges und unverzerrtes Bild auf Ihren Berufsalltag. Deshalb würden wir einige wenige Lehrkräfte unter Ihnen zusätzlich bitten, für ca. 1,5 Stunden ein Schallpegelmessgerät im Unterricht bzw. in der Pause mit sich zu führen.

Das von uns zur Verfügung gestellte, portable und leicht handhabbare Schallmessgerät (AMGAZE, Digital Sound Level Meter, Model GM1356) wurde speziell für Lärmmessungen in unterschiedlichen Umgebungen entwickelt. Durch die Messung wird es möglich, die Anforderungen des Gesundheitsschutzes zu erfüllen. Dementsprechend ist das Gerät in der

Lage, die Umgebungslautstärke in einem Bereich zwischen 30dB(A)-130dB(A) aufzuzeichnen und zu speichern. Es kann kein Ton mitgeschnitten werden, d.h. es werden keine Gespräche sondern lediglich die Lautstärke aufgezeichnet. Somit sind keine Rückschlüsse auf Schulmitglieder oder Unterrichtsstunden möglich. Diese Schallpegelmessung soll idealerweise im nächsten Schuljahr (September 2020) stattfinden. Wir wären Ihnen sehr verbunden, wenn sich an Ihrer Schule eine Lehrkraft freiwillig zur Verfügung stellt, das Schallmessgerät an einem vereinbarten Tag ab der großen Pause bis zur 4. Unterrichtsstunde mit sich zu führen. Selbstverständlich geben wir Ihnen bei Interesse im Anschluss an die Erhebung Auskunft über die erhobenen Schallpegelwerte.

Falls Sie sich für die Schallpegelmessung zur Verfügung stellen möchten, schreiben Sie uns bitte eine Email an **raphaela.fenzl@uni-passau.de**, damit wir im neuen Schuljahr nochmal Kontakt zu Ihnen aufnehmen und Ihnen genauere Informationen zukommen lassen können.

Wir bedanken uns für Ihr Engagement und Ihre Unterstützung der Bildungswissenschaften.

Mit freundlichen Grüßen

Questionnaire

Welches Geschlecht haben Sie?

- weiblich
 männlich

Wie viel Jahre sind Sie alt?

Antwort:

In welcher Schulart unterrichten Sie?

- Grundschule
 Mittelschule

Seit wie vielen Jahren unterrichten Sie bereits?

Antwort:

Wie belastend erleben Sie folgende Lärmbedingungen?

Kreuzen Sie die am besten passende Antwort an.

	gar nicht belastend	eher nicht belastend	teilweise belastend	belastend	stark belastend
Schüler, die bei schlechtem Wetter im Schulgebäude bleiben	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kleine Räume	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nachhallende Unterrichtsräume	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Unruhige Schüler	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lärm von draußen (z.B. Verkehr, andere Schulen)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Aufgedrehte Schüler	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Schüler mit Verhaltensauffälligkeiten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Geräuschintensive Aktivitäten im Schulgebäude (z.B. Montagearbeiten)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pausenlärm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lärm im Schulgebäude und Treppenhaus	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Unruhe im Lehrerzimmer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Wie stark treffen folgende Aussagen auf Sie zu?	trifft gar nicht zu	trifft eher nicht zu	trifft teilweise zu	trifft eher zu	trifft völlig zu
Wenn ich gegen Schülerlärm ansprechen muss, fühlt sich meine Stimme stark beansprucht an.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Die Antworten meiner Schüler kann ich aufgrund des Klassenlärms häufig nicht richtig verstehen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Am Ende eines lauten Schultages kann ich kaum mehr sprechen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Im Unterricht muss ich oft nachfragen, weil ich aufgrund der Lautstärke Probleme mit dem Verstehen habe.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Durch das Unterrichten neige ich zur Heiserkeit.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Im Schulalltag kommt es aufgrund des Lärms häufig zu Kommunikationsproblemen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wenn ich die Schüler mehrmals zur Ordnung rufen muss, wird meine Stimme zunehmend schwächer.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Die Verständigungsprobleme aufgrund des hohen Geräuschpegels erlebe ich als sehr belastend.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich versuche bestimmte Schulsituationen zu vermeiden, um meine Stimme zu schonen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Das ständige laute Sprechen im Unterricht ist sehr anstrengend.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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²⁵ Cf. Stappenbeck et al. (2017)

Wie stark treffen folgende Aussagen auf Sie zu?	trifft gar nicht zu	trifft eher nicht zu	trifft teilweise zu	trifft eher zu	trifft völlig zu
Die Arbeit ist für mich der wichtigste Lebensinhalt.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Was meine berufliche Entwicklung angeht, so halte ich mich für ziemlich ehrgeizig.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Auch in der Freizeit beschäftigen mich viele Arbeitsprobleme.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Misserfolge kann ich nur schwer verkraften.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Die Arbeit ist mein Ein und Alles.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich strebe nach höheren beruflichen Zielen als die meisten anderen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nach der Arbeit kann ich ohne Probleme abschalten.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Berufliche Fehlschläge können mich leicht entmutigen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Wie stark treffen folgende Aussagen auf Sie zu?	trifft gar nicht zu	trifft eher nicht zu	trifft teilweise zu	trifft eher zu	trifft völlig zu
Ich brauche die Arbeit wie die Luft zum Atmen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Für meine berufliche Zukunft habe ich mir viel vorgenommen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Arbeitsprobleme beschäftigen mich eigentlich den ganzen Tag.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wenn ich in der Arbeit erfolglos bin, deprimiert mich das sehr.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich wüsste nicht, wie ich ohne Arbeit leben sollte.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Beruflicher Erfolg ist für mich ein wichtiges Lebensziel.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Meine Gedanken kreisen fast nur um die Arbeit.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wenn ich keinen Erfolg habe, resigniere ich schnell.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Wie stark treffen folgende Aussagen auf Sie zu?	trifft gar nicht zu	trifft eher nicht zu	trifft teilweise zu	trifft eher zu	trifft völlig zu
Ich fühle mich dem Schullärm gut gewachsen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich mache mir Sorgen wegen des Schullärms, der täglich auf mich zukommt.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich freue mich trotz der Lautstärke auf jeden Schultag.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich befürchte, dass mich der Schullärm eines Tages überlastet.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich erlebe den täglichen Schullärm als Herausforderung.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich bezweifle, alle Aufgaben als Lehrkraft aufgrund des Lärms gut bewältigen zu können.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich empfinde den Schullärm als untergeordnetes Problem.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Für mich stellt Schullärm ein großes Problem dar.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Ich empfinde es als Belastung, wenn ...	trifft gar nicht zu	trifft eher nicht zu	trifft teilweise zu	trifft eher zu	trifft völlig zu
im Klassenzimmer Tische und Stühle laut verrückt werden.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
sich Schüler im Klassenzimmer lautstark unterhalten.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
wenn bei der Pausenaufsicht großer Rummel um mich herum ist.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ich die Unterrichtsvorbereitungen im lauten Schulgebäude erledigen muss.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ich durch Schülerlärm am Fortkommen in meiner Arbeit abgehalten werde.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ich Schülerlärm bei der Pausenaufsicht ausgesetzt bin.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ich Schüler kreischen, schreien oder brüllen höre.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

²⁷ Cf. Schwarzer and Jerusalem (1999); Zimmer and Ellermeier (1997)

Wie stark treffen folgende Aussagen auf Sie zu?	trifft gar nicht zu	trifft eher nicht zu	trifft teilweise zu	trifft eher zu	trifft völlig zu
Die Pausenaufsicht mit dem Schülerlärm nervt mich ziemlich.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Meine Konzentration wird durch den Pausenlärm deutlich beeinträchtigt.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Es ist wesentlich anstrengender, Pausenaufsicht zu führen, wenn es so laut ist.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Unterricht mit lauten, unruhigen Schülern nervt mich ziemlich.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Meine Konzentration wird durch den Schülerlärm im Unterricht deutlich beeinträchtigt.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Es ist wesentlich anstrengender, Unterricht zu halten, wenn es so laut ist.

Wie häufig leiden Sie nach einer lauten Pausenaufsicht bzw. einer lauten Pause unter folgenden Beschwerden?

	nie	selten	gelegentlich	oft	immer
Müdigkeit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Körperlicher Anspannung	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Emotionaler Anspannung	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nervosität / Unruhe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gereiztheit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Konzentrationsproblemen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heiserkeit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hörproblemen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Wie häufig leiden Sie nach einer lärmintensiven Unterrichtsstunde unter folgenden Beschwerden?

	nie	selten	gelegentlich	oft	immer
Müdigkeit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Körperlicher Anspannung	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Emotionaler Anspannung	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nervosität / Unruhe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gereiztheit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Konzentrationsproblemen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heiserkeit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hörproblemen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Sie befinden sich im Lehrerzimmer und versuchen sich auf die Korrektur der Klassenarbeiten zu konzentrieren. Im Hintergrund hören Sie das Geschrei der Schülerinnen und Schüler aus der Pausenhalle. Hinter Ihnen sprechen zwei Kollegen über die gestrige Lehrerversammlung. Sie versuchen die Geräusche um sich herum auszublenden.

Wie reagieren Sie?

Antwort:

Sie haben Pausenaufsicht und befinden sich in der Pausenhalle Ihrer Schule, da das Wetter zu schlecht ist, um die Schülerinnen und Schüler nach draußen zu schicken. Es ist sehr laut und Sie hören einzelne Gesprächsfetzen der Schülerinnen und Schüler raus. Dabei bekommen Sie einen Hinweis darauf, dass Sebastian und Laura sich einen Streich erlaubt haben und unerlaubterweise die Pause im Klassenzimmer verbringen.

Wie reagieren Sie?

Antwort:

Sie korrigieren während der Mittagspause Klassenarbeiten im Lehrerzimmer. Von draußen hören Sie die ausgelassenen Schüler lachen und reden. Dabei nehmen Sie immer wieder auch Gesprächsfetzen auf.

Wie reagieren Sie?

Antwort:

Wie stark treffen folgende Aussagen auf Sie zu?	trifft gar nicht zu	trifft eher nicht zu	trifft teilweise zu	trifft eher zu	trifft völlig zu
Durch die hohe Lautstärke in meiner Arbeit bin ich gefühlsmäßig am Ende.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Am Ende des Schultages fühle ich mich, vor allem durch Lärm bedingt, erledigt.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich fühle mich schon müde, wenn ich morgens aufstehe und wieder einen geräuschintensiven Schultag vor mir habe.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Den ganzen Tag mit unruhigen Schülern zu arbeiten, ist eine Strapaze für mich.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Durch meine laute Arbeit fühle ich mich ausgelaugt.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mein lauter Schultag frustriert mich.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich glaube, ich arbeite unter diesen lärmigen Bedingungen zu hart.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mit jungen krachmachenden Schülern arbeiten zu müssen, belastet mich sehr.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Was den Schüllärm betrifft, ich bin mit meinem Latein am Ende.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Ich finde es schwerwiegend, wenn ein Schüler ...	trifft gar nicht zu	trifft eher nicht zu	trifft teilweise zu	trifft eher zu	trifft völlig zu
etwas stiehlt.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
in der Klasse schwätzt.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
während des Unterrichts unnötig in den Sachen rumstöbert.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
seine Schulaufgaben unordentlich macht.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lehrer verbal angreift.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
unkonzentriert ist.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
schnell enttäuscht über etwas ist.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Schulkameraden hänselt.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
sehr empfindlich gegenüber Kritik reagiert.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
schnell wütend wird.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
unangemessene Kleidung trägt.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
unangenehm riecht.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
die Schule schwänzt.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Achtung! Freiwillige Angabe:

Wenn Sie einmal möchten, dass wir bei Ihnen die Lautstärke messen, können Sie im neuen Schuljahr an einer kurzen Untersuchung teilnehmen. Zur Kontaktaufnahme geben Sie bitte eine E-Mail-Adresse an. Wir würden uns freuen.

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Antwort:

³¹ Cf. Kokkinos et al. (2004)

Versicherung (gem. §4 Abs. 3 Satz 1 Nr.5 PromO)

Ich versichere hiermit

- an Eides statt, dass ich die Dissertation selbständig angefertigt, außer den im Schriftenverzeichnis sowie den Anmerkungen genannten Hilfsmitteln keine weiteren benutzt und die Herkunft der Stellen, die wörtlich oder sinngemäß aus anderen Werken übernommen sind, bezeichnet habe,
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