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Health and Health Literacy in Teacher Education: Comparative Analyses of Student Teachers and Teacher Trainees***

Summary

Health literacy (HL) represents an important determinant of health and is considered a necessary prerequisite for health-promoting behaviour as well as the maintenance and promotion of health. Strengthening HL is an important aspect of prevention and health promotion in the context of (teacher) education and it is partially integrated into the German Professional Standards for Teachers. Previous study results of (prospective) teachers point to deficient training regarding health-related competencies in the context of their qualification. Overall, there are too few studies on prospective teachers' HL and only few that focus on the key health-related competencies of HL in the context of prospective teachers' health. Linking this study examined the HL and health status of student teachers (ST) and teacher trainees (TT) and their differences. In addition, the association between the two constructs will be elaborated. In this study, 195 ST and 242 TT participated in an online survey, which used questionnaires to assess HL and health status. The statistical analysis took into consideration t-tests, product-moment correlations, and multivariate regression analyses.

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With the exception of key HL competence *communication and cooperation*, the other key HL competencies were significantly stronger among ST. In contrast, TT assessed their health status significantly better. In terms of correlations, ST and TT abilities to self-regulate played a leading role. In ST, *self-regulation* represented the statistically strongest predictor for health status, but in TT, *proactive approach to health* represented the strongest predictor.

Keywords: health literacy, health status, student teachers, teacher trainees, teachers' health promotion

Introduction

Since the turn of the century, health and health promotion have become increasingly important in the context of professional research on the teaching profession (Sandmeier, Mustafić, & Krause, 2020). The teaching profession is associated with a variety of occupational stresses (Abel & Sewell, 1999; Bradley, 2007) that, depending on an individual's assessment, may negatively impact a teacher's health or increase the likelihood of illness. In the context of salutogenesis, the availability of resistance resources is important for coping with occupational demands (Antonovsky, 1997). Health literacy represents such a resource and is understood as a key competence to strengthen physical and mental health as well as well-being. Promoting health literacy is also an important task related to prevention and health promotion in an educational context (Schaeffer, Hurrelmann, Bauer, & Kolpatzik, 2018). So far, health literacy has rarely been considered in the context of teacher education, although it seems to be relevant in light of teachers' increasing psychological stress and stress-induced health risks (Schaarschmidt & Kieschke, 2013). Initial study results on the health literacy of teachers indicated that more than half have limited health literacy (Hartmann, Rückmann, & Tannen, 2020). Further findings on student teachers replicated this in terms of insufficient health literacy (Ahmadi & Montazeri, 2019). Lamanauskas (2018) points out a lack of training in health-related competencies as part of teacher qualifications.

Overall, there are too few studies on the health literacy of prospective teachers and none that focus on the development of health-related competencies and their association with health in order to be able to derive recommendations for teachers' health promotion within the context of teacher education. Soellner, Huber, Lenartz, and Rudinger, (2010) and Lenartz (2012) developed a structural model of health literacy in which – in addition to the basic skills – advanced skills (key health literacy competencies) form the core

of the model (Soellner & Rudinger, 2018). The development of these key health literacy competencies could lead to an improvement in health literacy and an improvement in health.

The aim of this study is first to elaborate how the key competencies of health literacy of prospective teachers (student teachers and teacher trainees) are developed and how they assess their health status. Related to this, it will be investigated whether they differ in these two constructs. Second, the association between the key competencies of health literacy and the health status will be determined. Recommendations for teacher education in the context of teachers' health promotion will be derived from the study results.

Accordingly, the research questions are as follows:

1. How developed are the key health literacy competencies of student teachers and teacher trainees and do they differ?
2. How is the health status of student teachers and teacher trainees and do they differ?
3. How are the key health literacy competencies associated with student teachers' and teacher trainees' health status?

Theoretical and empirical background

The World Health Organization defines health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (Franzkowiak & Hurrelmann, 2018). Teachers' health is seen as a central resource for schools and their development (Paulus & Schumacher, 2007). Recent findings identified that teachers' health is related to school quality in many ways (Klusmann, Kunter, Voss, & Baumert, 2008; Klusmann, Richter, & Lüdtke, 2016). According to these findings, teachers' health and well-being have an influence on students' well-being, motivation to perform and educational success. Healthy teachers are better at building positive social relationships with their students than unhealthy teachers. They have a demonstrably positive impact on students' performance (Herzog, Sandmeier & Affolter, 2021). The definition of health describes a positive understanding of health, which is integrated in the concept of salutogenesis by Antonovsky (1997), and the development of resistance resources is essential for the long-term healthy coping with (professional) demands. In this context, the teaching profession is associated with a variety of occupational stressors and requires

sufficient resistance resources. An explanatory framework for this can be found in the context of teacher health in theoretical models such as the transactional stress model (Lazarus, 1966; Lazarus & Folkman, 1984) or the job demands-resources model (Bakker & Demerouti, 2007).

Teachers' Health in the Context of Teacher Education

In Germany, teacher education is structured into two consecutive phases – the first phase is carried out within a university and the second phase is more practical oriented *trainee phase* (called '*Referendariat*' or '*Vorbereitungsdienst*') usually lasting between 18 and 24 months. This phase is independent of the universities and organised by special 'teacher training seminars' as well as 'training schools'. During this phase, teacher trainees are prepared for their professional duties and their work at school. Their performance and their professional development are evaluated and supervised by mentors from their 'training schools' and teachers from their 'training seminars' (a more detailed overview of German teacher education and international comparison can be found in Howe, 2006).

Student Teachers

Study results on the health of student teachers indicated that they predominantly assess their health status as satisfactory to good (Jantonowski, 2008). However, they already showed more frequent unfavourable coping patterns compared to other students (Römer, Appel, Drews, & Rauin, 2012). Schaarschmidt and Fischer (2008) designed a multidimensional personality diagnostic inventory that can be used to identify work-related behaviour and experience patterns (*AVEM-Inventar*). The procedure identifies health-promoting or health-threatening behaviours and experience patterns when coping with work and occupational demands, integrating these into four patterns. The *health-ambitious type* (H) is characterised by a high level of occupational commitment and at the same time, pronounced resistance to stress. The *unambitious type* (U) is characterised by low occupational engagement but high resilience. People assigned to the following two risk patterns are thought to be at a high risk for burnout and stress. "The excessively *ambitious type* (A), scoring high on engagement and low on resilience, is characterized by excessive engagement, striving for perfection, and an inability to recover emotionally from work" (Klusmann et al., 2008, p. 704). A low level of commitment to work

and a low level of professional ambition are found in people who are assigned to the *resigned type* (R), which goes hand in hand with a reduced ability to cope with stress (Schaarschmidt, 2005). Twenty-five percent of student teachers classified themselves as the *resigned type* (R) (i.e. at risk of burnout). However, the results regarding the health situation of student teachers are inconsistent (Reichl, Wach, Spinath, Brünken, & Karbach, 2014; Roloff Henoch, Klusmann, Lüdtke, & Trautwein, 2015). Rothland (2011), for example, indicated a more favourable assessment, as only 15.5% of student teachers are assigned to the *resigned type* and the *health-ambitious type* is found most frequently (35%). The results of the survey by Lenz, Cesca and Pelz (2018) showed that the requirements in the teacher training programme represent a somewhat greater burden compared to other degree programmes at the university. Student teachers also associate the practical semester as part of their university education with a variety of new demands that can potentially represent stress (Kücholl, Westphal, Lazarides, & Gronostaj, 2019). They already feel exposed to high levels of stress during the practical phase due to parallel work at school and university (Jantonowski, Bartsch, Limmer, & Gumz, 2010). Initial surveys also showed that student teachers feel stressed, especially at the end of the practical semester, although negative stress consequences do not necessarily arise for all students (Holtz, 2014). In his longitudinal study, Rauins (2007) pointed out that a deficient fit between study-related and professional demands and individual coping resources can lead to health impairments from a medium- and long-term perspective. Moreover, greater physical complaints and poorer psychological well-being could be expected in the trainee phase (Christ, 2004).

Teacher Trainees

Looking at international studies, and therefore seemingly independent of the type of teacher education, it appears that the career entry phase is perceived by beginning teachers[1] as stressful and, above all, as insufficient in terms of coping with the actual tasks in the profession (Friedman, 2000; Klusmann, Kunter, Voss, & Baumert, 2012; Stokking, Leenders, de Jong, & van Tartwijk, 2003). Regarding the work-related behaviour and experience patterns mentioned previously, it is evident for the target group of teacher trainees in Germany that slightly less than half of them assign themselves to a pattern

[1] According to Veenman (1984), all teachers in their first three years of teaching are called beginning teachers, irrespective of whether they have only a partial qualification (as in Germany in the "Referendariat") or have a full degree (see Klusmann et al., 2012).

that is harmful to their health (*ambitious type* and *resigned type*) (Darius, Bunzel, Ehms-Ciechanowicz, & Böckelmann, 2020; Lohse-Bossenz & Rutsch, 2021). Lohse-Bossenz and Rutsch (2021) investigated whether these patterns change during the trainee phase and identified a change in approximately 44% of the teacher trainees, while at the same time clarifying the dynamics of professional experience and behaviour. Concerning mental health, Darius et al. (2020) showed that almost one-third trainee teachers complain of poor mental health and increased burnout symptoms. The results of this survey were in line with the findings of Klusmann et al. (2012), who showed that emotional exhaustion is a core component of burnout syndrome and increases during the trainee phase. For the trainee phase, there is an increase in emotional exhaustion during the first year (Dicke, Elling, Schmeck, & Leutner, 2015; Dicke, Parker, Holzberger, Kunina-Habenicht, Kunter, & Leutner, 2015), followed by a decrease towards the end of the trainee phase (Klusmann et al., 2012; Kunter, Linninger, Schulze-Stocker, Kunina-Habenicht, & Lohse-Bossenz, 2013; Richter et al., 2013). Referring to work-related behaviour and experience patterns, Klusmann et al. (2012) found that teacher trainees with the *health-ambitious and unambitious types* reported less emotional exhaustion than teacher trainees with the *ambitious* and *resigned types*.

Health Literacy as a Health Resource – Relevance in the Context of Teacher Education?!

Health literacy consists of cognitive and social skills that determine motivation and the ability to access, understand and use information in ways that promote and maintain health (Nutbeam, 1998). The fact that health literacy is a resistance resource for health maintenance and promotion (Kickbusch, Maag, & Saan, 2005) has become increasingly internationally accepted in recent years. This is evidenced by various initiatives of the World Health Organization, such as the *Shanghai Declaration* (WHO, 2016), the *Roadmap for the Promotion of Health Literacy over the Life Course* (WHO, 2019) and the *Manifesto on Health Literacy* (WHO, 2013). Strengthening health literacy is also an important task for prevention and health promotion in education. Institutions of the educational system have great importance for the promotion of health literacy and teachers can support people in the development of cognitive, social and emotional knowledge, skills and abilities that influence on health literacy (Schaeffer, Vogt, Berens, & Hurrelmann, 2016). In Germany, for example,

Strategy Paper #1 of the Alliance for Health Literacy recommends that the aim should be

> to support teachers in all institutions of the education system to integrate health issues into their professional understanding and to improve the well-being, motivation and ability to concentrate as well as the time and stress management of their respective clientele. Steps to safeguard their health (for example, to protect against burnout syndromes) should also be more strongly addressed (Hurrelmann, Bauer, Schaeffer, 2018, p. 7; the German quote was translated into English by the authors).

Currently, various models and measurement instruments exist for health literacy (Okan, Bauer, Pinheiro, Levin-Zamir, & Sørensen, 2019). Hartmann et al. (2020) used the HLS-EU-Q16 questionnaire to examine teachers' health literacy based on the conceptual model by Sørensen et al. (2012). The results showed that more than half of the respondents have limited health literacy. In the area of health promotion, teachers find it particularly difficult to deal with mental health issues and have great difficulty finding information to improve their mental well-being (Hartmann et al., 2020). Study results based on the same conceptualisation indicated that people with higher health literacy generally assess their subjective health status better and are more likely to engage in health-promoting behaviours than people with lower health literacy (Jordan & Hoebel, 2015; Schaeffer et al., 2016). In addition to the conceptualisation by Sørensen et al. (2012), there is also the structural model of health literacy by Soellner et al. (2010) and Lenartz (2012) to be mentioned, which is consecutive and describes content components of health literacy at the level of key competencies (the English version can be found in Soellner, Lenartz, & Rudinger (2017)). In addition to the basic skills of health-related knowledge and basic health-related skills, the core of the model consists of advanced skills (*key health literacy competencies*) that describe the competencies necessary to act in a way that promote one's health (Soellner & Rudinger, 2018). These include perceptive-motivational conditions (*self-perception and proactive approach to health*) and behavioural components (*dealing with health information*, *self-control*, *self-regulation*, *communication and cooperation*) of health literacy. These health-related competencies offer approaches to promoting health literacy. Soellner, Huber, Lenartz, and Rudinger (2009) illustrated that individuals with low health literacy are considered to be more at risk for developing diseases in terms of their perception and processing of stressful situations. Health literacy represents a competence that, like other competencies, can be

acquired through learning (Bitzer & Sørensen, 2018; Levin-Zamir, Leung, Dodson, & Rowlands, 2017).

Promoting health literacy is an important aspect of prevention and health promotion in the context of (teacher) education (Vamos, Okan, Sentell, & Rootman, 2020), and it may allow (prospective) teachers to gain more control over their health and the factors that directly influence one's health (Abel, Sommerhalder, & Bruhin, 2018; WHO, 2017). Health literacy's early promotion has been widely discussed in school settings (Paakkari, Inchley, Schulz, Weber, & Okan, 2019; Peralta & Rowling, 2018), and teachers as health promoters should have well-developed health literacy themselves (Byrne et al., 2016; Lamanauskas & Augienè, 2019). The development of teachers' health literacy, in conjunction with their various roles in the school, represent a major component in the realisation of health education and concomitant health literacy (Byrne et al., 2016; Peterson et al., 2001) in schools (Lamanauskas, 2018). Hartmann et al. (2020) summarised that teachers' health literacy is crucial for the success of school health promotion and influences adolescents' health literacy (Lamanauskas, 2018; Okan, Pinheiro, Zamora, & Bauer, 2015; Paakkari et al., 2017).

Overall, it remains unclear how student teachers' and teacher trainees' key health literacy competencies are developed and how their health status is and whether student teachers and teacher trainees differ from each other. In the context of health promotion for prospective teachers (student teachers and teacher trainees), studies are needed to investigate how health literacy is developed among prospective teachers and how it is related to their health, in order to derive recommendations for teacher education. The following study makes a first contribution to this.

Methods

Sample

A total of 195 student teachers and 242 teacher trainees from Germany participated in the online survey. The teacher trainees complete an 18-month trainee phase – divided into three semesters – in Lower Saxony (Germany), and are assigned to different study seminar locations where subject-specific and pedagogical seminars take place. The participants were at different points

in their second phase of teacher education, with the majority being in the first and second semesters. They came from different school types (e.g. primary school and secondary school). On average, student teachers were 25.0 ± 4.1 years old and teacher trainees were 28.8 ± 4.8 years old. The composition of the sample is shown in Table 1.

Table 1. Distribution by Student Teachers and Teacher Trainees by Gender

	Student Teachers		Teacher Trainees	
Gender	n	%	n	%
female	167	86.1	193	79.8
male	25	12.9	48	19.8
diverse	2	1.0	1	.4

Measures

For data collection, a quantitative cross-sectional survey[2] was conducted in the form of an anonymous online questionnaire. Health literacy was measured based on Lenartz (2011) German questionnaire. The questionnaire includes 29 items which measure key health literacy competencies in the areas of *self-regulation* (five items), *self-control* (five items), *self-perception* (five items), *proactive approach to health* (five items), *communication and cooperation* (four items), and *dealing with health information* (five items). In this study, the items were rated on a four-point Likert scale with the response alternatives 1 = 'not correct at all' to 4 = 'correct'. A higher value refers to a stronger expression of the respective abilities. In the case of negatively formulated statements, the polarity of the statements made was reversed. The questionnaire proved to be a valid measuring instrument (Soellner et al., 2017) and has already been used in other studies (Kuhlmann et al., 2015; Stassen et al., 2020). In this survey, all scales had acceptable to very good internal consistency (alpha between $\alpha = .70$ and $\alpha = .87$; see Table 2).

To assess health status, we asked 'How is your health status in general?' in accordance with the recommendation of the World Health Organization

[2] The data from the student teachers were collected as part of a survey by Dr Timo Beckmann during the practical phase of student teachers at Leuphana University Lüneburg at the beginning of 2020. The data for the teacher trainees were collected as part of our cross-sectional study from November 2020 to February 2021.

(WHO) (de Bruin et al., 1996). This item has already been used in other German-language surveys (DEGS: Robert Koch-Institut, 2018, GEDA: Jordan & Hoebel, 2015). The response format includes five levels (1 = 'very poor' to 5 = 'very good'). For the analysis, the categories were dichotomised according to the GEDA study (Jordan & Hoebel, 2015) and classified into 'self-assessed good health' (values 1 and 2) or 'self-assessed poor health' (values 3–5).

Statistical Analysis

Data analysis was performed using SPSS statistical software (version 26.0). To answer research question 1, descriptive characteristics of health literacy and health status differentiated according to the two groups were used and group differences were calculated using t-test. In the case of significant differences, effect sizes according to Cohen (1988) were determined, which can be interpreted as follows: d between 0.2 and 0.5 = small effect, d between 0.5 and 0.8 = medium effect, and d > 0.8 = strong effect.

To answer research question 2, Pearson's product-moment correlations were calculated for both groups to identify the correlations between the key health literacy competencies and health status. To determine how large the correlation was, Cohen (1988) provides the following classification for interpretation: r = .10 corresponds to a weak effect, r = .30 corresponds to a medium effect, and r = .50 corresponds to a strong effect. To test the associations between the key health literacy competencies and health status, multivariate regression analyses were performed for both groups. According to Cohen (1988), the following interpretations apply: $|R^2|$ = .02 = weak variance explanation; $|R^2|$ = .13 = moderate variance explanation; $|R^2|$ = .26 = strong variance explanation. A probability of error smaller than 5% was assumed to be significant for the results.

Results

Health Literacy

Student teachers had higher values than teacher trainees in all key health literacy competencies. The groups have in common that in each case, the highest mean values could be found for the scales *dealing with health*

information and *self-perception* and the lowest values in the scales of *communication and cooperation* and *self-regulation*. With the exception of *communication and cooperation* (t(428) = 1.951, p = .052, 95% CI = .000 – .230), group-specific significant differences could be determined for the remaining skills (see Table 2). The effect sizes were medium (Cohen, 1988).

Table 2. Descriptive Results and Group Differences in Health Literacy

	Groups	Mean	Standard deviation	Cronbachs Alpha (α)	Group Differences p – value, 95% – CI and Effect sizes
self-regulation	ST	2.78	.55	.77	p < .000*** [.295 – .518] d = .69
	TT	2.38	.60	.80	
self-control	ST	3.06	.49	.81	p < .000*** [.091 – .281] d = .60
	TT	2.88	.50	.78	
self-perception	ST	3.25	.43	.74	p = .01* [.027 – .197] d = .57
	TT	3.14	.45	.70	
proactive approach to health	ST	3.18	.52	.87	p < .000*** [.219 – .417] d = .67
	TT	2.86	.51	.80	
communication and cooperation	ST	2.88	.60	.79	p = .05 [.000 – .230] d = .55
	TT	2.77	.61	.77	
dealing with health information	ST	3.34	.47	.84	p = .024* [.014 – .200] d = .56
	TT	3.23	.49	.83	

Notes: Range = 1–4, **CI** confidence interval, **d** effect size, ***p** < .05, **p < .01, ***p < .001, **ST** student teachers, **TT** teacher trainees.

Health Status

Of the student teachers, 63.1% rate their health status as good (49.2% = good, 13.9% = very good) and 36.8% as poor (34.2% = moderate, 2.1% = poor, 0.5% = very poor). Of the teacher trainees, 78.9% rate their health status as good (56.2% = good, 22.7% = very good) and 21.0% as poor (20.2% = moderate, 0.8% = poor). Student teachers (M = 3.74, SD = .74) and teacher trainees (M = 4.01, SD = .68) differed significantly from each other (t(382.511) = –3.920; p = .000; 95% CI = –.407 – –.133; d = .61) and the effect size is medium (Cohen, 1988).

Associations Between Health Literacy and Health Status

An examination of the correlation coefficients for student teachers showed how differently the individual components correspond to the health status (see Table 3). The ability to *self-regulate* was primarily related to the health status ($r = .43$; $p < .01$). Further, *proactive approach to health* ($r = .27$; $p < .01$), *self-control* ($r = .27$, $p > .01$), and *self-perception* ($r = .23$, $p < .01$) also showed significant positive, but weak to moderate, associations with health status (Cohen, 1988).

Table 3. Intercorrelations (by Pearson) of the Key Health Literacy Competencies and Correlation (by Pearson) of the Key Health Literacy Competencies With Outside Criteria for Student Teachers

	SR	SC	SP	PATH	CUC	DWHI	HS
SR	1						
SC	.17*	1					
SP	.39**	.38**	1				
PATH	.27**	.17**	.39**	1			
CUC	.17*	$.11^{ns}$	.28**	.26**	1		
DWHI	.17*	.24**	.45**	.41**	.15*	1	
HS	**.43****	**.27****	**.23****	**.27****	$.3^{ns}$	$.11^{ns}$	1

Notes: The external criteria health status was surveyed by a single item, significant correlations with the external criteria are highlighted in bold, ***p** < .05; ****p** < .01, ^{ns} = not significant, **SR** self-regulation, **SC** self-control, **SP** self-perception, **PATH** proactive approach to health, **CUC** communication and cooperation, **DWHI** dealing with health information, **HS** health status.

The results of the correlation analysis for teacher trainees consistently showed positive correlation coefficients for the person-related components of health literacy with health status (see Table 4). The ability to *self-regulate* was primarily related to health status ($r = .42$; $p < .01$). *Proactive approach to health* ($r = .27$; $p < .01$), *self-control* ($r = .27$; $p < .01$), and *self-perception* ($r = .21$; $p < .01$) also showed positive correlations with health status. These were small to medium effects (Cohen, 1988). The remaining abilities showed no significant correlations with health status (see Table 4).

Table 4. Intercorrelations (by Pearson) of the Key Health Literacy Competencies and Correlation (by Pearson) of the Key Health Literacy Competencies With Outside Criteria for Teacher Trainees

	SR	SC	SP	PATH	CUC	DWHI	HS
SR	1						
SC	.12^{ns}	1					
SP	.34**	.36**	1				
PATH	.26**	.19**	.41**	1			
CUC	.19*	.12^{ns}	.28**	.25**	1		
DWHI	.18*	.26**	.47**	.44**	.13^{ns}	1	
HS	**.42****	**.27****	**.21****	**.27****	.08^{ns}	.12^{ns}	1

Notes: The external criteria health status was surveyed by a single item, significant correlations with the external criteria are highlighted in bold, ***p** < .05; ****p** < .01, ^{ns} = not significant, **SR** self-regulation, **SC** self-control, **SP** self-perception, **PATH** proactive approach to health, **CUC** communication and cooperation, **DWHI** dealing with health information, **HS** health status.

Comparing the results of the multiple regression analyses of both groups, they had in common that *self-regulation* and *proactive approach to health* had a positive, significant association with health status (see Table 5).

Table 5. Health Status and Health Literacy: Results of Multiple Regression Analysis

	Student Teachers (ST)			Teacher Trainees (TT)		
Predictors	B	SE	β	B	SE	β
SR	.50	.09	**.37*****	.27	.07	**.24*****
SC	.30	.11	**.20****	.11	.09	.08^{ns}
SP	–.01	.14	–.01^{ns}	–.06	.12	–.04^{ns}
PATH	.27	.11	**.19***	.33	.09	**.25*****
CUC	–.11	.08	–.09^{ns}	–.05	.07	–.04^{ns}
DWHI	–.10	.12	–.06^{ns}	–.17	.09	–.12^{ns}
R^2	.227			.139		

Notes: For each regression, highly significant F value ($p < .001$), *p < .05, **p < .01, ***p < .001, ^{ns} = not significant, multicollinearity statistic = .59 < tolerance < .89, 1.11 < VIF < 1.69, **B** regression coefficient, **SE** standard error, **β** standardized β-coefficient, **R^2** corrected R squared, **SR** self-regulation, **SC** self-control, **SP** self-perception, **PATH** proactive approach to health, **CUC** communication and cooperation, **DWHI** dealing with health information.

Accordingly, for student teachers, the predictor *self-control* ($\beta = 20$, $p < .01$) additionally contributes to an improvement in health status. The variance explanation of the health status was 22.7% for the student teachers and 13.9% for the teacher trainees. This corresponded to moderate to strong variance elucidation in each case (Cohen, 1988; see Table 5).

Discussion

The present study aimed to provide empirical findings on student teachers' and teacher trainees' health literacy in the context of teacher health. With these data, it is possible to describe the prerequisites for health-promoting behaviour for both groups and the association with health status in more detail, and based on this, to derive initial recommendations for teachers' health promotion in the context of teacher education.

The first research question was related to the comparison of the two groups of prospective teachers. Student teachers have more favourable prerequisites concerning health-promoting behaviour. With the exception of *communication and cooperation*, they had significantly higher values in the other key health literacy competencies. It could be hypothesised that the student teachers have already been able to attend a few courses on health and health promotion since their university offers several seminars on this topic. Trainee teachers came from several different universities with diverse curricula, so it is uncertain whether they had already attended health-related courses in their first and during their second phase of teacher education.

Overall, the professional standards for teacher education in Germany[3] integrate the training of health-related competences in both phases of teacher education. This may also be because study results show that emotional exhaustion increases during the transition from university to the second phase of teacher education (Dicke, Elling, et al., 2015; Dicke, Parker, et al., 2015), only decreases towards the end of the trainee phase (Klusmann et al., 2012; Kunter et al., 2013; Richter et al., 2013) and might exert an influence on health literacy. The majority of the teacher trainees who participated in this study

[3] Resolution of the Conference of Ministers of Education and Cultural Affairs of 16.12.2004 as amended in German on 16.05.2019: https://www.kmk.org/fileadmin/veroeffentlichungen_beschluesse/2004/2004_12_16-Standards-Lehrerbildung-Bildungswissenschaften.pdf

were in the first and second semesters of their practical oriented phase. Future studies should investigate this hypothetical relation.

It could also be hypothesised that the different measurement times explain the significant differences in health literacy. The survey of student teachers took place before the COVID-19 pandemic and the survey of teacher trainees during the pandemic. Finding regarding teachers' health during the pandemic in Germany (Hansen, Klusman, & Hanewinkel, 2020) indicated that teacher trainees were at higher risk of high emotional exhaustion than, for example, school headmasters. Even when controlling for age, gender and type of school, this association remained constant. Furthermore, teachers with high levels of emotional exhaustion were more likely to report that the pandemic exacerbated their symptoms (Hansen et al., 2020). This is also confirmed by results showing that people with low health literacy are considered to be at greater risk for the development of diseases and their perception and processing of stressful situations (Soellner et al., 2009). Hansen et al. (2020) also showed that more than half of the surveyed teacher trainees felt they had more work to do due to the COVID-19 pandemic. The development of health literacy is a dynamic process that be impacted by experiences with different health circumstances (Zarcadoolas, Pleasant, & Greer, 2006), such as pandemics.

Regarding the second research question, teacher trainees rated their health status better than student teachers did. Conversely, studies have shown that people with higher health literacy generally rate their subjective health status better and are more likely to engage in health-promoting behaviours than people with lower health literacy (Jordan & Hoebel, 2015; Schaeffer et al., 2016). On the other hand, the variance explanation for the health status of teacher trainees had a lower percentage than student teachers, so other predictors exert a greater influence but this should also be a focus in further studies.

The results of the correlation and regression analyses showed correlations between the key health literacy competencies and health status. The correlation coefficients for both groups were relatively stable and positive. Despite the diversity of health-related determinants, up to 22.7% of the variance in health status could be explained by the results of the regression analyses for student teachers and up to 13.9% for teacher trainees. For student teachers, self-regulation was the most significant predictor for health status and for the teacher trainees, self-regulation and proactive approach to

health were the most significant predictors. In terms of predictors, proactive approach to health ranked higher among teacher trainees. It could be hypothesised that this may be due to age and the associated personal development that teacher trainees pay more attention to oneself and one's health. Teacher trainees also take responsibility for students through their work in school. However, this should also be investigated in further studies.

Both groups had the lowest means in the competences of self-regulation and communication and cooperation, which complements the results of the studies mentioned previously, and points to the less favourable work-related behaviour and experience patterns in dealing with stress (Lohse-Bossenz & Rutsch, 2021; Römer et al., 2012). In this context, these competencies can also be seen as important health resources that enable a person to deal constructively with (occupational) stresses and personal problems. Lenartz's (2012) findings on scenarios of various health-related behaviours showed a positive association of the behaviour 'taking a break' on the ability to self-regulate ($r = .46$, $\beta = .43$; $p < .01$), the perception of need in a pressure situation ($r = .25$, $\beta = .18$, $p < .01$) and for the perception of tension and stress at work ($r = .33$, $\beta = .17$, $p < .01$). In a professional context, the study results indicated that learning opportunities that include the acquisition of professional self-regulation skills have rarely been integrated into the context of teacher education (Roloff Henoch et al., 2015). The usefulness of self-regulation strategies, in general, for the teaching profession and, in particular, for beginning teachers has been highlighted (Mansfield et al., 2012; Roloff Henoch et al., 2015). Overall, further studies are needed to examine the association between occupational self-regulation and the key competence of health literacy.

Concerning the ability to *communicate and cooperate*, it was shown that this has a positive association with the health behaviour 'telling about illness/ accepting help' ($r = .43$, $\beta = .40$, $p < .01$) and emphasises the use of help (Lenartz, 2012). Also, in a professional context, related to the assessment of health-relevant conditions in the workplace, and according to findings from research on teacher stress, social support is an extremely health-relevant factor (Lehr, 2004; Rothland, 2013). Social support does not exclusively refer to health issues, but it does not exclude them either. In the trainee phase, fellow candidates support teacher trainees in their second phase of teacher education, especially emotionally, in dealing with stress and in relation to work organisations (Braun, 2017; Richter, Kunter, Lüdtke, Klusmann, & Baumert, 2011). This support is also relevant during the first phase of

teacher education, especially for the practical semester and the supervision by mentors (Kücholl et al., 2019). However, this correlation should also be examined in further studies.

Conclusions and Implications for Practice

The results underline the need for interventions aimed at the sustainable and systemic promotion of health literacy. We hypothesised that early promotion of health literacy in the context of teacher education could have a positive impact not only on the study period and practice semester during the first phase of teacher education but also on the trainee phase and the later work situation. Early promotion requires curricular adaptations and learning opportunities within the framework of teacher education, which aims to improve health literacy and health. The results indicated especially the need for interventions improving the skills *self-regulation* and *communication and cooperation*.

(Prospective) Teachers need self-regulation skills that enable them to use action- and emotion-related strategies in ways that are functional for coping with job demands and health issues. Mindfulness represents a possible emotion-related form of coping that can help identify and regulate individual stress patterns (Lutz, Slagter, Dunne, & Davidson, 2008), as well as promote self-care and overall well-being (Goyal et al., 2014). The relevance of mindfulness in the educational context has been investigated in numerous studies, and the positive effects of mindfulness-based interventions in relation to teacher trainees and teachers seem promising (Emerson, Leyland, Hudson, Rowse, Hanley, & Hugh-Jones, 2017; Flook, Goldberg, Pinger, Bonus, & Davidson, 2013; Wimmer, von Stockhausen, & Bellingrath, 2019). Besides self-regulation, especially in the second phase of teacher training, which is associated with multiple stresses, social support is an important health resource for communicating one's state of health and accepting help. A first university seminar concept that pursues the promotion of student teachers' health literacy was developed by Hohensee and Schiemann (2022).

Overall, this study showed that teacher education should change and be rethought in terms of a stronger integration of health-related competences to maintain and promote (prospective) teachers' health early and sustainably. This study addresses a topic in (teacher) education that is gaining increasing attention in international discourses (Vamos et al., 2020) and is one of the

main social factors influencing health (Lamanauskas, 2018). The promotion of health literacy is also highlighted as one of three priority action goals in the 2016 WHO Shanghai Declaration (WHO, 2017).

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