A Meta-Analysis for Exploring the Diverse Causes and Effects of Stress in Teachers

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This study provides a correlational meta-analysis of 65 independently written or published studies on teacher stress between 1998 and 2003. We measured the relationships between teacher stress and numerous other constructs including coping, burnout, emotional responses, personality mediators, personal support, environmental structure, and background characteristics. A theoretical-empirical model of construct relationships investigated across studies was developed and n = 2,527 correlational effect sizes were used to estimate the empirical relationships between the operationalized theoretical constructs. Results showed that the strongest association of teacher stressors exists with negatively oriented emotional responses confirming the central role of teachers' coping mechanisms, personality mediators, and burnout potential according to our model of the stress cycle.

Key words: stress, coping, teacher burn-out, teacher emotional response

Cette recherche fournit une méta-analyse corrélationnelle de 65 études, rédigées ou publiées entre 1998 et 2003, sur le stress chez les enseignants. Les auteurs ont mesuré les relations entre le stress des enseignants et de nombreux autres construits, dont l'adaptation au stress, l'épuisement professionnel, les réactions émotionnelles, les personality mediators, le soutien personnel, la structure du milieu et les antécédents. Un modèle théorico-empirique des relations entre les construits a été élaboré et des valeurs d'effets corrélationnels de n = 2527 ont été utilisées pour déterminer les relations empiriques entre les construits théoriques opérationalisés. Les résultats démontrent que, pour les facteurs de stress chez les enseignants, l'association la plus importante se trouve du côté des réactions émotionnelles négatives, ce qui confirme le rôle clé des mécanismes d'adaptation au stress des enseignants, des personality mediators et du potentiel d'épuisement professionnel selon le modèle du cycle du stress qui a été utilisé.

Mots clés : stress, adaptation au stress, méta-analyse, enseignants.

Over the past ten years educational research has established that high teacher stress is associated with psychological distress, which may be mediated through different coping mechanisms and personality traits (Chan, 1998). Specifically, poor active coping abilities or an over-reliance of passive coping strategies may lead to negative emotional responses and, consequently, teacher burnout. A plethora of research on the different sources of stress and their eventual consequences in teachers and student teachers exists, and researchers have used varying methods in explaining the intricate relationships between sources of psychological stress and other intricately related constructs such as coping mechanisms, personality traits, emotional responses, environmental effects, and burnout.

This study investigates and summarizes the correlational evidence of the relationships between psychological stress and related constructs through a meta-analytic lens to synthesize and, more importantly, understand some general trends in the current research literature on teacher stress and to conceptually represent a model of teacher stress based on this literature. Specifically, this study focuses on the recent research literature on teacher and student teacher stress[1] between 1998 and 2003. In doing so, this study updates recent international research data on teacher stress and constitutes a modest step toward allowing other researchers to understand relationships between stress and other constructs within the stress cycle. This, in turn, is an attempt to aid them in responding to Guglielmi and Tatrow's (1998) paramount call for a shift toward more theory-based investigations that test causal models of teacher stress and health-related outcomes with more sophisticated research designs and measurement strategies, which can be facilitated by having an empirical sense of which construct relationships merit closer investigation.

TOWARD A THEORETICAL-EMPIRICAL MODEL OF STRESS

Numerous constructs have been identified as causes and effects of stress in different populations over the years. Moreover, numerous mediating factors may influence the relationships between variables in the nomological networks in which researchers place constructs. In

preparation for developing a meta-analytic framework, we examined, discussed, and synthesized existing theoretical stress models to map the empirical relationships and represent these studies into a finalized model of the stress cycle that we will present later. Because our meta-analysis focuses on a variety of relationships among numerous constructs, rather than on a few isolated relationships between few constructs within a larger framework, we wanted to have a conceptual model of teacher stress to augment and refine, based on the empirical relationships studied in the research we surveyed. Before presenting this model, however, we have described our understanding of stress and some of its related constructs, based on well-established existing research and theory.

Definition of Stress

Our understanding of stress originated in the empirical research of Derogatis (1987), who conducted his most recent research using the *Derogatis Stress Profile (DSP)*, a psychological questionnaire to measure individuals' stress dispositions. Derogatis based this questionnaire on Lazarus's (1966) social interaction theory of stress which consequently led us towards Lazurus's more recent research and theories of stress and coping. Lazarus and Folkman (1984) define stress as a particular interaction between the person and the environment, appraised or evaluated by the person as being taxing or exceeding his or her personal resources, and, as a consequence, disrupting his or her daily routines. According to Derogatis, stress may be defined as a state of psychological pressure influenced by three main sources or domains: personality mediators (constructs of time pressure, driven behaviour, attitude posture, relaxation potential, and role definition); environmental factors (constructs of vocational satisfaction, domestic satisfaction, and health posture); and emotional responses (constructs of hostility, anxiety, and depression). Derogatis accordingly explains that these three sources must be studied interactively to develop a comprehensive account of psychological stress.

Sources of Teacher Stress

Research has shown that teachers are exposed to a number of sources of stress. Kyriacou (2001) reports that the main sources of teacher stress stem from teaching students who lack motivation; maintaining discipline in the classroom; confronting general time pressures and workload demands; being exposed to a large amount of change; being evaluated by others; having difficult or challenging relationships with colleagues, administration, or management; and being exposed to generally poor working conditions. The author warns that the sources of stress experienced by a particular teacher will, of course, be unique to him or her and will depend on the precise complex interaction between his or her personality, values, skills, and circumstances. Moreover, coping mechanisms, personality traits, or the environment can interactively influence the degree to which stressful situations are being perceived, and influence the teacher's emotional and cognitive well-being.

Stress and Coping

Our approach to investigating coping mechanisms was grounded in Lazarus and Folkman's transactional model of stress and coping which focuses on how problematic events trigger stressful episodes. Lazarus and Folkman (1984) and, more recently, Admiraal, Korthagen, and Wubbels (2000) believe that daily events predict changes in psychosomatic health better than major life events. Lazarus and Folkman claim that when confronted by a given event, an individual engages in a process of primary appraisal whereby the event may be seen as stressful or benign, depending on the individual and the situation. Next, the individual will engage in a process of secondary appraisal. In this process, an individual will engage in the cognitive evaluation of his or her personal and environmental resources to deal with the stressful event. In other words, primary appraisal refers to the appraisal of the stressful character of the situation, whereas secondary appraisal refers to the evaluation of an individual's capacity to confront the situation. Both types of appraisals are cognitive processes that depend, to a large extent, on the appraising individual. Finally, their theoretical model predicts

that individuals will use cognitive and behavioural strategies of adaptation to deal with a given stressful event.

Chan (1998) points out that evidence of stress reactions, including ill-health and psychological distress, are not solely the result of external stressors but are also determined by a host of mediating variables, many of which are generally collected under the umbrella term coping mechanisms or strategies (Lazarus & Folkman, 1984; Scheier & Carver, 1985). Several classifications of coping strategies related to these processes have been proposed in the literature. For example, coping behaviour may be directed at managing or altering the problem that is causing the distress or at regulating the emotional response to the problem. The former is referred to as problem-focused coping and the latter as emotion-focused coping (Admiraal, Korthagen, & Wubbels, 2000). Problem-focused coping behaviour consists of confrontational and problem-solving strategies such as defining the problem, generating alternative solutions, weighing alternatives in terms of their cost and benefits, selecting one of them, and taking action. Emotion-focused coping behaviour consists of positive reappraisal and comparisons as well as defensive strategies such as avoidance, minimisation, and distancing. Individuals will use emotion-focused coping behaviour when they believe that they cannot do anything to modify environmental conditions. By contrast, they will utilize problem-focused coping behaviour when they see conditions as changeable. Similarly, Kyriacou (2001) defines direct action techniques as things that a teacher can do to eliminate the source of stress, and mental or physical palliative techniques as things that they can do to lessen the feeling of stress.

Stress and Personality

The literature also provides support that an individual's personality characteristics influence the degree to which he or she seeks social support when confronted by a stressful event (Houston & Vavak, 1991; Kobasa, Maddi, Ouccelli, & Zola, 1985; Watson & Clark, 1984). Guglielmi and Tatrow (1998) claim that personality traits, especially Type-A personality, and demographic characteristics, such as gender, age, and ethnicity, further mediate the ability to establish and maintain

supportive social networks and facilitative cognitive appraisal of the stressor. Stress is not viewed as being due exclusively to situational or personal characteristics but rather to the interaction between them. These findings reveal that the seeking of social support and the engagement in successful coping strategies can render an objective situation less demanding, threatening, or harmful to an individual.

Stress and Burnout

Individuals may experience burnout as a result of stress itself, a sudden breakdown of their mediating coping mechanisms, or an ineffectiveness of their mediating coping mechanisms over a long period of time (Guglielmi & Tatrow, 1998; Vandenberghe & Huberman, 1999). Burnout has traditionally been viewed as having three components: emotional exhaustion, depersonalization, and lack of personal accomplishment. Burnout is most frequently measured using *Maslach's Burnout Inventory* (Maslach & Jackson, 1981). A feeling of burnout is not a direct effect of repeated exposures to stressful situations, however. Burnout is mediated through various active and passive coping mechanisms, as discussed above, and is a result of the accumulation of positively and negatively oriented emotional responses that have arisen through coping mechanisms.

A THEORETICAL-EMPIRICAL MODEL OF TEACHER STRESS

Based on the above definition of stress as well as discussions, previous lectures of recognized scientific theories on stress, an overview of the literature on teacher stress, including both qualitative and quantitative methodologies[i], and an extensive review of theoretical teacher stress models, including their related constructs and definitions within this overview, we developed a model of key construct relationships. This model includes as its central component a representation of teachers' intra-individual process of reacting to stressful events (see Figure 1).

The most important premise of the model is that a teacher, reacting to outside events, is the core agent throughout the entire model. External stressors are present at the beginning of what we consider to be the

Figure 1. Theoretical-empirical model of construct relationships of teacher stress.

stress cycle. As for the other labels, the labelling process of the categories captures the general patterns of construct relationships and maps onto similarly signified latent variables in structural equation models (Chan, 1998). Specifically, we developed this model after reviewing and discussing major characteristics in both qualitative and quantitative research. Next, we qualitatively categorized individual variables and variable relationships in the empirical literature (i.e., in quantitative articles) on teacher stress surveyed for this paper, the reason why the stress cycle in the diagram is semantically tied to an environment. Apart from the sources of teacher stress (external stressors), the remaining part of the model appears to display universally applicable relationships that may be used in other domains for research.

     According to this model, intra-individual processes consist primarily of the experience and evaluation / appraisal of external stressful events that have their sources in different aspects of a teacher's professional / vocational life such as students, administration, colleagues, general work demands, and characteristics of the school environment (external stressors). In addition, external stressful events in a teacher's personal / domestic life such as problems in the relationship with a life partner or financial debt may also influence his or her overall emotional, cognitive, and behavioural state. Once an individual has appraised these events, he or she engages in active coping or passive coping strategies, perhaps both. The former can take the form of cognitive strategies (e.g., changing perspective, exerting self-control, rationally distancing oneself), behavioural strategies (e.g., setting limits for work, seeking advice from others, engaging in relaxation exercises), and emotional strategies (e.g., being calm, thinking positively) and also manifest themselves in individuals' physical responses or health posture. In contrast, passive coping mechanisms such as resignation, drinking, wishful thinking, and avoidance are characterized by a lack of direct engagement with the stressful event toward its resolution. As a result of the application, or lack thereof, of these coping mechanisms, or sometimes directly as a consequence of the stressful events, an individual experiences a host of emotional responses, which are either positively oriented such as hope, enjoyment, or passion, or are negatively oriented such as anxiety, frustration, depression, or even suicidal ideation. In addition, an

individual may experience strong feelings of satisfaction or dissatisfaction with his or her job and life situation more generally, which may influence this individual's commitment level to his or her work. Finally, then, individuals may experience different levels of emotional exhaustion, depersonalization, or personal accomplishment as facets of burnout. It is, of course, debatable whether the degree of satisfaction is causally prior or posterior to experiences of burnout, which will likely depend on an individual and a situation; we chose to place satisfaction prior to burnout because we viewed it as predominantly connected / related to emotional response.

The entire intra-individual situational process described so far is further mediated by relatively stable personality traits, so-called personality mediators (e.g., driven behaviour, attitude posture, relaxation potential, type-A behavior) that influence the strength of the relationships depicted in the core of the model. In fact, certain individuals may be more predisposed to external stressors because of their personality. Personality, therefore, accounts for what we consider to be the inner stressors in our model. Moreover, the relationships are mediated by the degree to which individuals feel supported, both in their vocational environment (e.g., by their bosses and colleagues) and their domestic environment (e.g., spouse and friends); these sets of factors are depicted as outward circles around the core path diagram. Further outward in the model, the relatively stable structural characteristics of the environment are represented such as the teachers' grade level, their average class size, or the type of school in which they are teaching. Similarly, background variables such as sex, educational qualifications, and years of experience are individuals' stable characteristics that may have some influence on the intra-individual process of dealing with stressful events.

This model does not account, per se, for the fluidity of individuals' responses to stressful events to distinguish between state and trait components of stress, a measure that would require the collection of longitudinal data on cohorts. Moreover, because the focus of this paper is the estimation of average correlational effect sizes for each of the displayed paths and hypothesized relationships, we are necessarily restricted to statements that aggregate effects over teacher groups and

situations. At the same time, our study is an important empirical step toward investigating in a relatively comprehensive manner the systemic nature of construct relationships between stress and other widely studied constructs. This model may, therefore, be applicable to other contexts or domains (e.g., managerial, medical, social) when trying to understand stress and its relationship with other constructs.

The organization of the variable sets in Figure 1 represents, partially, our primary focus on the core relationships between stress, the engagement of coping mechanisms, the experience of emotional responses and satisfaction, and the experience of burnout. In addition, it also describes the relative importance we ascribe to the different classes of constructs and concepts that are represented in the model. These factors lead us to the following hypotheses.

Research Hypotheses

We hypothesize that the relationship between stress and coping mechanisms as well as between coping mechanisms, emotional responses, and burnout is stronger than the influences that background variables have on the coping process. Similarly, considering the outer rings, we hypothesize that environmental structure variables will display weaker relationships with the intra-individual variables than the support structure variables or the personality mediator variables. At the same time, we believe that personality mediators and support variables display strong influences with the intra-individual relationships depicted in the core.

METHOD

The following section of this article describes our methodological steps to code variables and to compute average effect size measures in our meta-analysis.

Collection of Articles

We located relevant recent articles on stress though a computer search of international databases housed in North America such as PsychInfo,

Eric, Sociofile, Canadian Periodical Index, Index-Cpi.Q, Infotrac, Digital Dissertations, Current Contents, Ontario Scholars Portal, Francis (International Humanities and Social Sciences), and Merlot as well as through searches of the internet via Google, Metacrawler, and Yahoo. We also located articles in data banks housed outside North America such as the FisBildung in Germany and Repère in Canada and France.

We employed various permutations of keywords to track articles. Every search included the keywords "teachers" and "stress," while other searches included keywords such as "student teacher," "pre-service," "burnout," "coping," "anxiety," and "depression." We used the reference lists in all primary articles to perform a search of additional references within the sampling frame of interest until we found no new articles. We selected studies that investigated teacher stress in some form although, in several cases, the title did not necessarily indicate it (e.g., we included studies on teacher burnout, teacher coping, and teacher health if they were also investigating the relationship between these constructs and teacher stress). Finally, of the 211 studies initially identified, we kept only articles that contained quantitative research, thus excluding conceptual overview and synthesis articles as well as qualitative research because we could not use meta-analytic procedures for these studies. In addition, we eliminated articles that employed complex multivariate measures such as cluster structures because it was impossible to unambiguously define or assign effect sizes as measuring a single variable or a single relationship between pairs of variables.

We included research from refereed journal publications (n = 51), dissertations (n = 13), and refereed conference proceedings (n = 1) for a total of n = 65 independently written or published studies. Eleven of the studies were published in a language other than English (2 were in French, 2 were in Japanese, and 7 were in German); the Japanese studies were translated by trained bilingual graduate students, whereas the French and German studies were not translated because both authors are multilingual.[3]

Sample Characteristics

Table 1 shows some important characteristics of the samples included across the studies.

Table 1

Sample Characteristics across Studies

Study	Country	Teacher	Sample Size	Age Mean	Age (SD)	Female (%)	Male (%)	Exp. Mean	Exp. (SD)
Abel & Sewell (1999)	USA	Second.	98	---	---	86	14	15.35	8.56
Adams (2001)	USA	Second	364	---	---	64	36	---	---
Alkhrisha (2002)	USA and Jordan	Other	228	---	---	---	---	---	---
Anopchand (2000)	USA	Second	143	---	---	---	---	---	---
Antoniou et al.(2000)	Greece	Other	110	---	---	39	61	---	---
Avramidis et al.(2000)	UK	Primary	135	---	---	---	---	---	---
Bechen (2000)	USA	Both	300	---	---	---	---	---	---
Boehm-Kasper & Weishaupt (2002)	Germany	Second	1091	---	---	55	45	---	---
Cains & Brown (1998)	UK	Primary	76	---	---	---	---	1.00	---
Center & Callaway (1999)	USA	Other	151	---	10	85	15	---	8.60
Center &Steventon (2001)	USA	Other	149	---	---	---	---	---	---
Center (2001)	USA	Other	35	37	14	94	6	10.93	7.80
Chan (1998)	China	Second	415	31	8	55	43	7.78	7.46
Chan (2002)	Hong Kong	Second	83	24	3	72	28	---	---
Chan (2003)	Hong Kong	Other	83	24	3	72	28	---	---
Cheuk et al. (2002)	China	Second	180	---	---	---	---	---	---
Chi On (2001)	Hong Kong	Both	543	---	---	---	---	---	---
Conley & Woosley (2000)	USA	Both	371	---	---	73	27	---	---
Cousin (2000)	USA	Both	166	---	---	90	10	5.00	---
Davis & Wilson (2000)	USA	Primary	704	---	---	---	---	---	---
DeJesus & Conboy (2001)	Portugal	Both	25	42	---	88	12	18.00	---
Friedel & Dalbert (2003)	Germany	Primary	108	43	8	---	1	22.52	8.00
Griffith et al. (1999)	England	Both	780	---	---	76	24	---	---

Study	Country	Teacher	Sample Size	Age Mean	Age (SD)	Female (%)	Male (%)	Exp. Mean	Exp. (SD)
Griva & Joekes (2003)	UK	Second	166	38	---	52	48	12.40	---
Hawe et al. (2000)	New Zealand	Primary	353	---	---	85	15	---	---
Hemmings & Hockley (2001)	Australia	Primary	54	---	---	---	---	---	---
Ishofsky (1998)	USA	Both	43	---	---	---	---	---	---
Jacobsson et al. (2001)	Sweden	Both	928	43	---	---	---	---	16.40
Kittel & Leynen (2003)	Belgium	Second	128	44	9	---	---	19.90	9.80
Kumarakula singam (2002	USA	Primary	227	---	---	100	---	13.31	10.62
Lafave (2000)	USA	Primary	53	---	---	---	---	.	---
Mearns & Cain (2003)	USA	Both	86	40	11	76	24	13.88	11.20
Montgomery & Leonard (2003)	Canada	Both	106	---	---	72	28	---	---
Montgomery (2001)	Canada	Both	458	---	---	80	20	---	---
Murray-Harvey et al. (2000)	Australia	Both	---	---	---	---	---	---	---
Neuenschwader (2003)	Germany	Second	146	45	---	54	46	---	---
Pack (2000)	Canada	Other	40	---	---	---	---	19.00	---
Pascual et al. (2003)	Spain	Second	198	44	28	53	47	---	---
Peklaj & Puklek (2001)	Slovenia	Primary	---	---	---	---	---	---	---
Petrie (2001)	USA	Primary	382	---	---	---	---	---	---
Pisanti et al. (2003)	Italy	Second	169	48	8	64	42	21.00	---
Pithers & Soden (1998)	Australia & Scotland	Other	332	---	---	---	---	0.00	0.00
Pomaki et al. (2003)	Greece	Second	215	44	6	60	40	17.39	6.39
Rasku & Kinnunen (2003)	Finland	Second	373	46	10	69	31	18.40	10.70
Root (2001)	USA	Primary	74	---	---	---	---	---	---
Ryo & Koji (2003)	Japan	Both	710	---	---	---	---	---	---
Sakata et al. (1999)	Japan	Second	212	37	---	45	55	13.41	---
Sann (2003)	Germany	Second	297	48	9	46	54	20.30	9.10
Schmitz & Schwarzer (1999)	Germany	Other	140	---	---	58	42	---	---
Schmitz (2001)	Germany	Other	132	---	---	58	42	---	---

Study	Country	Teacher	Sample Size	Age Mean	Age (SD)	Female (%)	Male (%)	Exp. Mean	Exp. (SD)
Schmitz (2004)	Germany	Other	103	---	---	73	27	---	---
Schonfeld (2000)	USA	Both	184	---	---	---	---	---	---
Schonfeld (2001)	USA	Both	184	---	---	100	---	---	---
Sumsion & Thomas (2000)	Australia	Both	13	---	---	---	---	---	---
Thomas et al. (2003)	Australia	Primary	102	43	8	100	---	17.18	8.26
Van der Doef & Maes (2002)	Holland	Second	454	44	8	36	64	16.30	8.20
Van Dick et al. (1999)	Germany	Both	424	47	8	56	44	19.80	8.80
Van Zyl & Pietersen (1999)	South Africa	Second	66	---	---	---	---	---	---
Vandoan (1998)	USA	Primary	246	---	---	36	64	5.00	---
Verhoeven et al (2003)	Holland	Second	1878	---	---	42	58	16.80	---
Whitehead et al. (2000)	New Zealand	Primary	386	---	---	87	13	---	---
Winzelberg & Luskin (1999)	USA	Primary	21	25	---	71	29	0.00	0.00
Yagil (1998)	Israel	Primary	69	31	8	69	---	---	---
Yoon (2002)	USA	Primary	113	---	---	---	---	12.00	---
Yu (2002)	Hong Kong	Second	128	---	---	49	50	64.83	35.17

The mean sample size across studies was 265.8 with a standard deviation of 303.4, which arose from a few outliers in large-scale studies, and we computed this standard deviation based on 63 studies that reported the standard deviation. Using 36 studies, we found the mean percentage of females in the samples was 61.5 per cent with a standard deviation of 18.1 per cent, and the mean percentage of males in the samples was 38.3 per cent with a standard deviation of 18.0 per cent. Moreover, the mean average age of teachers in the samples was 42.1 years with a standard deviation of 5.8 years based on 22 studies that reported these data, and the mean average number of years of experience was 15.6 years with a standard deviation of 4.4 years based on 26 studies. We noted that 17 studies out of 65 (26.2%) used only elementary school teachers or student teachers, 20 out of 65 studies (30.8%) used only secondary school teachers or student teachers, and 17 out of the 65 studies (26.2%) used both types of teachers; the remaining 11 studies used teachers at other levels or did not provide this

information.   Therefore, the participants in the studies were largely
female, a reflection of the teaching profession internationally, generally
older (i.e., between 30 and 50 years of age), with substantial experience
(i.e., around 10 - 20 years), and generally elementary or secondary school
teachers.

Coding of Studies

We coded studies according to characteristics of the sampling frame and
stages, the experimental design structure, the population(s) sampled,
and the statistical methodologies utilized. We entered the information
from the studies in three different ways. First, because of the variability
in the measures employed across all studies, we created a data file that
contained each bivariate relationship in each study as a separate entry.
For each relationship, we entered the two variables as they were labelled
in the study along with the statistical technique used to compare them,
the effect size measure that was reported, and the degrees of freedom,
sample size, and p-value for the associated test. For studies that did not
report effect sizes or provided insufficient information, we   computed
data manually.

    We then reduced the original data file to a smaller number of studies
(n = 65) because for some studies only complex statistical models were
employed whose parameter estimates or effect sizes could not be
transformed to a correlation metric. The resulting data file contained $k =$
2,527 entries where, on the original metric; $k = 2,061$ effect sizes were
Pearson product-moment correlation coefficients; $k = 62$ were Spearman
correlation coefficients; $k = 6$ were Pearson point-biserial correlation
coefficients; $k = 134$ were independent-samples t-test statistics; and $k =$
264 were F-test statistics largely representing independent-samples t-test
statistics because they had 1 numerator degree of freedom. Because
constructs involved in the bivariate relationships varied, we developed
more global coding categories to summarize the effects of different
relationships that represent a single path in the theoretical-empirical
model depicted in Figure 1. Indeed, the statistical analyses presented in
the following sections are aimed at estimating the average zero-order
correlations between the variable pairs.

Creation of Variable Categories

After having entered all explanatory and response variables from all studies within our sampling frame, we recoded the variables according to the theoretically derived categories depicted in our model (see Figure 1), based on a detailed analysis of the study design descriptions. Hence, the highest-order categories corresponded to different sources of stress, different types of active and passive coping, different types of emotional responses, different facets of burnout, and different types of support, as well as personality mediators, environmental structure variables, and background variables.

    We were able to classify most variables into one of these categories. For example, if one study used the phrase 'educational qualifications' and another used the phrase 'educational level' while, at the same time, both studies measured the number of years that student teachers had in previous teaching-related experiences, we renamed both variables as 'years of experience' and assigned it to the category 'background characteristics.' Similarly, we relabelled categories such as 'financial stressors' and 'money stressors' as 'degree of financial stress' and assigned them to the category 'stress' nested within 'domestic.' We categorized constructs such as depression, suicidal ideation, and anxiety as negative emotional responses rather.than as internal stressors. In cases where we disagreed over classifications, we reached a final classification by going back to earlier studies that contained a theoretical model with these variables in them or by consulting other empirical research articles outside of our sampling frame.[4]

Statistical Analysis

We analyzed the correlational data using the methods outlined in Fern and Monroe (1996), Lipsey and Wilson (2001), Hedges & Olkin (1985), and Hunter and Schmidt (1990). The structure of effect-size statistics varies, of course, by the statistical model for which the effect size is reported as a measure. Nevertheless, most effect sizes can be readily transformed from one metric to another (e.g., Fern & Monroe, 1996). Because most of our effect sizes were zero-order Pearson product-

moment correlation coefficients based on two variables measured on interval scales, we chose to transform the remaining effect sizes onto the correlation metric, consequently eliminating a few effect sizes such as unstandardized and standardized regression coefficients in multiple linear regression models or structural equation models because they represent partial effects and are computed with other variables included in the model.

For each correlation coefficient so obtained, we recorded the number of samples on which they were based. Because of the variability in the measures we investigated, these samples are not, technically, statistically independent because multiple correlation coefficients from the same study that index different bivariate relationships between different construct pairs were included in the computation of the same average. However, whether the violation of the statistical independence would lead to serious biases in the computation of the average effect size measures and their standard errors is debatable because it depends on the amount of dependence. To ensure that sample sizes were non-inflated, we recorded only the total sample size for all independent samples across the studies.

For each study, we recorded the reliabilities of the psychometric measures because our original intention was to correct the involved coefficients for unreliability. Unfortunately, empirical reliability estimates were not reported for more than half of the scales and subscales used across the studies; we did not complete this correction. However, the median reliability for 380 reported subscale reliabilities was 0.81 (5th percentile = 0.60 and 95th percentile = 0.92) and all reported reliabilities were internal consistencies measured by Coefficient α. Based on these data, we estimated the effect that corrections for unreliability resulting in disattenuated coefficients would have on individual correlational effect sizes to get a sense of the effect of unreliability correction if all reliability values had been available. We considered the 25th, 50th, and 75th percentile of the observed reliability distribution as three representative conditions and assumed that both variables on which an observed correlation coefficient was based have the same reliability. For these cases, Table 2 shows how the difference between

uncorrected and corrected effect sizes varies, depending on the size of the observed correlation and the reliabilities of the variables involved.

For small effect sizes, this difference is generally no larger than about 0.05. For medium correlational effect sizes and a typical scale reliability of 0.81, this difference is no larger than about 0.10 and is, of course, even less if the variable reliabilities are higher, and more if the variable reliabilities are lower. For large correlational effect sizes and a typical scale reliability of 0.81, this difference is generally no larger than about 0.15. If one compares these idealized cases with results of corrections for unreliability and range restriction in other meta-analyses from journals such as *Review of Educational Research*, one can relatively safely assume that the difference between the uncorrected and the corrected correlation coefficients would generally be around 0.05 or 0.10 with corrected values being, of course, higher than the uncorrected ones. Because most of the observed correlations in this study were low, as will be discussed below, the difference between uncorrected and corrected correlations in this meta-analysis would most likely not be striking; we therefore did not do any comparison.

Table 2

Theoretical Values of Correlational Effect Sizes Corrected for Unreliability

Effect Size	r	$\alpha = .72$		$\alpha = .81$		$\alpha = .86$	
		rc	(rc − r)	rc	(rc − r)	rc	(rc − r)
Small	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.05	0.07	0.02	0.06	0.01	0.06	0.01
	0.10	0.14	0.04	0.12	0.02	0.12	0.02
Medium	0.15	0.21	0.06	0.19	0.04	0.17	0.02
	0.20	0.28	0.08	0.25	0.05	0.23	0.03
	0.25	0.35	0.10	0.31	0.06	0.29	0.04
	0.30	0.42	0.12	0.37	0.07	0.35	0.05
	0.35	0.49	0.14	0.43	0.08	0.41	0.06
	0.40	0.56	0.16	0.49	0.09	0.47	0.07
Large	0.45	0.63	0.18	0.56	0.11	0.52	0.07
	0.50	0.69	0.19	0.62	0.12	0.58	0.08
	0.55	0.76	0.21	0.68	0.13	0.64	0.09

Effect Size	r	α = .72		α = .81		α = .86	
		rc	(rc − r)	rc	(rc − r)	rc	(rc − r)
	0.60	0.83	0.23	0.74	0.14	0.70	0.10
	0.65	0.90	0.25	0.80	0.15	0.76	0.11
	0.70	0.97	0.27	0.86	0.16	0.81	0.11
	0.75	1.00	0.25	0.93	0.18	0.87	0.12
	0.80	1.00	0.20	0.99	0.19	0.93	0.13
	0.85	1.00	0.15	1.00	0.15	0.99	0.14
	0.90	1.00	0.10	1.00	0.10	1.00	0.10
	0.95	1.00	0.05	1.00	0.05	1.00	0.05
	1.00	1.00	0.00	1.00	0.00	1.00	0.00

Notes: r = Observed correlational effect size, rc = Correlational effect size corrected for unreliability, α = Coefficient α used as a measure of reliability (i.e., internal consistency).

The correction is based on the correction formula $r_C = \dfrac{r}{\sqrt{\alpha_1 \alpha_2}} = \dfrac{r}{\alpha}$. It is assumed that both variables have the same reliability.

Next, we constructed confidence intervals for the correlation coefficients. The correlation coefficients were first transformed to the standard normal metric using Fisher's z transformation, which possesses superior statistical properties, and the standard errors, weights, and 95 per cent confidence interval limits were subsequently computed in that metric. Finally, we transformed the confidence interval limits back to the original correlation metric (see, e.g., Lipsey & Wilson, 2001, p. 72, for the formulas). The following section now presents a summary of the major associations found between indicators of the constructs included in our model.

RESULTS

We computed average correlation coefficients for all pairs of variables subsumed under the higher-order construct classification categories depicted in Figure 1; Table 3 shows the resulting average correlational effect sizes.

Table 3

Correlation Matrix with Average Correlational Effect Sizes

	Stress	Active Coping	Passive Coping	Emotional Responses	Burnout	Personality Mediators	Support	Environment Structure	Background
Stress	1	N = 6280 K = 179	N = 1761 K = 25	N = 6254 K = 128	N = 4453 K = 124	N = 7941 K = 99	N = 5798 K = 61	N = 5166 K = 92	N = 15360 K = 133
Active Coping	.2025 (.1942, .2107)	1	N = 1761 K = 41	N = 3274 K = 92	N = 4217 K = 123	N = 5562 K = 77	N = 4966 K = 55	N = 2491 K = 24	N = 13358 K = 93
Passive Coping	.0751 (.0475, .1025)	.1544 (.1327, .2759)	1	N = 1626 K = 17	N = 1626 K = 27	N = 1540 K = 7	N = 1540 K = 8	N = n/a K = n/a	N = 6950 K = 16
Emotional Responses	.2512 (.2413, .2611)	.0500 (-.0628, .1615)	.0950 (.0611, .1287)	1	N = 2447 K = 69	N = 5402 K = 79	N = 3910 K = 42	N = 1446 K = 18	N = 10267 K = 57
Burnout	.2673 (.2565, .2780)	.2685 (.2575, .2793)	.0858 (.0583, .1131)	.3977 (.3846, .4106)	1	N = 4821 K = 49	N = 3700 K = 39	N = 3112 K = 33	N = 12464 K = 116
Personality Mediators	.2535 (.2433, .2635)	.1624 (.1489, .1760)	.1031 (.0531, .1527)	.3033 (.2080, .3930)	.2746 (.2600, .2890)	1	N = 4837 K = 24	N = 2967 K = 19	N = 11667 K = 18
Support	.2604 (.2475, .2731)	.1503 (.1355, .1650)	.0608 (.0105, .1108)	.2671 (.2495, .2844)	.2357 (.2188, .2525)	.2302 (.2095, .2507)	1	N = 549 K = 8	N = 9683 K = 28
Environment Structure	.1914 (.1806, .2021)	.2067 (.1867, .2265)	n/a	.2772 (.2488, .3052)	.1781 (.1609, .1951)	.2225 (.2047, .2401)	.3342 (.2991, .3683)	1	N = 448 K = 3
Background	.1120 (.1035, .1205)	.0909 (.0820, .0999)	.1292 (.1085, .1497)	.0631 (.0506, .0756)	.0728 (.0642, .0813)	.1199 (.1037, .1361)	.0616 (.0438, .0794)	.1400 (-.0634, .3322)	1

Notes. Values in the lower off-diagonal are average effect size statistics on a correlation metric with 95% confidence intervals underneath. Values in the upper-off diagonal are the total sample size of all independent samples (N) and the number of effect sizes on which the averages are based (K). *n/a* = not applicable due to the fact that no correlations were observed for this construct pair.

The upper off-diagonal of Table 3 shows the total sample size of all independent samples (N) and the number of effect sizes on which we based the averages (K), whereas the lower off-diagonal shows the average effect size statistics on a correlation metric with their respective 95 per cent confidence intervals. The total number of correlations between variables from the nine categories (i.e., stress, active coping, passive coping, emotional responses, burnout, personality mediators, support, environmental structure, background characteristics) utilized across the 64 studies was $k = 2,023$. The average absolute correlation size was 0.19 with a standard deviation of 0.08. All average correlations are significant at an individual $\alpha = .05$ level because the corresponding 95 per cent confidence intervals do not contain 0, with the exception of the average correlation between active coping and emotional responses ($\bar{r} = 0.05$; 95% CI = [-0.06,0.16]) and the average correlation between background characteristics and environmental structures ($\bar{r} = 0.14$ [-0.06,0.33]).

According to Cohen (1988), correlations of less than or equal to 0.10 can be considered small whereas correlations of more than 0.40 can be considered large although no definitive classification and labelling exists; therefore, the linguistic descriptors in the following are somewhat imprecise. Results from Table 3 indicate that average correlations between external stressors such as student misbehaviour and workload demands and others constructs are, generally, weak to moderate with typically only about 5 per cent and 15 per cent of shared variance between variable pairs. External stressors are most highly correlated with burnout ($\bar{r} = 0.27$; 95% CI = [0.26,0.28]), support variables ($\bar{r} = 0.26$; 95% CI = [0.25,0.27]), personality mediator variables ($\bar{r} = 0.25$; 95% CI = [0.24,0.26]), and emotional response variables ($\bar{r} = 0.25$; 95% CI = [0.24,0.26]) and less strongly correlated with active coping ($\bar{r} = 0.20$; 95% CI = [0.19,0.21]), environmental structure variables ($\bar{r} = 0.19$; 95% CI = [0.18,0.20]), and background variables ($\bar{r} = 0.11$; 95% CI = [0.10,0.12]); the lowest average correlation was found for passive coping ($\bar{r} = 0.08$; 95% CI = [0.05,0.10]). In other words, external stressors may be moderately influencing burnout directly, with support from family and other colleagues playing a mediating role with similarly moderate effects.

We have attributed an important central role to emotional responses because they are moderately to highly correlated with several other variables. The majority of emotional response variables that have been empirically investigated are negatively orientated (e.g., distress, anxiety, depression), implying, for example, that the average correlations between external stressors and these responses primarily reflect an exposure to stressful events and lead to negative experiences for teachers, be they mediated through coping mechanisms or not, and that these responses, in turn, may lead to different types and magnitudes of burnout. With emotional response variables, average correlations were moderate to high in the frame of reference of the average correlations observed here. Specifically, we observed a high average correlation between emotional response variables and burnout ($\bar{r} = 0.40$; 95% CI = [0.38,0.41]), showing that the degree in which teachers emotionally respond to stressful events and how satisfied they are as a consequence, either mediated through coping mechanisms or not, has a strong influence on the degree of burnout they experience. We observed moderate average correlations between emotional responses and personality mediator variables ($\bar{r} = 0.30$; 95% CI = [0.21,0.39]), suggesting that the way teachers emotionally respond to a variety of stressful situations is closely tied to the relatively stable personality traits that mediate their responses according to the stress cycle. Emotional response variables were also moderately correlated with environmental structure variables ($\bar{r} = 0.28$; 95% CI = [0.25,0.31]), and support variables ($\bar{r} = 0.27$; 95% CI = [0.25,0.28]), indicating that these factors also influence quite strongly how people emotionally respond to stressful events, which, in turn, influences the degree of burnout they experience. Put simply, this shows that the subjectively perceived quality of the environment and the support structures available to individual teachers, both at home and at work, are important for dealing with stressful situations. In this context, future induction studies considering the relationship between mentoring and stress may reveal relevant findings because the former may act as a buffer against burnout. Finally, as seen with active and passive coping, the average correlation between emotional responses and background variables ($\bar{r} = 0.06$; 95% CI = [0.05,0.08]) was low.

In terms of active coping, average correlations were generally weak to moderate, and we found that active coping was most strongly correlated with burnout ($\bar{r} = 0.27$; 95% CI = [0.26,0.28]). We found weaker correlations between active coping and environmental structure variables ($\bar{r} = 0.21$; 95% CI = [0.19,0.23]), personality mediator variables ($\bar{r} = 0.16$; 95% CI = [0.15,0.18]), support variables ($\bar{r} = 0.15$; 95% CI = [0.14,0.17]), and passive coping ($\bar{r} = 0.15$; 95% CI = [0.13,0.27]). Finally, extremely weak correlations exist between active coping and background variables ($\bar{r} = 0.09$; 95% CI = [0.08,0.10]) as well as emotional response variables ($\bar{r} = 0.05$; 95% CI = [-0.06,0.16]). Thus, how one actively copes through exercise (e.g., one's health posture), concrete behavioral strategies, cognitive planning, or through using appropriate emotional responses in the face of various stressors may moderately determine if one will indeed feel emotionally exhausted, depersonalized, or not accomplished. Yet, at the same time, the degree to which one engages in active coping strategies does not vary systematically with background characteristics and does not systematically predict the emotional responses to stressful events, even though these are, in themselves, moderately correlated to stressful events as a cause and burnout as a result. In terms of passive coping, average correlations were generally low. Interestingly, the construct that most strongly correlated with passive coping was background characteristics ($\bar{r} = 0.13$; 95% CI = [0.11,0.15]), showing that, for example, there are differences in which people with different levels of teaching experience cope passively even though that, in itself, does not strongly influence the manner in which they internally mediate the stressors.

In terms of personality mediators, average correlations are similarly moderate as shown by, for example, the average correlations between personality mediator variables and burnout ($\bar{r} = 0.27$; 95% CI = [0.26,0.29]), support variables ($\bar{r} = 0.23$; 95% CI = [0.21,0.25]), and environmental structure variables ($\bar{r} = 0.22$; 95% CI = [0.20,0.24]). Moreover, the average correlation between personality mediator variables and background variables is low ($\bar{r} = 0.12$; 95% CI = [0.10,0.14]), showing that personality traits do not vary systematically with stable background characteristics such as sex.

In terms of support variables, average correlations varied by the construct they were related to. For example, although a moderate average correlation exists between support variables and environmental structure variables ($\bar{r} = 0.33$; 95% CI = [0.30,0.37]), only a low average correlation exists between support and background characteristics ($\bar{r} = 0.06$; [0.04,0.08]), showing that the perception of available support for individual teachers does not vary systematically with background characteristics such as sex or educational level. Moreover, the average correlation between background characteristics and environmental structure variables is low ($\bar{r} = 0.14$; 95% CI = [-0.06,0.33]), but is, at the same time, the highest correlation between background characteristics and other constructs.

Findings for Research Hypotheses

Based on the results presented so far, one can observe that the empirical support for our hypotheses was, generally, only weak. Specifically, only moderate associations exist between external stressors and burnout, personality mediators, negatively or positively oriented emotional responses including satisfaction and dissatisfaction, and support variables as well as between emotional responses and burnout. Although background characteristics did not seem to strongly affect other components within the stress cycle, the structure of the teaching environment (environmental structure) and personality mediators were generally relatively highly correlated with other components within the stress cycle, given the average correlations observed in this study. Within the core of the model, it became clear that only some support occurred for the influence of active coping strategies as effective mediators for influencing the emotional responses and that no support occurred for the effectiveness of passive coping strategies generally. As expected, stress levels correlated positively with other variables in the stress cycle, but not always as strongly as expected.

To summarize some of the central average correlations discussed above, Figure 2 shows the theoretical-empirical model described earlier with selected effect sizes indicated. Note that the numbers in Figure 2 are
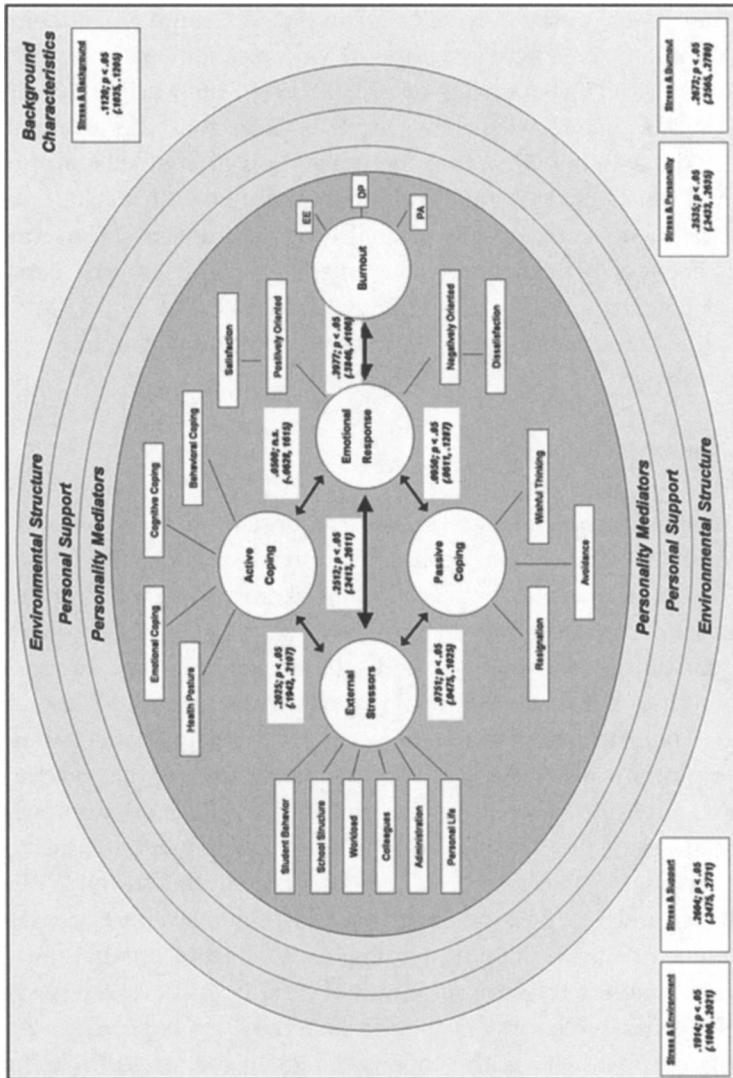
Figure 2. Theoretical-empirical model of construct relationships of teacher stress with selected average correlations shown.

selected average zero-order correlations as discussed above and not coefficients in a structural equation model, which is beyond the scope of this paper.

One may gather from the results that follow that emotional responses, personality mediators, support variables, and burnout play, not surprisingly, a central role in the manner in which teachers respond to external stressors. In particular, this may point to the importance to examine emotions in conjunction with external stressors in future studies to better understand the effects of external stressors on negative emotions and, possibly, resulting in burnout. Indeed our results confirm Goleman's (1995) theory of emotional intelligence because the results presented here suggest that emotions have a more central role for understanding the intricate relationship between stress, burnout, personality, and support variables.

There are, of course, limitations to this study. If the correlation coefficients were disattenuated and corrected for range restriction, their absolute values would change making the corrected observed effect sizes somewhat higher. In addition, it might be argued that there could be some disagreement concerning the labelling of some of the categories if the same studies were handed to other researchers, but the consensus approach with multiple researchers used here coupled with a continual integrative look at the literature to derive at final classifications makes us confident that the classifications would be rather stable.

Implications

The results of the present study may be useful for researchers in other fields trying to better understand the relationship between external stressors, negative emotions, personality mediators, support variables and, most importantly, burnout. Indeed, understanding and uncovering negative emotions related to external stressors is the first step towards a better performance, a higher degree of professional satisfaction, and, consequently, a higher level of teacher retention.

CONCLUSION

Our study highlights the importance of considering the relationship between stress and negative emotions, the latter leading possibly to burnout which is costly for both individuals and society. The results of our study and our model should give educators and other related professionals in the managerial or medical field a clearer vision of stress, coping, and burnout.

NOTES

[1] We use the term teacher stress and not student teacher stress because most of the studies found concerned the former.

[2] Only research with quantitative methodology/data was used to refine our model after we initially conceived/constructed our model, based on our overview of qualitative and quantitative studies.

[3] The studies used in this meta-analysis are available from the authors.

[4] In the future, it would be important to investigate the inter-rater reliability of the classifications because the current ones are based only on the expertise of the two principal researchers.

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