

WHAT MAKES AN EFFICACIOUS TEACHER? THE ROLE OF BASIC PSYCHOLOGICAL NEEDS AND RECOVERY FROM STRESSORS IN RELATION TO TEACHERS' SELF-EFFICACY AND PERFORMANCE

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ABSTRACT

Background: Studies suggest that teachers' ability to perform their work tasks well is one of the most important antecedents of the achievements of students. This project was focused on verifying an underresearched relation among basic psychological needs satisfaction and frustration, the way the teachers use their time to recover from work stressors, with their performance and self-efficacy. **Material and Methods:** The participants were 503 teachers from a representative sample of schools in Poland. In the study performance (*Individual Work Performance Questionnaire*), self-efficacy (*Norwegian Teachers Self-Efficacy Scale*), basic psychological needs (*Basic Psychological Needs Satisfaction and Frustration Scale*), and recovery processes (*Recovery Experience Questionnaire*) were measured. **Results:** As expected, the results showed that there is a strong relation between basic psychological needs and teachers' individual performance and self-efficacy. However, this relation is partially mediated by some recovery processes, mostly control and detachment. **Conclusions:** The results prove that, to some extent, the relation between basic psychological needs satisfaction and teachers' performance and self-efficacy could be explained by the stress recovery processes undertaken by teachers in their free time. This study focused on explaining these relations and suggesting ideas for further studies in this domain. *Med Pr Work Health Saf.* 2024;75(4):309–320

Key words: teachers, self-determination theory, basic psychological needs, individual performance, recovery from stressors, teachers self-efficacy

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INTRODUCTION

The question of what makes an efficacious teacher has been asked by practitioners, policymakers, and researchers for decades [1]. Within educational institutions, such as schools, colleges, or universities, the high work performance of teachers, as well as their self-efficacy related to students achievements, often surpassing the impact of class size or composition, socioeconomic status and students' prior accomplishments [2–6]. It is, than crucial to comprehend the factors contributing to the performance and self-efficacy of teachers. This, as so far studied, may depend on factors, such as school

culture and management [7], licensing procedures [8], as well as social support received by the teachers [9]. Some research suggests that, within the initial years of teaching, teachers experience serves as a predictor of student outcomes [10], other studies suggest that teachers who excel in communication with their students tend to be more effective and teachers' verbal skills correlate with academic gains among students [11,12]. Additional insights and exploration into new research domains are necessary to elucidate why certain teachers outperform others. The factors, which so far received limited research attention, and which may be related to teachers performance and self-efficacy include basic

psychological needs (BPN) and free time recovery processes (FTRP) [13,14]. Both of these factors seem important, as teachers do their work in a very broad social environment (with or among students, parents, other teachers, etc.), which because of the number of social interactions has an impact on their BPN satisfaction (or their frustration). Basic psychological needs satisfaction in numerous domains proved to build autonomous and intrinsic forms of motivation, so it might be considered a crucial factor for performance [13]. On the other hand, the way teachers utilize their free time for stress recovery may help them to maintain more efficacious at work. Some of teachers' duties could be done both at work and at home (checking tests, preparing classes etc.) which makes it harder to find work-life balance and to recover from work stressors [14]. These 2 general reasons, as well as more specific theoretical and empirical ones emphasized in the introduction, made the authors of this study focus on studying how BPN and the way teachers use their time for recovering after work might be related to their performance and self-efficacy in their role.

Teachers performance and self-efficacy

Teachers performance is not easily operationalized, as looking from a broader perspective, it could be defined not only as the achievements of students, but also as proper time management of various duties, collaboration with other teachers and parents, and addressing students' challenging behaviors, among others [15–18]. Researchers often gauge teacher performance through indicators such as students' achievements, grades, or externally published standardized tests. Nevertheless, it will be contended that this approach is too narrow, especially considering the broader societal expectations placed on education. For instance, grades are increasingly criticized as a limited form of evaluation [19]. Certain psychological studies utilize measures of occupational or teacher self-efficacy, which is the measure of an attitude, or an individual's belief in his or her capacity to execute behaviors necessary to produce specific performance attainments [20]. Despite their associated drawbacks, primarily tied to self-evaluation susceptibility to social approval [21], some of the self-efficacy questionnaires which were developed over the years with cooperation with experts and practitioners from the area of education are very promising, as they are developed based on the actual school situations and teachers challenges [20,22]. A different approach is used in studies which focus

on individual performance [23], which is a concept used in management and occupational psychology and is defined through „behaviors or actions that are relevant to the goals of the organization” [24]. The current study, combines these 2 approaches, by measuring both teachers' self-efficacy and individual work performance. The latest approach to teachers' self-efficacy involves defining of its 6 crucial factors: self-efficacy for instruction, adapting education to individual students' needs, motivating students, maintaining discipline, cooperating with colleagues and parents, and coping with changes and challenges [25,26]. The dimension of “instruction” pertains to teachers' beliefs in their capacity to explain subject matter or answer questions to enhance students' understanding. “Adapting education to individual students' needs” underscores teachers' confidence in their ability to tailor education to the needs and abilities of individual students, considering student diversity. The “motivating students” dimension relates to teachers' beliefs in their ability to engage and involve students in schoolwork, fostering increased learning desires. “Maintaining discipline” involves teachers' confidence in their ability to uphold order and discipline in their classes, effectively addressing student misbehavior. The dimension of “cooperating with colleagues and parents” pertains to teachers' beliefs in their capacity to collaborate in teams and work with parents on students' schoolwork. Finally, the “coping with changes” dimension focuses on the ability to handle external demands representing significant changes for teachers [25,26].

The 2 approach is to measure teachers' work performance, that is the quantity and quality of work, as well as the fundamental skills and professional knowledge required for a given position. It encompasses basic professional behaviors that contribute to higher performance of duties and the delivery of higher-quality services, such as adeptly planning work in time and setting measurable goals in work and achieving them [24,27].

Teachers performance, self-efficacy and basic psychological needs

One of the main assumptions of achieving high performance is that it could be done through building motivation and engagement towards doing specific tasks [28,29]. The BPN that is autonomy, competence, and relatedness could be related to teachers performance and self-efficacy exactly through this mechanism, that is by building autonomous and intrinsic types of motivation towards the teacher's job. Basic psychological

needs theory (BPNT) is a subtheory of self-determination theory (SDT) [13,30], and describes the 3 needs as essential for growth, optimal motivation and performance. The needs are universal, meaning that they play an important role across cultures and environments [13,31]. At school environment, autonomy satisfaction occurs when teachers experience psychological freedom, possibility to choose and create the way they do their job. Autonomy frustration, on the other hand, represents a feeling of being controlled and pressured of how to conduct their job. Competence satisfaction involves feeling effective and capable at work, while competence frustration denotes a feeling of inadequacy and failure at the tasks they are responsible for. Relatedness satisfaction involves the sense of being warmly connected to people from school's environment (e.g., students, other teachers, parents of students), while relatedness frustration denotes feelings of loneliness, ostracism or rejection. Extensive research in different contexts confirms the link between the needs satisfaction and building autonomous motivation [32,33] and between autonomous or intrinsic motivation and performance [34]. Additionally, the meta-analysis confirms direct relationship between basic needs and performance [35,36]. Authors also emphasize that there are other, different than an increase in internal motivation and different for each of the needs reasons, why the needs can predict performance. For the need for autonomy this is an internal locus of causality which lead to taking ownership of work done including the teaching process [34,35]. For the need for competence it is the mix of challenge and skill which enables teachers to experience work which is not too easy and not too difficult, and at the same time to possess skills which are necessary to do it right, and for the need for relatedness it is the well-being of teachers in their workplace [34,35]. These factors suggest that BPN may be beneficial for the teachers performance. However, there is still little research which directly proves this relation. As specifically for teachers' context, the research conducted by Lam et al., highlighted the significance of supporting BPN in project-based learning [37]. The study indicated that when teachers perceive their schools as fostering a collegial and supportive environment, where teacher BPN are valued, they become more motivated and committed to implementing educational innovations. Similarly, 1 study proved that a stronger perception of an innovation's importance is linked to higher levels of self-determined motivation, which on the other hand are

dependent on satisfaction of BPN [38]. In this study it is assumed that BPN will have a direct impact on performance at work and self-efficacy, but also, that this relation, will be partially mediated by the way teachers recover from stressors.

Teachers' free time recovery processes and their performance and self-efficacy

Studies suggest that processes related to recovering and unwinding from job stressors can be relevant for individuals well-being and job performance [39–41]. The free time recovery processes refers to a processes during which individual functional systems that have been called upon during a stressful experience return to their prestressor levels [41,42]. The recovery process can be seen as a opposite one to the strain process. It results in restoration of impaired mood and action prerequisites and is often also reflected in a decrease in physiological strain indicators. When it comes to teachers, the FTRP may be seen as especially important for their performance, as teaching is considered as stressful activity, and stress may decrease performance [43,44]. Moreover, for teachers it is often not clear how to distribute the teachers' duties between those done at work and at home [45]. This can disrupt the way the teachers recover from stressors and as a consequence be related to their worse performance. Typically, researchers have focused on 4 recovery experiences: psychological detachment (i.e., not thinking about work related issues), relaxation (i.e., taking time for leisure), mastery (i.e., learning new things), and control (i.e., having control over one's leisure time) [46]. As so far, there were no studies focusing on the relation between these 4 recovery processes and any form of work performance or self-efficacy, the assumptions may be based only on theoretical assumptions. From this perspective all 4 processes seem important for both performance and self-efficacy [41]. Detachment and control correspond with teachers' job characteristics (no clear work-life balance boundary). So if they can detach from work and still have control over their free time, this may correspond with their better performance at work, as they do not think about their duties while resting, and could be more mindful at work [45]. Mastery is generally involved with improvement of the teachers' skills, which itself can build the feeling of efficacy and improved performance [47]. Relaxation, on the other hand, may be connected with regaining energy and reducing stress, which can help to be more focused and be able to withstand more stressful situations [48,49].

Basic psychological needs and free time recovery

So far, there were no studies which investigated the BPN satisfaction or frustration relation with FTRP [50]. However, one might find several explanations for the potential connection between satisfaction of BPN and the FTRP. To begin with, as per self-determination theory articulated by Ryan, the contentment of BPN can lead to the preservation or enhancement of energy, which could facilitate the process of recovery [50,51]. This is rooted in the understanding that recovery involves the renewal of an employee's energetic resources that might have been depleted during the course of the workday [51]. Moreover, BPNT give some hints of why, the satisfaction of BPN may be beneficial for recovery processes. For example, satisfaction of relatedness at work may be connected with good atmosphere at work and less conflicts. When conflicts occur, they may attract teachers attention and thoughts and make it harder to focus on recovering. Similar situation may concern the need for competence, for example a negative feedback of a colleague or a principal concerning the teachers work may frustrate the need for competence, and distract the teacher from focusing on recovery after work. Lack of autonomy on the other hand may focus attention on regaining control over once work situations. Another reason why BPN may be positively related to FTRP is by building positive emotions and acquiring new resources [30]. Existing research has demonstrated that the experience of positive emotional states often accompanies daily BPN satisfaction, as shown by Reis et al. [51]. These positive emotions are correlated with the activation of certain hormones within the brain's „pleasure reward” system (e.g., serotonin, dopamine) that help regulate the stress response, according to findings [52]. This aligns with Fredrickson's broaden-and-build theory, which suggests that positive emotions can counterbalance the negative emotions triggered by psychosocial stressors [53,54]. This augmented interaction capability is likely to amplify the opportunities for employees to accrue new resources or to reclaim those that were depleted due to previous work-related efforts. It is, therefore, reasonable to speculate that BPN satisfaction contributes to the FTRP by enabling employees to acquire fresh resources. In support of this, the limited studies investigating the role of BPN satisfaction in daily recovery have found affirmative associations between satisfaction of basic needs and employee recuperation during leisure hours following work [55]. These studies however did not investigate

the specific types of FTRP, which the current project concentrates on.

Current study and hypotheses

This study focuses on how BPN are related to teachers performance and self-efficacy, and whether this relation could be mediated by the FTRP. Generally, according to the aforementioned studies, it is assumed that there will be a direct relation between BPN satisfaction and teachers performance [28,35]. This relation, though, will be partially mediated by the FTRP [39]. The mediation is particularly important, as some of the teachers' job responsibilities (e.g., preparing teaching material, checking tests) may disturb their work-life balance as teachers may choose to do the duties at home (or think of them) in the time which could „be used” for recovery. The teachers whose BPN are satisfied will be able to recover more efficiently, and as a result will be more efficacious when back at work. In this study the 2 scales were used; first, *Individual Work Performance Questionnaire* (IWPQ) is designed to measure IP in the general work context. This scale constitute of items concerning the skills of time management and planning of work which is important for teaching (e.g., “I managed to plan my work so that it was done on time”) [27]. Additionally, teachers' self-efficacy (TSE) was measured, with the use of *Norwegian Teachers Self-Efficacy Scale* (NTSES) [26,56]. This NTSES, although it is designed to measure self-efficacy consists of items very closely related to specific teachers' behaviors (e.g., “How certain are you that you can organize classroom work so that both low- and high-ability students work with tasks that are adapted to their abilities?”). As for the recovery processes, there is no research so far, where they were used as mediators between BPN satisfaction / frustration and performance or self-efficacy at work. It is assumed that all 4 processes may be important mediators for this relation.

It is specifically assumed that:

- satisfaction of the BPN is positively related to teachers' IP (H1). This direct relation will be significant, although weaker even after including the mediator (recovery processes) in the model;
- the relationship between the satisfaction of the BPN and IP will be mediated to varying degrees by different FTRP (H2);
- satisfaction of the BPN is positively related to TSE (H3). This direct relation will be significant, although weaker even after including the mediator (recovery processes) in the model;

- the relationship between the satisfaction of the BPN and TSE will be mediated to varying degrees by different FTRP (H4);
- frustration of the BPN is negatively related to teachers IP (H5). This direct relation will be significant, although weaker even after including the mediator (recovery processes) in the model;
- the relationship between the frustration of the BPN and teachers IP will be mediated to varying degrees by different FTRP (H6);
- frustration of the BPN is negatively related to TSE (H7). This direct relation will be significant, although weaker even after including the mediator (recovery processes) in the model;
- the relationship between the frustration of the BPN and TSE will be mediated to varying degrees by different FTRP (H8);
- the hypotheses H2, H4, H6 and H8 concerning the mediation process do not state which recovery processes will be responsible for the mediation, as no study so far has investigated such a relation.

MATERIAL AND METHODS

Recruitment and participants

For the reason of recruitment of participants, a purposive sampling design was used, that is the schools from all the voivodeships in Poland were randomly chosen, and at given school the teachers who themselves reported to the researcher took part in the study. One of the largest survey panels in Poland BBS Obserwator™ has been used for data collection and access to the survey sample. A questionnaire created using Qualtrics™ was chosen as the research tool. An a priori power analysis was conducted using G*Power ver. 3.1.9.7 to determine the minimum sample size required to test the study hypothesis. Results indicated the required sample size to achieve 80% power for detecting a medium effect, at a significance criterion of $\alpha = 0.05$, and 5 predictors was $N = 203$. All of the participants gave their informed consent to take part in the study. It was conducted in accordance with the ethical standards of the Helsinki Declaration as revised in 2013. There were 503 teachers from primary ($N = 253$) and high schools ($N = 250$) across Poland, aged $M \pm SD$ 44.7 ± 8.56 years, including 301 women (59.8%) and 202 men (40.2%). Of these, 48 participants (9.5%) lived in a city with $>500\,000$ inhabitants, 162 (32.3%) in a town with 150 001–500 000 inhabitants, 78 (15.5%) in a town with 50 001–150 000 inhabitants, 114 (22.7%) in a town with 50 001–20 000 inhabitants and 101 (20.1%)

in a town with $<20\,000$ and in a village. The average seniority at current workplace was 18.76 years ($SD = 8.65$).

Measures

Basic Psychological Needs Satisfaction and Frustration at Work

Basic Psychological Needs Satisfaction and Frustration at Work were assessed by the BPNSFS-Work Domain in the Polish version [57,58]. The scale consists of 24 items, 4 items for each of the 6 subscales (i.e., *Autonomy satisfaction*, *Autonomy frustration*, *Relatedness satisfaction*, *Relatedness frustration*, *Competence satisfaction* and *Competence frustration*). Respondents answered the questions concerning their feelings about their jobs during the previous 4 weeks (e.g., “At work, I feel capable at what I do”) on a 7-point response scale ranging from 1 (“strongly disagree”) to 7 (“strongly agree”). For the purpose of this study an aggregated index of needs satisfaction and needs frustration were used. Cronbach’s α for the scales are presented in Table 1.

Recovery experience

Recovery experience was measured by *Recovery Experience Questionnaire* (REQ) in the Polish experimental version, which consists of 16 items, 4 items for each of the 4 subscales, that is *Psychological detachment*, *Relaxation*, *Mastery*, *Control* [46]. Respondents answered the questions concerning their off work time during the previous 2 weeks (e.g., “During my off work time I didn’t think about work at all”) on 5-point scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”). The items of the original scale were translated into Polish by a bilingual translator; another bilingual person then back-translated the scale. Next, the back-translated English version of the scale was consulted with the authors of the original, universal version of the scale and whenever inconsistencies were found, the back-translation procedure was continued until a consensus was reached that the translation was the best representation of the meaning of the items in Polish. Cronbach’s α for the scales are presented in the Table 1.

Individual performance

Individual performance was measured by *Individual Work Performance Questionnaire* (IWPQ) – task performance scale in the Polish adaptation [24,27]. The subscale consists of 5 questions concerning task performance at work, and it is a part of a scale consisting together of 16 items. Respondents answered the questions concerning their work during the previous

Table 1. Pearson's r correlation, descriptive statistics and Cronbach's α of the individual performance, teachers; self-efficacy, basic psychological needs satisfaction and frustration and recovery processes of the teachers from the randomly chosen schools from Poland (study conducted in 2023)

Variable	M	SD	Skewness	Kurtosis	Correlation									
					1	2	3	4	5	6	7	8		
1. Individual performance	3.94	0.71	-0.26	-0.361	0.84									
2. Teachers' self-efficacy	5.78	0.74	-0.461	-0.360	0.488**	0.95								
3. Basic needs satisfaction	5.69	0.66	-0.604	0.681	0.372**	0.609**	0.83							
4. Basic needs frustration	2.89	0.73	0.666	0.625	-0.194**	-0.263**	-0.393**	0.67						
5. Detachment	2.67	0.74	0.423	0.596	0.287**	0.346**	0.271**	-0.252**	0.79					
6. Relax	3.41	0.72	-0.478	0.103	0.272**	0.208**	0.293**	-0.213**	0.467**	0.87				
7. Mastery	2.78	0.78	-0.216	-0.157	-0.115**	-0.175**	-0.012	0.066	0.087	0.276**	0.75			
8. Control	4.02	0.69	-0.822	1.529	0.430**	0.510**	0.428**	-0.256**	0.396**	0.388**	-0.0051	0.88		

Descriptive statistics provided for non-standardized variables. All correlations for N = 503. * p < 0.05, ** p < 0.01, *** p < 0.001.

2 weeks (e.g., "I was able to plan my work so that I finished it on time"). Participants evaluate their IP at work on the 5-point scale ranging from 1 ("rarely") to 5 ("always"). Cronbach's α for the scale is presented in the Table 1.

Teachers' self-efficacy

Teachers' self-efficacy was measured by NTSES [26,56]. The scale consists of 24 items where participants assess their self-efficacy on the scale from 1 ("I am definitely not able") to 7 ("I am definitely able to do it") (e.g., "How certain are you that you can organize schoolwork to adapt instruction and assignments to individual needs?"). In this study the general indicator of TSE was used, as suggested by the authors of Polish cultural adaptation [50]. Cronbach's α for the scale is presented in the Table 1.

RESULTS

Analytic strategy

For data analysis IBM SPSS 29 and AMOS 29 for Windows were used. First, the initial, correlation analyses with basic descriptive statistics and Cronbach's α of the data was presented. This was followed by checking the structure of the used measures conducting their confirmation factor analyses. The initial analyses were followed by 4 Hayes mediation analyses in order to answer the posited hypotheses [51]. The results of the correlation analyses together with basic statistics and Cronbach's α of the scales were presented in Table 1.

Additionally, in order to verify and control the tested variables a series of Student's t-test analyses between high school teachers and primary school teachers, as well as for the younger and older teachers (divided according to median score of age, that is 44 years) were conducted. Sixteen Student's t-test analyses were conducted, that is 8 between high and primary school teachers and 8 between younger and older teachers for IWPQ, REQ *Detachment*, REQ *Relax*, REQ *Mastery*, REQ *Control*, BPN *Satisfaction*, BPN *Frustration*, NTSES. Out of all the tested pairs only 1 proved significant. High school teachers had significantly higher mastery scores ($M \pm SD$ 2.87 \pm 0.75) than primary school teachers ($M \pm SD$ 2.70 \pm 0.80), $t(501) = -2.53$, $p < 0.006$, $d = -0.23$, 95% CI: -0.31 - (-0.04). The tests gave an additional insight in the data and proved that school types or age did not differentiate the levels of the tested variables. Moreover, the confirmatory factor analyses on the version of the questionnaires used in the study were conducted in order to check their theoretical structure. As IWPQ and REQ were used in their original versions

Table 2. Fit indices of the structures of tools used in the study of the teachers from the randomly chosen schools from Poland (study conducted in 2023)

Model	χ^2	df	CMIN/df	GFI/AGFI	RMSEA	90% CI
BPNSFS						
2 factor ^a	680.19	251	2.71	0.89/0.88	0.058	0.053–0.064
6 factor	611.76	237	2.58	0.90/0.87	0.056	0.051–0.062
REQ						
4 factor	346.50	98	3.54	0.91/0.88	0.071	0.063–0.079
IWPQ						
1 factor	7.54	2	3.76	0.99/0.96	0.074	0.023–0.134
NTSES						
1 factor ^a	606.54	252	2.41	0.90/0.88	0.053	0.048–0.058
6 factor	576.75	237	2.44	0.90/0.88	0.053	0.048–0.059

AGFI – adjusted goodness of fit index, CMIN/df – normed χ^2 /degrees of freedom, GFI – goodness of fit index, RMSEA – root mean square error of approximation. BPNSFS – *Basic Psychological Needs Satisfaction and Frustration Scale*, IWPQ – *Individual Work Performance Scale*, NTSES – *Norwegian Teachers Self-Efficacy Scale*, REQ – *Recovery Experience Questionnaire*.

* $p < 0.001$.

^a Scales (models) used in the current study.

their fit indices were tested. For the NTSES and BPNSFS, except for the version used in the study, additionally their original, 6 factor versions were verified. The fit indexes of the tools used in the study were satisfactory (Table 2).

The correlational analysis, Student's t-test comparison analyses and Confirmatory Factor Analysis (CFA) structure analyses results provided a good basis to test the mediational effects of the studied constructs. In order to verify the assumed hypotheses a series of mediation analyses was conducted. Figure 1a shows the relation between BPN satisfaction and teachers' IP mediated by the 4 FTRP [59]. As expected, BPN satisfaction is related to IP both directly (which confirms H1) and indirectly, through some FTRP (which partially confirms H2). The strongest mediating variable between needs satisfaction and IP was control, and to much less extend also detachment and relax. When it comes to the relation between needs satisfaction and TSE, the results were similar (Figure 1b). Basic psychological needs satisfaction were a strong direct predictor of TSE, which confirmed H3. The relation between satisfaction of the needs and TSE, as predicted, was partially mediated by control, and detachment but not by mastery or relaxation.

The relationship between BPN frustration and teachers' performance and self-efficacy, although as predicted was negative, it was fully mediated by the FTRP, which does not confirm H5 (Figure 1c, 1d). The strongest mediating variable between needs satisfaction and both performance and self-efficacy was control, and to much

less extend also detachment and relax. The link between BPN frustration and TSE was significant both without and with mediators, which confirms H7. Hypothesis H8 was only partially confirmed, as the relation between BPN and TSE was mediated by control but not by mastery. Moreover, the relation was to some extend mediated by detachment and relax.

DISCUSSION

This study aimed to verify whether BPN satisfaction, and frustration may be related to IP and TSE in their professional role and, whether the way teachers recover from work stressors could mediate this relation. The general assumption behind the hypotheses was the fact that BPN are not only related to their TSE and IP through autonomous and intrinsic types of motivation (as it stated in BPN theory and proven) [28], but also by enabling teachers to use their time to recover from stressors by detachment from work (not thinking about work), having control over of how they use their free time, being able to find time to relax and learn and develop (mastery) [39]. Moreover, it was assumed that a similar pattern of relations and mediations between BPN satisfaction with TSE and IP could be observed. The opposite assumption was made for the frustration of the BPN [60]. Many of the assumptions of the study were confirmed. The results showed a direct positive relation between BPN satisfaction and the IP and TSE. This relation remained significant (although

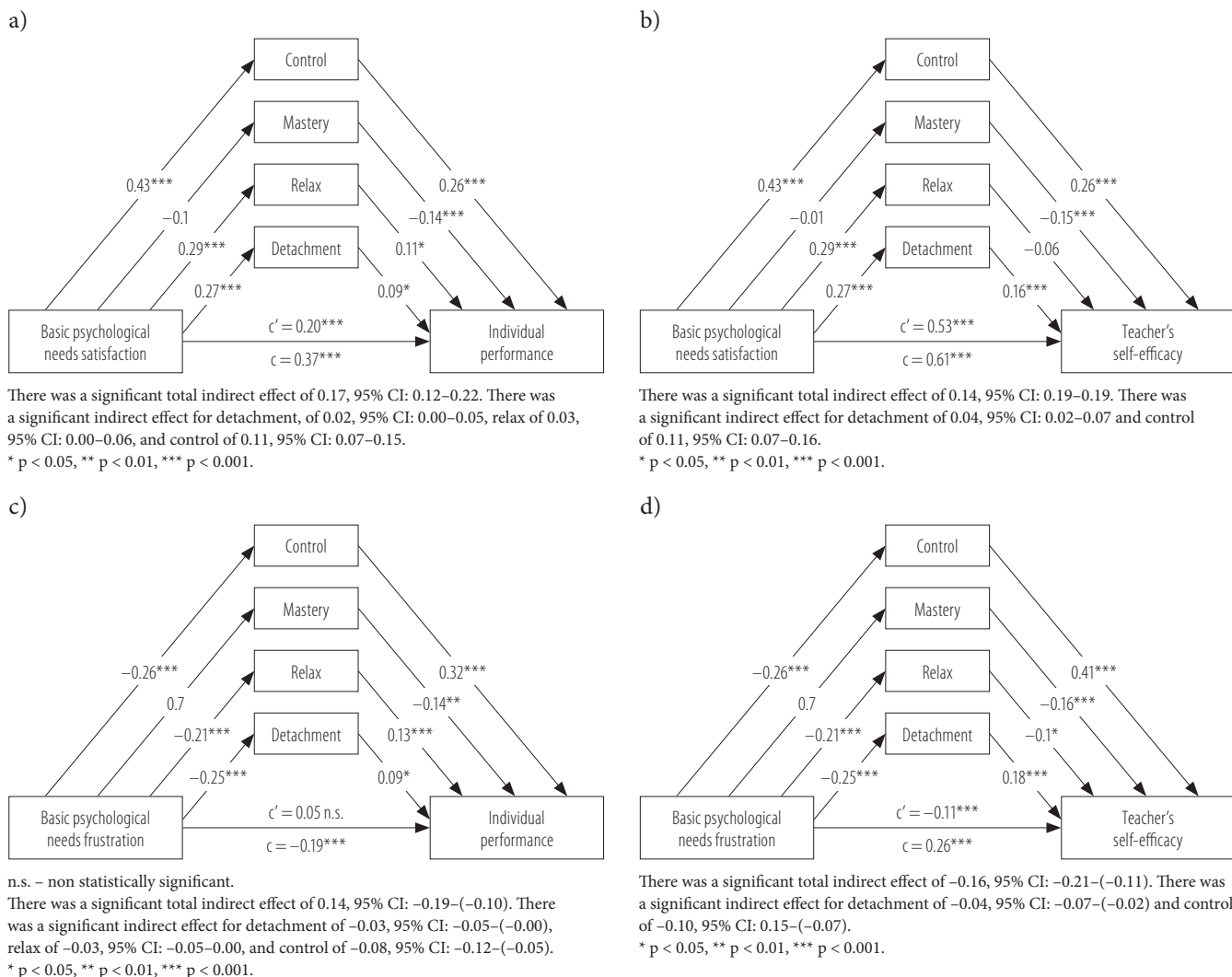


Figure 1. Standardized regression coefficients for the relation as mediated by recovery processes between: a) basic psychological needs satisfaction and individual performance, b) basic psychological needs satisfaction and teacher's self-efficacy, c) basic psychological needs frustration and individual performance, d) basic psychological needs frustration and teacher's self-efficacy

was weaker), even after excluding the indirect effect through the FTRP. This proves a well established relation between BPN satisfaction and performance, but also adds a new path of explaining it – the FTRP undertaken by teachers in their free time [28,39]. In case of needs frustration, the results prove that the relation between the needs frustration and teachers' performance was observed, but it remained significant (after including the mediating effect of the FTRP) only in case of self-efficacy, but not in the case of individual task performance, where it was completely mediated by the FTRP [39,60]. So how this unexpected difference can be explained? *Individual Work Performance Questionnaire* consisted of participants actual behaviors assessment (like how their planned or managed their time) and TSE was assessment of attitudes. When BPN

are frustrated, it means that there are actively deprived, for example through a conflict among teachers (relatedness frustration) or by not allowing the teachers to develop their skills (competence frustration) [13]. In such case the thoughts about these needs frustrating situations may occur during time, which could be used for recovery, and as a consequence makes it more difficult to detach from work or control your free time activities, which as a consequence directly impacts behaviors (IP). In case of self-efficacy, the direct relation between needs frustration and self-efficacy believe stays significant as the teachers still may consider (have such an attitude) that they are less efficacious because, for instance, the principal did not give them possibility to take part in training (competence frustration), and not only because they did not fully recover from stressors [13].

When it comes to specific mediation effects of FTRP between the BPN satisfaction and teachers' efficaciousness, most of the assumptions were confirmed. Out of 4 FTRP, control was the strongest mediator for both IP and TSE. As predicted, the teachers, who have more control over their free time, deal better with the division of their responsibilities and work-life balance, and it makes them more efficacious at work [41,42]. At the same time, BPN theory assumes that satisfaction of BPN causes more self-determination and being in control of one's choices and behaviors, including control over one's free time [13,50]. For the relation between BPN and IP 2 other significant mediators were detachment and relaxation. It seems that for behaviors like time planning and management (individual performance), physically getting rid of the stress (relax) and mentally (not thinking about work) were the most efficient way of increasing IP [49,54]. For the relation between BPN satisfaction and TSE, detachment (but not relaxation) also proved to be a significant mediator. Mastery, on the other hand, did not prove to be a mediator between BPN satisfaction and self-efficacy. One of the reasons for this result is that learning new things in spare time (mastery) in the teacher's occupation may be understood in a different way than in other professions. Teaching is stereotypically understood as transferring knowledge that the teacher already has. As a consequence, teachers may consider learning in their free time as „making up” the skills they do not, but should have, which decreases their self-efficacy. These differences need more studies to recognize the reasons behind them.

When it comes to mediation between BPN frustration and the teachers performance, the results were more varied. Three processes, namely control, relax and detachment were significant mediators between BPN frustration and IP, and as mentioned above, they fully mediated the relation. In other words, teachers whose BPN are frustrated had less control over their free time, less time to relax and were thinking about their work during time for recovery, which as a consequence made them act with higher efficacy. As it was mentioned, BPN frustration occurs through some active behaviors, for example through a very controlled process of education or imposed duties (autonomy frustration). In such case teachers have no control when and how they can use their free time (less control), they think about these difficult work situations (less detachment), and have less time for relaxation (less relax). These processes make it difficult for teachers to recover from stressors, and as a consequence they become less

efficacious in their work [41,46]. Similar results were obtained for BPN frustration and teachers self-efficacy relation, with control and detachment as main mediators of the relation, with the reservation of relaxation, which was not significant. Presumably, the reason behind this difference is that relaxation is mostly about restoring the energy, which is more important for actual behaviors (IP) than for beliefs and attitudes (TSE). When the energy is not restored, and in the moment of tiredness, the teachers may still believe they are productive (TSE) but their actual behaviors (IP) show that they do not perform as well as when relaxed [51,52]. Naturally, it is worth remembering that IP is still a self-observation measure, even though it concerns behaviors.

CONCLUSIONS

In summary, the findings demonstrate a connection between BPN and teacher performance and self-efficacy, both through direct and indirect pathways involving FTRP. These innovative results highlight that the way the teachers choose to use their free time for stress recovery can play a crucial role in maintaining their performance at work and keeping their self-efficacy attitude. Furthermore, this positive outcome appears to be initiated by the satisfaction of BPN.

Limitations and further research

Although the study was performed on a diverse sample of primary and high school teachers from different regions of Poland (representative group) and contained a sufficient number of participants, it would be good to replicate it with dual randomization of both schools and teachers. The cross-sectional results also do not allow to draw any conclusions regarding the dynamics between the examined constructs by the time factor and to formulate causality-based conclusions. Further research should focus on experimental or longitudinal studies in this domain.

Additionally, the REQ which was used in the study was still in experimental version (after the process of back translation, acceptance by the authors of original scale and primary analyses) and it would be wise to repeat the study with the fully adapted version of the scale. Further research is needed in order to investigate some of the interesting results which were not included in the hypotheses. It is also worth considering using other sources of data of teachers performance (e.g., students or principals reports), in order to strengthen the reliability of the measurement of this variable.

Author contributions

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Interpretation of results: Michał Szulawski, Łukasz Baka

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