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REVIEW ARTICLE

Assessing Teacher Appraisals and Stress in the Classroom: Review of the Classroom Appraisal of Resources and Demands

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Abstract Stress research increasingly emphasizes the role of appraisal in determining which events are perceived as stressful. The Classroom Appraisal of Resources and Demands (CARD) was developed to measure teachers' appraisals of their classroom demands and resources in order to assess their risk for experiencing occupational stress. The present purposes are to review the literature identifying appraisals as a key determinant of stress, to describe the development of the CARD, and to provide meta-analytic results from 18 studies comparing CARD scores to the following variables: teacher's job satisfaction and occupational commitment, burnout symptoms, stress prevention resources, and challenging student demands. Results suggest moderate effects for associations between the CARD and these constructs, and implications for educational policy aimed at reducing turnover and increasing teacher and student welfare are discussed.

Keywords Teacher · Stress · Vocational concerns · Job satisfaction · Coping · Retention

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As early as 1977, Kyriacou and Sutcliffe recognized the impact of stress on teachers and defined it as "a response by a teacher of negative affect …as a result of the demands made upon the teacher in his role as a teacher" which includes "the degree to which the teacher perceives that he is unable to meet the demands made upon him" (p. 299). In subsequent years, teacher stress has received considerable attention (c.f., Bibou-Nakou, Stogiannidou, and Kiosseoglou 1999; Brouwers and Tomic 2000; Eskridge and Coker 1985; Friedman 2006; Sutton, Mudrey-Camino, and Knight 2009), and it is implicated in the high level of attrition occurring in the US teacher workforce (McCarthy et al. 2012c).

While teacher stress is widely recognized as a primary factor in causing turnover (Ingersoll 2012), research over the past 30 years focuses mainly on workforce considerations (Boyd, Lankford, Loeb, and Wyckoff 2005; Johnson 2006; Ladd 2011; Zellars et al. 2004), such as class size (French 1993) and administrative burdens (Moriarty, Edmonds, Blatchford, and Martin 2001). This line of inquiry follows the historical trend of educational policy analysis and research by examining "inputs" (class size, administrative climate) that are presumed to lead to certain "outputs," such as teachers' satisfaction and occupational commitment (Hanushek 2008; Monk 1988). This education production function approach is followed in teacher job satisfaction and retention research as well (cf. Ingersoll 2001; Liu 2007; Liu and Ramsey 2008). These models, relying on surveys, regularly consider teachers' perceptions of school climate as the genuine conditions of the school rather than accounting for the perceptual nature of their responses. Conflating perceptions of environment with actual school characteristics, this research suggests a theoretical leap of causation—namely that reported workplace conditions mitigate teacher professional commitment. Conversely, examining teachers' responses as their intended perceptions (appraisals) allows researchers to consider a more nuanced model for the risk of occupational stress.

A key component of teacher stress is not just macro workforce factors but the individual appraisals teachers make of their own classroom environment (Kyriacou and Sutcliffe 1977). According to this perspective on stress, high classroom demand levels become particularly stressful when teachers also appraise these demands as exceeding their resources for coping (Lazarus and Folkman 1984). Accurate assessment of teachers' appraisals of their classroom demand levels and resources could provide critical information about which teachers are most vulnerable to stress, even in similar school environments, that administrators and policymakers can use in improving the lives of teachers and their students.

Goals of Paper

The purpose of this paper is to examine literature suggesting the importance of appraisals in the stress process and to review research using the Classroom Appraisal of Demands and Resources (CARD), which was developed to assess teacher stress by measuring appraisals of classroom demands and resources (Lambert, McCarthy, O'Donnell, and Wang 2009). The primary theoretical foundation for the CARD is Lazarus and Folkman's (1984) transactional model of stress, which posits that we can predict teacher stress by measuring perceptions of her or his classroom demands vis-à-vis her or his classroom resources, although this specific proposition has not been tested empirically (Hobfoll 1989). We will then offer a rationale for which constructs have been examined in studies using the CARD: teacher satisfaction and occupational commitment, burnout, teacher resources, and challenging student demands. This research was conducted to provide validity evidence for the CARD, to demonstrate that teacher perceptions of the classroom

environment can be measured in a manner consistent with transactional models of stress, and to show that this measurement approach is relevant to variables typically examined in education production function research. Following this review, meta-analysis results summarizing 18 CARD studies will be presented. We conclude with implications for school professionals and policymakers, as well as limitations of current studies using the CARD and suggestions for future research.

The Role of Appraisal in Stress

Lazarus and Folkman's (1984) appraisal model of stress is the most well-accepted and commonly cited of all approaches to understanding stress (Hobfoll, Schwarzer, and Chon 1998). According to Folkman, Lazarus, Dunkel-Schetter, DeLongis, and Gruen (1986), "cognitive appraisal is a process through which the person evaluates whether a particular encounter with the environment is relevant to his or her well-being, and if so, in what ways (p. 992)." Lazarus (2001) wrote that he chose the term appraisal, originally used by social psychologists studying cognition and emotion, because it most accurately captured the cognitive evaluation process that occurs when life demands are encountered. He believed we appraise demands placed upon us according to their particular significance for our well-being and our estimation of whether we can cope with the demand successfully. However, both Hobfoll (1989) and Moore (2006) have noted that despite the many studies utilizing transactional models, none have attempted to measure the essential proposition that stress results from an imbalance of perceived demands vis-à-vis resources. Hobfoll (1989) described the following measurement challenge with transactional models,

"To test the model, the units of coping resources must be compared to the units of demands for balance or imbalance to be judged. No attempt has been made to develop such a system of equivalent units, no doubt because it would be an extremely difficult task. Without such units, however, the model remains a general conceptual framework, but one that may never be directly tested" (p. 515).

Other than the research with the CARD presented here, our review of the literature has not identified other attempts at comparing resources to demands as suggested by Hobfoll (1989). A central premise of transactional theory is that appraisal is but one of two complimentary processes: viewing events as realistically as possible while also putting the best possible light on situations to maintain hope and cope as effectively as possible (Lazarus 2001). As he put it, "appraisal is a compromise between life as it is and what one wishes it to be, and efficacious coping depends on both (p. 41)." Coping behaviors, which are not measured by the CARD, are defined as a distinct and separate process that refers to cognitive and behavioral efforts to manage or mitigate demands after an event is appraised as signaling threat and necessitating coping (Folkman et al. 1986). The type of coping employed, according to Larzarus (2003), is dependent on the results of the appraisal process, which includes harm appraisal (something negative has already occurred), threat appraisal (something negative is imminent), and challenge appraisal (confidence that a demand can be overcome by deploying coping resources).

Appraisals therefore set the stage for the use of coping strategies, which occur after stressors have been engaged. According to the transactional model of stress, there are two main types of coping strategies: emotion-focused and problem-focused (Lazarus and Folkman 1984). Problem-focused coping is directed at the stressor directly (for example, a teacher directly addressing a student's misbehavior), and emotion-focused coping helps individuals deal with

the emotions triggered by the stressor (for example, a teacher using deep breathing before addressing a student's misbehavior). Other taxonomies for classifying coping strategies exist and have been the subject of study and debate for decades (see Skinner, Edge, Altman, and Sherwood, 2003, for a review).

Lazarus and Folkman's (1984) transactional theory is one of several major balance models of the stress process (Meurs & Perre, 2011), which all assume that stress results from imbalances in demands and resources. Hobfoll's (1989) conservation of resources model (COR) is another example of a balance model identified by Meurs and Perre (2011), which focuses on threats to accumulated resources as a key determinant of stress. While Hobfoll has important disagreements with Lazarus and Folkman's model and its emphasis on appraisals (see Hobfoll 1989), Meurs and Perrewe (2011) maintain that COR is a balance theory in that threats to resources come from the magnitude of environmental demands. A similar emphasis on the role of balancing demands and resources is seen in the job demands-resources model (JD-R) (Bakker and Demerouti 2007), which contends that job stress is caused by high levels of demands unless offset by relevant resources, particularly those having to do with control over the work environment.

Balance models such as Lazarus and Folkman's (1984) have been critiqued for focusing mainly on demands as a source of stress, as opposed to opportunities for challenge and growth. For example, given theory suggesting that appraisals can result in confidence in the ability to cope with challenging life circumstances (challenge appraisals), other researchers have explored the balance of demands—that a demand can be viewed as positive challenges or negative hindrance (Podaskoff et al. 2007). Further, researchers such as Feuerhahn, Bellingrath, and Kudielka (2013) have examined the buffering effect of matching specific types of job demands to appropriate job resources. This research is founded on the Demand-Induced Strain Compensation (DISC; de Jonge & Dormann 2006) model, which maintains that all demands, resources, and stress reactions can be classified as emotional, cognitive, or physical and that maximal buffering of stress takes place when demands are matched with corresponding resources. Among a sample of German teachers, Feuerhahn et al. (2013) found support for this theory by matching specific types of teacher demands and specific resources, which allowed for better prediction of stress-related emotions using a longitudinal design.

While research into the positive aspects of challenges and alternative frameworks for conceptualizing how demands and resources interact offer considerable promise for more comprehensive models of stress, it is our contention that two important aspects of models such as Lazarus and Folkman (1984) need further examination. First, as Hobfoll (1989) and Moore (2006) noted, research has not attempted to measure the essential proposition of transactional models that teacher stress could result from an imbalance of perceived classroom demands vis-à-vis classroom resources. Second, in order to reliably measure this central construct of transactional models, the CARD was developed to assess teacher appraisals of their unique work context, specifically classroom demands and resources. In order to examine these two propositions further, we will review research evaluating teacher appraisals and the development of the CARD measure.

Classroom-Specific Demand and Resources

Recent research with teachers suggests that appraisals of the classroom environment are an important determinant of whether teachers will experience stress and burnout (Chang 2009;

Kokkinos, Panayiotou, and Davazoglou 2005; Steinhardt et al. 2011). As was noted above, this perceived imbalance is what contributes to their stress and vulnerability to job dissatisfaction, emotional exhaustion, and burnout (Klassen and Chiu 2011; López, Castro, Santiago, and Villardefrancos 2010). Our conceptualization of key elements of the appraisal process with teachers is summarized in Fig. 1.

As can be seen in Fig. 1, a number of factors can potentially impact the teacher's experience of the classroom environment, including individual factors (their level of experience and personal coping resources) and broader contextual factors (such as their school climate and structural characteristics). Following Lazarus and Folkman's (1984) theory, teachers' appraisals of the classroom environment are modeled in the figure as primary appraisals of classroom demands, and secondary appraisals are modeled as appraisals of classroom resources. As is further shown, primary and secondary appraisals converge to determine whether the teacher-classroom transaction is regarded as primarily stressful (containing the possibility for harm) or challenging (having the possibility for challenge and optimal functioning). This is represented in the center of figure, in which we draw attention to the need in current research for an Appraisal Index—in other words, an indicator of whether a significant amount of discrepancy in demands and resources exists for a teacher in their overall classroom context (see following section describing the development of the CARD).

This model, drawn from major tenets of transactional models, posits that teachers appraising overall classroom resources as equal to, or exceeding, classroom demands will experience less stress and therefore be more satisfied with their jobs and committed to the teaching

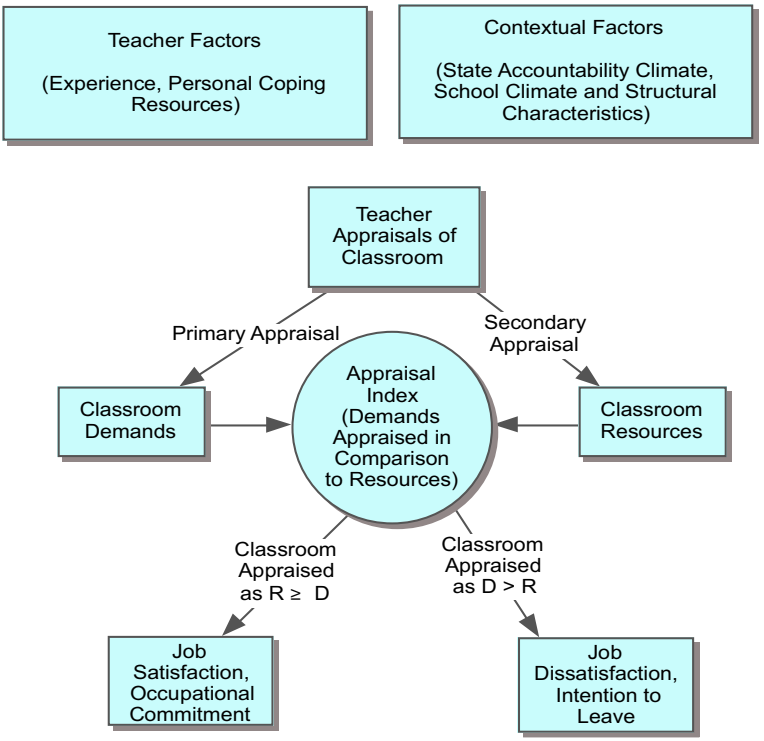

Fig. 1 Hypothesized model of teacher appraisals and demands of classroom and outcomes

profession. Conversely, teachers appraising overall classroom resources as insufficient for classroom demands will be more likely to experience stress, leading them to be dissatisfied and more likely to leave teaching. Such a model could account for why some teachers persevere in the face of high demands while others seem overwhelmed, a burgeoning issue particularly in the research of early-career educators (Mansfield, Beltman, Price, and McConney 2012; Robertson-Kraft and Duckworth 2014).

Development of the CARD

The CARD is divided into two sections that parallel the appraisal process suggested by Lazarus and Folkman (1984) and summarized in Fig. 1: Demands (primary appraisals) and Resources (secondary appraisals). The Demands scale from the CARD contains 35 ratings of the severity of demands associated with various aspects of the classroom environment using a five-point Likert scale that ranged from 1, "not demanding," to 5, "extremely demanding." Teachers are asked to assess the following categories of demands: students with problematic behaviors (sample item: disruptive children), other student-related demands (sample item: number of students with poor attendance), administrative demands (sample item: meetings you are required to attend), and lack of instructional resources (sample item: availability of instructional supplies). The Resources section of the CARD contains 30 items measuring the helpfulness of various school-provided resources using a five-point Likert scale that ranged from 1, "very unhelpful," to 5, "very helpful." Items on this scale ask teachers to assess the following types of resources: school support personnel (sample item: administrators at your school), other adults in the classroom (sample item: community volunteers), instructional support (sample item: instructional materials), and specialized resources (sample item: materials for children performing below grade level). With respect to factor analytic evidence, Lambert et al. (2009) reported the results of a multi-level confirmatory factor analysis in which the two-factor structure of the CARD was supported. The estimated correlation between the Demands and Resources latent constructs in the model was −.250, which is very similar other studies using the CARD.

The reliability of the CARD Demands and Resources scale, and the low correlation between them, allows for the calculation of difference scores that assess the availability of teachers' resources vis-à-vis their demands (McCarthy et al. 2014). This is accomplished by creating a score for each teacher based on the difference between their Demands and Resources scale scores. This is labeled an Appraisal Index since it represents a teacher's overall appraisal of whether her or his classroom resources are sufficient for the level of classroom demands she or he encounters. In the development of the Appraisal Index, it was recognized that obtaining highly reliable difference scores is not easy and can even be problematic (Lambert et al. 2009; Hoffman and Schraw 2010). The reliability of a difference score formula (Crocker and Algina 1986) is dependent upon the reliability of the two measures in question and how correlated they are with each other. Therefore, we sought to develop a highly reliable scale to measure perceived classroom demands, a highly reliable scale to measure classroom resources, and to make these scales scores as independent of each other as possible.

The scoring strategy for the CARD uses the reliability of the difference score (Demands−Resources) to create both a standard error of measurement for the Appraisal Index and a 95 % confidence interval around an Appraisal Index score of 0 (no difference between scores on the Demands and Resources scales). This confidence interval allows for identification of those

respondents with Demands score exceeding their Resources score by enough to be beyond measurement error and classify teachers into one of three categories (Resourced, Balanced, or Demands). Figure 2 graphically represents the distribution of Appraisal Index scores, which are centered around zero (no difference between Demands and Resources) and the cut scores for the boundaries are set at the upper and lower limit of the 95 % confidence interval that is created around zero difference. The confidence interval is formed using the standard error of measurement for the Appraisal Index, which allows for 95 % confidence that there is a difference in true scores between members of the Demands and Resourced groups (Lambert et al. 2009).

The Appraisal Index allows for a test of the key prediction of transactional models of stress, as teachers can be classified into three groups according to their risk for stress: (1) teachers perceiving classroom resources as greater than demands (labeled the Resourced group), (2) teachers perceiving classroom demands as equal to resources (labeled the Balanced group), and (3) teachers perceiving classroom demands as greater than resources (labeled the Demands group). According to Lazarus and Folkman's (1984) transactional model of stress, this last group (Demands) is theorized to be the most vulnerable to stress (McCarthy et al. 2014). Analysis of variance in CARD scores at the individual teacher level and at the school building level has revealed that most of the variance has been accounted for at the individual teacher level (O'Donnell et al. 2008; McCarthy et al. 2009). This pattern of findings suggests that individual teacher perceptions of classroom demands and resources can vary considerably among teachers within the same school, even though each building presumably contains classrooms with similar types of material resources and students (O'Donnell et al. 2008). A version of the CARD has also been developed for school counselors (McCarthy et al. 2010b) and principals (Helf 2013).

The target population for the CARD is teachers and professional educators (Lambert et al. 2009), and it has been used with preschool, elementary, middle and high school teachers with minor modifications to item content. Versions of the CARD were also created for school administrators and school counselors, and there are English, German, and Mandarin Chinese versions. Local samples utilized in existing CARD research, which are described in the sections to follow, were collected from North Carolina (NC), South Carolina (SC), Texas (TX), and Baden-Württemberg, Germany.

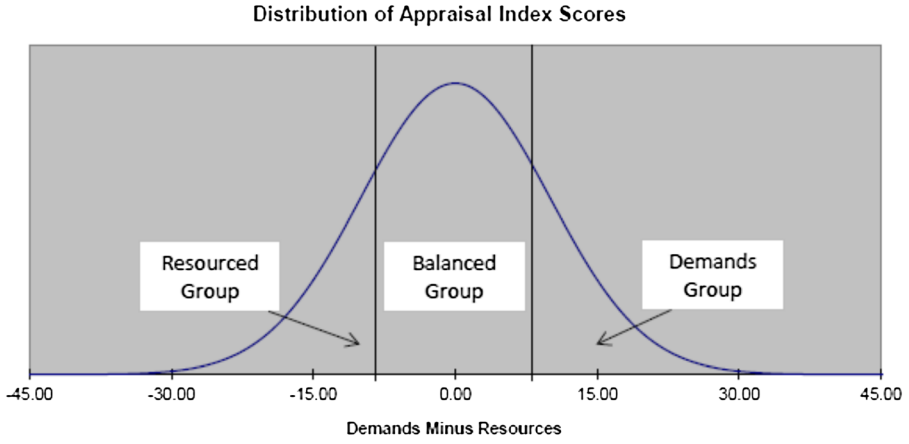

Fig. 2 Distribution of appraisal index scores and group classifications

Evidence for the generalizability of this approach to classifying teachers was provided in one recent study that replicated the measurement strategy used in CARD research with two waves of the large nationally representative samples from the Schools and Staffing Survey (SASS) (1999–2000 and 2007–2008) (Lambert et al. 2015). The CARD measure itself was not included in the SASS survey, although the SASS contains a series of items that are conceptually similar to CARD demands items and another set that is conceptually similar to CARD resources items. The overall classification strategy of creating difference scores and an Appraisal Index was applied to scoring these responses to SASS items. A total demands score, total resources score, and Appraisal Index were all calculated. Using these data, teachers were classified into the three CARD appraisal groups, Demands, Resourced, and Balanced, using a modified version of the CARD scoring algorithm. Large, theoretically predicted differences between the groups were found that directly replicate the findings summarized later in this review (Lambert et al. 2015).

Studies utilizing the CARD with local samples have examined its relationship to a number of constructs typically examined in traditional production function research. Table 1 provides a summary of this research by listing all known CARD studies in chronological order (studies are numbered in Table 1 for ease of reference). Table 1 also provides information about the types of constructs examined in each study, the statistical outcomes utilized (regression coefficient, mean difference, or correlation), and the sample *N*. A description of each type of outcome used in CARD research will next be reviewed.

CARD Research Examining Vocational Concerns of Teachers

Job Satisfaction

The MetLife Survey of The American Teacher (2012) noted that teacher satisfaction in the USA has fallen to a new 25-year low, with only 39 % of respondents reporting that they are very satisfied. Researchers have studied job satisfaction for a number of years as it has important implications for both workers and organizations, including intention to quit and burnout (Taleb 2013). Some early researchers described job satisfaction as simply "an individual's attitude toward his work" (Brayfield & Rothe 1951, p. 307), while other earlier industrial organizational psychologists described job satisfaction in relation to an organization's environment (Locke 1976; Taleb 2013). Locke's (1976) definition was closer to the attitude toward work, and he defined job satisfaction in terms of "a pleasurable or positive emotional state resulting from the appraisal of one's job or job experiences" (p. 1300). Thus, like vocational stress, job satisfaction can be conceptualized as a personal appraisal of one's experiences in her or his role.

Research using the CARD has focused on job satisfaction using a measure created by Koeske, Kirk, Koeske, and Rauktis (1994) to measure workers' satisfaction with salary, promotion, working conditions, benefits, and organizational climate. As can be seen in Table 1, results have consistently shown that teachers classified in the Demands group are more likely to report job dissatisfaction using this measure (see studies 1, 2, 4, 10, and 13 in Table 1). This pattern of findings is consistent with other research linking stress to teacher job dissatisfaction (Reilly, Dhingra, and Boduszek 2014; Sutton, and Huberty 1984; Watson, Harper, Ratliff, and Singleton 2010). However, in generalizing CARD results to other research, it is important to note the varying ways in which teacher satisfaction is measured.

Table 1 Literature review and outcome

Reference	Outcome	ES type	N (site)
1 McCarthy et al. (2014)	Demands group scored lower in stress prevention, job satisfaction, years of experience, and years at current school	Mean difference	122 (NC)
	Demands group scored higher in intention to leave	Mean difference	122
2 Lambert et al. (2012a)	Demands group scored lower in stress prevention and job satisfaction	Mean difference	113 (nationwide)
	Demands group scored higher in intention to leave	Mean difference	113
3 Ullrich et al. (2012)	CARD demands correlated positively with burnout	Correlation	469 (Germany)
4 McCarthy et al. (2012b)	Demands group scored lower in job satisfaction	Mean difference	40 (TX)
	Demands group scored higher in intention to leave	Mean difference	40
	CARD demands and appraisal index correlated negatively with job satisfaction	Correlation	79 (TX)
	CARD demands and appraisal index correlated positively with intentions to leave	Correlation	79
	CARD demands and appraisal index were not correlated with stress prevention	Correlation	79
	CARD appraisal index correlated positively with stress prevention and intentions to leave	Correlation	79
	Appraisal index correlated negatively with job satisfaction	Correlation	79
5 Lambert et al. (2012b)	Demands group scored higher in burnout	Mean difference	109 (Germany)
	Demands group scored lower in stress prevention	Mean difference	109
	CARD demands correlated positively with burnout	Correlation	185 (Germany)
	CARD demands correlated negatively with stress prevention	Correlation	185
	CARD appraisal index correlated positively with burnout	Correlation	185
	CARD appraisal index correlated negatively with coping	Correlation	185
6 McCarthy et al. (2012a)	As demands scores increased, burnout increased	Path coefficients	521 (NC)
7 Helf (2013)	Demands group scored higher in years of experience, school size, number of teachers, district size, ESL children in class, academic gifted children in class, poor attendance,	Mean difference	192 (NC)

Table 1 (continued)

Reference	Outcome	ES type	N (site)
	behavioral problems, children below grade level		
8 McCarthy et al. (2010b)	Demands group scored higher on stress prevention and percentage of children in class with learning disabilities, physical disabilities, poor attendance, and performing bellow grade level	Mean difference	148 (TX)
9 McCarthy et al. (2009)	CARD demands and appraisal index correlated negatively with stress prevention	Correlation	451 (NC)
	CARD demands and appraisal index correlated positively with burnout	Regression coefficient	451
10 McCarthy et al. (2010a)	Appraisal index correlated negatively with stress prevention, job satisfaction, and intention to leave	Correlation	158 (nationwide)
11 Lambert et al. (2009)	Demands group reported more children with distracting behavior, disruption of teaching process, and burnout	Mean difference	122 (NC)
	CARD demands correlated negatively with reported numbers of children with positive social behavior	Correlation	521 (NC)
	CARD demands correlated positively with burnout and child overactive behavior	Correlation	521
	CARD appraisal index correlated negatively with child positive social behavior	Correlation	521
	CARD appraisal index correlated positively with burnout and child overactive behavior	Correlation	521
12 Ullrich (2009)	Demands group scored higher in burnout	Mean difference	296 (Germany)
	Demands group scored lower in stress prevention	Mean difference	337 (Germany)
	CARD demands correlated negatively with stress prevention	Correlation	469 (Germany)
	CARD demands correlated positively with years of experience, challenging student behavior, and burnout	Correlation	469
	CARD appraisal index correlated negatively with stress prevention	Correlation	469
	CARD appraisal index correlated positively with years of experience, challenging student behavior, and burnout	Correlation	469
13 Fisher (2011)	CARD appraisal index correlated negatively with stress prevention, years of experience, and age	Correlation	385 (NC)
	CARD appraisal index correlated positively with number of students, job satisfaction, and burnout	Correlation	385
14 O'Donnell et al. (2008)	Teacher experience negatively correlated with reported numbers of students with behavioral problems	Regression coefficient	521 (NC)

Table 1 (continued)

Reference	Outcome	ES type	N (site)
	Teachers' years of experience at the school correlated with CARD demands	Regression coefficient	521
15 Lambert et al. (2007)	Demands group scored higher in years of experience, years at current school, class, size, ESL children, behind development children, learning disabilities, academically gifted children, homeless or transient children, poor attendance, behavioral problems and performing below grade level	Mean difference	185 (TX, NC, SC)
	Demands group was lower in age	Mean difference	185
16 Jazaar et al. (2007)	Teachers who express intention to leave scored higher in CARD demands and lower in stress prevention	Mean difference	499 (NC)
17 Lambert et al. (2006)	Demands group scored higher in years of experience, class size, behind development children, poor attendance, and behavioral problems	Mean difference	219 (TX, NC, SC)
	Demands group scored lower in age and reported numbers of ESL children	Mean difference	219
18 Brewer (2006)	No relationship found between teacher demands and the implantation of best practices	Regression coefficient	200 (NC)

Locke's (1976) original construct of job satisfaction included multiple facets. Since that study, job satisfaction has been measured either as overall job satisfaction, usually asked with one single question (as in the MetLife Survey of the American Teacher, 2012), or as a single construct involving multiple facets (Brayfield & Rothe 1951; Koeske et al. 1994; Liu and Ramsey 2008; Skaalvik and Skaalvik 2011). Other researchers, studying job satisfaction within education (Skaalvik and Skaalvik 2011) and job satisfaction more broadly (Brayfield & Rothe 1951), have used multiple items to measure job satisfaction, without creating multiple facets. Overall, research using these various strategies for assessing job satisfaction has shown similar findings to the CARD studies reviewed here: teachers' perceived stress has an inverse relationship with their job satisfaction (Reilly et al. 2014; Sutton, and Huberty 1984; Watson et al. 2010). For example, in a study of teachers in Ireland, a measure of perceived job-related stressors was the only unique predictor of job satisfaction among five other variables: self-efficacy, self-esteem, age, teaching experience, and highest level of education (Reilly et al. 2014). Perhaps most relevant to the teacher turnover problem in the USA, when teachers become stressed and dissatisfied, they also start to contemplate leaving the field (Grissom 2011; Tickle, Chang, and Kim 2011). Therefore, the links between job satisfaction and attrition were examined in several CARD studies, which are reviewed next.

Teacher Attrition and Intentions to Leave Education

Almost a third of US teachers quit the profession in their first 3 years of service (National Commission on Teaching and America's Future 2009). This has created a "greening" of the field, a teaching workforce that fails to mature and in which the most common teacher has

1 year of experience (Ingersoll 2012). Given that new teachers face a steep learning curve in their first few years on the job, this means that many will choose to leave the profession just as they are acquiring the experience and confidence necessary to become more effective teachers. These unstable educational environments can negatively impact workplace climate and student learning (Guin 2004; Hong 2012; Johnson, Kraft, and Papay 2012; Ronfeldt et al. 2013). As was noted previously, dissatisfied teachers are more likely to leave the profession and Ingersoll (2012) asserted that teachers are leaving the profession early in their careers mostly because of dissatisfaction with teaching and the pursuit of other employment, despite the fact that new teachers are being hired at an accelerated pace.

Research with the CARD has not been longitudinal in nature; thus, it is not known whether teachers classified in the Demand group leave the profession at a higher level, though that would be our hypothesis. However, research both with national data sets and with CARD measure have investigated factors that account for teachers' intentions of remaining in or leaving the profession. Tickle, Chang, and Kim (2011) found that higher levels of administrative support were associated with intending to remain in teaching. Kim and Liu (2005) found that a beginning teacher's experience in the first year (including the presence of a teacher induction, professional development training, professional support, and communication with administration) was associated with intending to remain teaching longer.

As can be seen in Table 1, research with the CARD has found not only lower levels of job satisfaction among teachers in the Demand group but also a greater reported likelihood of leaving teaching the following year. Four studies have used the Plans to Leave Current Job (PLCJ; Fisher, 2011) measure, a 13-item scale that includes questions about teachers' job seeking activities and intentions to leave their current positions (studies 1, 2, 4, 13; Table 1). The PCLJ measures a continuum of specific plans related to leaving the current job, from items that are frequently endorsed (such as thinking about leaving) to less frequently endorsed (actually applying for another job). Across these studies, a clear pattern has been found: being classified in the Demand group is associated with a teacher making more plans to leave the profession.

Large differences were also found between appraisal groups using the SASS nationally representative dataset (Lambert et al. 2015). Teachers in the Resourced group were much more likely to report that they would become a teacher again (94.3 %—2000 SASS, 94.5 %—2008 SASS) than teachers in the Demands group (75.3 %—2000 SASS, 76.6 %—2008 SASS). Similarly, teachers in the Resourced group were much more likely to report that they will return to teaching next academic year (86.0 %—2000 SASS, 85.2 %—2008 SASS) than teachers in the Demands group (65.1 %—2000 SASS, 67.2 %—2008 SASS).

Teacher Burnout

Related to the topics of satisfaction and turnover is teacher burnout, which is understood as a worldwide phenomenon associated with detrimental outcomes to the teachers and schools (Parker and Salmela-Aro 2011). Burnout was originally recognized among human service workers as reduced idealism and enthusiasm (Freudenberger 1974), and burnout in the workplace is now considered a chronic, job-related response caused by repeated failed attempts to cope with highly demanding working conditions (Carson, Plemmons, Templin, and Weiss 2011; Schaufeli, Leiter, and Maslach 2008). Teaching has long been recognized as one of the many human service professions characterized by high levels of burnout. For example, Schaufeli and Enzmann (1998) reported that teachers make up more than one fourth

(27 %) of all worker samples in burnout studies. Relevant to this manuscript are findings that teacher burnout symptoms are related to numerous aspects of their work measured by the CARD, including lack of support from colleagues (Gavish and Friedman 2010), insufficiency of classroom materials (Kaufhold et al. 2006) and student misbehavior (Sutton et al. 2009).

Three dimensions have been identified in the burnout phenomenon (Schaufeli et al. 2008). Emotional exhaustion (EE) involves feeling emotionally spent and over-extended. Depersonalization (DP) refers to a cynicism towards others and is sometimes understood as a coping mechanism used to manage EE (Maslach, Schaufeli, and Leiter 2001). The third component of burnout is lack of personal accomplishment (PA), which refers to a reduced sense of professional accomplishment and efficacy (Parajes, 1996; Tschannen-Moran and Hoy 2001).

These three dimensions are therefore generally examined together as the basis for examination of teacher burnout, often using the Maslach Burnout Inventory (MBI), or its teacher-specific version known as the MBI-Educators Survey (MBI-ES; Maslach, Jackson, and Schwab 1986). The MBI is the most widely used research instrument to measure burnout (Maslach, Jackson, and Schwab 1986) and Schaufeli and Enzmann (1998) estimated that the instrument is used in over 90 % of the empirical research studies on burnout.

There is debate in the field about the process by which burnout develops. EE is understood as the central quality and most obvious manifestation of burnout, but the literature is less clear as to its relationship to DP and PA (Boersma and Linblom 2009). Specifically, research has not clarified whether these three factors co-occur or whether EE is as a precursor or trigger for the other two factors. Taris, Le Blanc, Schaufeli, and Schreurs (2005) have argued this has occurred because the MBI development was not grounded in theory but rather developed inductively through factor-analyzing items developed without theoretical coherence.

Research examining relationships between the CARD and teacher burnout symptoms have consistently yielded statistically significant associations (see Table 1). Specifically, a study of teachers in Germany found that all scales of the MBI were correlated in theoretically-predicted ways with both the demands section of the CARD and the Appraisal Index (Ullrich et al. (2012). A study of US teachers found fewer but still important correlations: the emotional exhaustion and depersonalization scales were both positively correlated with the Appraisal Index (McCarthy et al., 2009). Further, in examining variability in burnout symptoms in both studies, hierarchical modeling was used to nest teachers within school. Specifically, most variability in burnout scores was found at the individual teacher level (between teachers in the same school), rather than the school level (between schools) (McCarthy et al., 2009; Ullrich et al., 2012). The authors of both studies argued that this individual variability supported theories suggesting the perceptual nature of burnout: that is burnout is a function of an individual's perceptions of his or her environment rather than simply external factors such as the particular building or community in which the teacher works.

Stress Prevention Resources

Teachers' stress prevention resources were examined in several studies because they are an important component of the stress process, both generally (Hobfoll et al. 1998) and specifically with teachers (Friedman 2006). Coping resources have been defined as the various assets in one's personal repertoire for addressing stress (Matheny, Aycock, Curlette, and Junker 1993), and several studies have examined whether teachers' scores on the CARD (perception of classroom demands and resources) are associated with their personal resources for coping.

These studies have used the Preventive Resources Inventory (PRI; McCarthy et al. 2002), which is a self-report measure designed to explore a respondent's level of agreement with items assessing her or his perceived ability to prevent stressful reactions to life circumstances. Previous research has supported the validity of the PRI and has found hypothesized relationships between theoretically consistent and divergent constructs (Lambert et al. 2006). Research summarized in Table 1 has shown that teachers' stress prevention resources are negatively associated with the CARD Appraisal Index (McCarthy et al. 2010a), and that Resourced, Balanced, and Demands teachers all differed from each other in the predicted directions on the PRI (McCarthy et al., 2014). These findings suggest that teachers with lower stress prevention resources may also be more likely to find their classroom environments stressful.

Challenging Student Demands and Class Size

The constructs reviewed so far have linked CARD scores to aspects of teacher well-being, but several studies have also examined more features of the classroom environment. Extant literature has demonstrated that certain types of student behaviors are associated with teacher turnover and stress levels. For the purpose of this manuscript, we will use the term challenging student demands as a descriptor for this category—in doing so, we are referring to the aggregate effect that student demands can have on a teacher, but the term is not meant to imply that such students are inherently problematic.

In a study using both national and statewide Florida data, Feng (2010) found that teacher turnover was positively correlated with levels of disciplinary incidents. Likewise, Ingersoll and May (2012) noted that the higher levels of student discipline problems were associated with higher levels of teacher turnover for secondary math and science teachers. In research with the CARD, as seen in Table 1, teachers in the Demands group tend to report having more students with behavioral problems than teachers in either the Resourced or Balanced groups. Research with the CARD supports extant literature suggesting that teacher stress is associated with, but not necessarily caused by, challenging student behaviors.

Feng (2010) determined that teachers with greater concentrations of students with Individualized Education Plans (IEPs) tend to have less experience (defined as 1–5 years of teaching). Working with large numbers of students with such individualized needs may place less experienced teachers at a greater risk for stress—particularly if they perceive fewer resources to meet individualized education needs. Research with the CARD, shown in Table 1, has also demonstrated that teachers in the Demands group tend to report having more children with learning disabilities than other teachers.

Research has demonstrated associations between teacher attrition and class size (Loeb, Darling-Hammond, and Luczak 2005). Moreover, synthesis of educational policy studies in the USA suggests that teachers' occupational stress and organization demands increase as class size increases, resulting in harmful effects on student achievement (Schanzenbach 2014). International research has likewise demonstrated that ratings of teacher stress were higher in British teachers with larger class sizes (Griffith, Steptoe, and Cropley 1999) and has suggested that to help reduce teacher stress in Hong Kong, schools should work to reduce the class size of teachers (Jin, Yeung, Tang, and Low 2008). In research using the CARD, differences have been found between the classroom sizes of Resourced, Balanced, and Demands teachers. As is shown in Table 1, studies 15 and 17 found that Demands teachers were more likely to report larger class sizes, although the actual number of students in each teachers' class was not independently verified by the researchers.

The preceding review of constructs examined in CARD research supports the importance of understanding teachers' appraisals of the classroom and that such appraisals are associated with variables typically examined in education production function research. We were also interested in summarizing the effects of studies that included comparisons between the means of the CARD Demands and Resourced groups on the constructs reviewed above, and studies that reported correlation or regression coefficients in which the association between CARD scale scores and the constructs reviewed above were examined. The authors of this review were already aware of all the studies that had used the CARD measure as they had either conducted the studies themselves or had assisted other researchers with using the CARD.

Meta-Analysis of CARD Findings

Methods

Formal meta-analyses begin with the specification of searching strategies and parameters, as well as admissibility criteria to be applied to the studies and effect sizes. A total of 18 studies met these criteria at the time of this review. Four were doctoral dissertations, eight were articles in peer-reviewed research journals, and six were peer-reviewed book chapters.

To conduct the synthesis of the differences between the CARD groups, the means, standard deviations, and sample sizes from each comparison were converted to Hedges Unbiased Effect Size values (Hedges and Olkin 1985). This approach requires the researcher to subtract the mean of the control group from the mean of the treatment group. For our purposes, we subtracted the mean of the Resourced group from the mean of the Demands group. This value was then divided by the pooled standard deviation across the groups, and a bias correction factor was applied to the result. Next, the resulting standardized mean difference effect sizes were separated into subgroups by the type of outcome measure that was used as the dependent variable in each comparison. The mean and standard deviation of each set of effect sizes was calculated. Each effect size was then weighted by the reciprocal of its sampling variance, and the weighted mean effect size was also determined (Hedges and Olkin 1985). General guidelines from Cohen (2013) were used to interpret effect magnitude.

A similar process was followed for the correlation coefficients. Each of the Pearson correlation coefficients was converted to a Fisher's z transform value in order to normalize their sampling distributions. These transformed values were separated by outcome type, weighted by the reciprocal of their sampling variances, and the weighted and unweighted values were summarized. The resulting means were then converted back into the Pearson r scaling for reporting and interpretation purposes (Hedges and Olkin 1985).

Results

Studies using the CARD with preschool (Lambert et al. 2006), elementary (McCarthy et al. 2009), and high school teachers (McCarthy et al. 2010a) have demonstrated sample-specific reliability evidence for the both the Demands and Resources scales. Further, teacher scores on the Demands and Resources scales typically have low correlations (McCarthy et al. 2009, r=−.21; McCarthy et al. 2014, r=.−18) showing the CARD measures distinct aspects of both demands and resources in the classroom environment (Lambert et al., 2009). As reported in Table 2, 12

Table 2 Summarized CARD reliability and related indexes

Coefficient	Unweighted		Weighted				
	Mean	SD	Mean	SE	95 %	CI	*n*
Coefficient alpha—demands scale score	.917	.030	.926	.002	.920	.930	12
Coefficient alpha—resources scale score	.943	.020	.949	.001	.945	.952	12
Reliability—appraisal index	.941	.020	.947	.002	.943	.950	11
Correlation—demands and resources	−.228	.120	−.231	.018	−.197	−.265	11

CI confidence interval

studies provided unique information regarding the reliability of the CARD Demands and Resources scales, which is important given concerns about the use of difference scores raised by Crocker and Algina (1986) and Hoffman and Schraw (2010). In order for the Appraisal Index to be reliable, it was important to have a highly reliable scale to measure perceived classroom demands and classroom resources, and to make these scales scores were also independent of each other. As can be seen in Table 2, the weighted mean coefficients for the Demands and Resources scales were .926 and .949, respectively. Eleven studies provided unique information regarding the reliability of the Appraisal Index (weighted mean=.947) and the correlation between Demands and Resources (weighted mean=−.231). Based on these results, it appears the criteria for a reliable Appraisal Index were established in these studies.

As a result of the summarization process, differences between the Demands and Resourced groups were found across six different outcomes. Table 3 contains the weighted and unweighted mean effect sizes for each of these outcomes. The weighted mean across the sample of effect sizes is reported for each of the standardized mean differences along with its standard error and 95 % confidence interval. To summarize the findings, we will refer to the weighted mean effect sizes. A large difference was found between teachers in the Demands group and

Table 3 Summarized effect sizes by outcome

Outcome construct	Unweighted		Weighted				
	Mean ES	SD	Mean ES	SE	95 %	CI	*n*
Burnout	.901	.250	.846	.034	.780	.912	16
Teacher preventive coping resources	−.501	.286	−.486	.051	−.586	−.385	11
Classroom concentration of challenging students	.326	.176	.323	.035	.255	.391	19
Intention to leave the profession	.681	.177	.698	.126	.451	.945	3
Job satisfaction	−1.152	.434	−1.272	.134	−1.535	−1.008	3
School or district size	.427	.204	.424	.083	.261	.586	3
Correlation	Unweighted		Weighted				
	Mean *r*	SD	Mean r	SE	95 %	CI	*n*
CARD demands score with burnout	.385	.077	.384	.012	.360	.409	12
CARD appraisal Index with burnout	.412	.065	.413	.012	.390	.435	13
CARD appraisal index with job satisfaction	−.422	.117	−.423	.034	−.486	−.356	3

ES standardized mean difference effect size for CARD demands vs. resourced groups, *CI* confidence interval

those in the Resourced group with respect to burnout symptoms. Teachers in the Demands group tend to have higher average burnout scores (ES=.846). A moderately large difference was found between teachers in the Demands group and those in the Resourced group with respect to teachers self-reported preventive coping resources. Teachers in the Demands group can be expected to have lower preventive coping resources (ES=−.486).

A moderate-sized difference between teachers in the Demands and Resourced groups was found with respect to their classroom concentration of challenging student demands. As expected, teachers in the Demands group have somewhat higher concentrations of challenging student demands (ES=.323). A large difference was found between teachers in the Demands and Resourced groups with respect to intention to leave the education profession. Teachers in the Demands group tend to have higher intention to leave scores (ES=.698). There was also a large difference found between teachers in the Demands group and those in the Resourced group with respect to job satisfaction scores. Teachers in the Demands group generally have lower job satisfaction scores (ES=−1.272). A moderately large difference was found between Principals in the Demands groups and those in the Resourced group with respect to school and district size in the study by Helf (2013). Principals in the Demands group tend to work in larger districts and schools (ES=.424).

The summarization process yielded mean correlation coefficients across three different outcomes. Table 3 contains the weighted and unweighted mean correlations across these outcomes along with their respective standard errors and 95 % confidence intervals. To summarize these findings, we will refer to the weighted mean correlations. The CARD Demands score was found to be moderately positively correlated with measures of burnout (r=.384). The CARD Appraisal Index or stress score was found to be also moderately positively correlated with measures of burnout (r=.413). It is clear from these results that accounting for the difference between Demands and Resources, rather than using Demands as a predictor alone, accounts for more variance on this outcome. Furthermore, the mean differences between the Demands and Resourced groups are consistently large and are also driven by the difference score, the Appraisal Index, not by Demands alone.

The CARD Appraisal Index was found to be moderately negatively correlated with measures of job satisfaction (r=−.423). Only two studies included regression coefficients, and, given that the models tested included quite different additional explanatory variables, these effect sizes were not included in the summarization process. However, the general magnitude and direction of these coefficients confirmed the findings from the correlation coefficients. Within regression models that control for teacher background variables, small positive associations were found between the Emotional Exhaustion scale of the MBI and both the CARD Demands scale score and the Appraisal Index (McCarthy et al., 2009). Within the context of structural equation models that control for teacher self-report concerning stress prevention and disruption to teaching, moderate associations were found between a latent variable formed from the CARD Demands subscale scores and a latent variable formed form the MBI scale scores (McCarthy et al., 2012a).

Strengths of Research Using the CARD and Implications for Policy and Practice

External realities at the school level, such as being in a lower performing school, lacking administrative support, and increased pressure related to student performance on standardized tests, are clearly important to teachers' occupational well-being. However, according to transactional models (Lazarus and Folkman 1984), such factors will not universally cause

teachers' stress. Rather, it is important to understand which teachers experience high demand levels versus their resources. The research reviewed here using the CARD suggests that individual teachers perceptions about demands and resources can be measured reliability and is meaningfully associated with indicators of vocational concerns. Such research could at least partially address Hobfoll's (1989) critique of transactional models, namely that stress has not been measured in a way that is consistent with Lazarus and Folkman's (1984) theory.

The CARD findings presented in the meta-analysis suggest important implications for teacher attrition (Ingersoll 2012). Given the high rates of teacher turnover in the first few years of entering the profession, it is critical to identify early on which teachers are perceiving the highest demand levels. The findings presented here demonstrate that those in the Demand group are most likely to be planning an exit from the field. Early assessment could help administrators and other school personnel intervene before these teachers leave the profession altogether.

These findings also have important implications for administrators charged with offering support for their teachers. School administrators have limited material resources and time to devote to mentoring and intervening in the professional lives of the teachers they lead and supervise. The evidence presented in this review demonstrates that a measure such as the CARD could be useful in identifying a subgroup of teachers who are different form their peers in a variety of important ways. Lambert et al. (2006) addressed the importance of administrators considering carefully how best to apportion students with special needs among their various teachers, including how they assign the most challenging children to classrooms. Findings from CARD studies show that unequal classroom concentrations of children with special needs and problem behaviors can lead teachers to perceive unhealthy levels of demands, leaving them exposed to occupational stress (studies 11, 12, and 17 in Table 1). These results underscore the importance of administrators and other support professionals developing strategies to spread out concentrations of children with special needs and problem behaviors in an attempt to help protect teachers from seemingly overwhelming demands.

Moreover, in her study of North Carolina working conditions, Ladd (2011) noted that teachers' positive perceptions of school administrators was associated with a greater likelihood to remain teaching at their school. Ladd, like previous researchers (cf. Shen 1997; Singh and Billingsley 1996; Taylor and Tashakkori 1995), suggests that school principals who implement policies that grant teachers leadership roles are linked with higher teacher retention. In a recent study, Johnson et al. (2014) found that teachers were more likely to actively buy-in to administrative policies in high-poverty work environments if the principal took an "inclusive approach to teacher leadership." Future research could be directed at matching principal's leadership styles with teachers' appraisal of occupational stress, which could potentially shape how administrators are prepared to work in school environments and manage potentially stressful school climates.

The results reviewed using the CARD and attached findings also have implications in the first steps toward teachers' professional growth—teacher education. Traditionally, teacher education has focused on the theory and professional beliefs with little emphasis on how to balance the professional tensions associated with being a classroom teacher (Ball & Forzani 2009; Costigan and Crocco 2004). Teacher candidates too frequently leave their programs (particularly alternative ones) and enter classrooms lacking specific instructional and coping strategies for their profession, contributing to lower teacher efficacy and student performance outcomes (Darling-Hammond, Chung, and Frelow 2002; Darling-Hammond et al. 2005). Consequently, novice teachers often feel overwhelmed and stressed in their first years on the

job. Reverting to a survivalist mentality (see Katz 1972), teachers sacrifice their professional training to cope with the bureaucratic milieu of schooling, classroom management, and other overburdening extracurricular responsibilities. Perhaps not coincidentally, research suggests over two thirds of new teachers report that their teacher education experience did not prepare them for the classroom (Levine 2006).

Findings from the CARD studies may inform teacher preparation by offering unique insight into how teachers might cope in a high demand context. In addition to the large differences between the groups that have consistently emerged across studies, one study also involved visiting classrooms of teachers and observing their behaviors and style of interacting with children. McCarthy and Lambert (2012c) reported the results of a mixed methods study in which the observational data from blind observers confirmed that teachers in the varying CARD appraisal groups do in fact interact with students in quite different ways in the classroom.

Class size, associated with higher teacher stress, is an organizational factor outside of a teacher's locus of control. However, teacher education programs can use research such as that reviewed here to promote practices and professional habits that might alleviate the stress associated with larger classes. Teacher educators should also use these findings to specifically examine the balance of resource versus demands among teachers. What resources countermand the perceived demands of schooling? Conversely, what demands outweigh resources as perceived by teachers? What can be done to help teachers receive and use the resources that would help them counterbalance the demands they face?

The CARD instrument and corresponding studies hold promise for informing teacher preparation as to the educational climate in today's schools. Furthermore, such interventions mirror research on teacher resilience, suggesting that educators with positive affect, emotional stability, and/or communities of support are more likely to thrive in the workplace (Gloria et al. 2013; Hargreaves 2001; Mansfield et al. 2012). Used judiciously, this data could help shape future pre-service programming by informing teacher educators on which coping resources might mitigate the demands of teaching.

Limitations and Future Directions

A number of cautions should be observed in interpreting the results of this review of research using the CARD. First, the results are based on responses to survey data and causality among the patterns in the data should not be inferred. Second, since the data were based on teacher self-report, data such as class size was not verified independent of teachers' responses. Third, the localized sampling of previous studies possibly masks the lack of between building-level variance. Thus, many of the sampled schools shared ecological traits that would account for the lack of between-building effects. Fourth, individual characteristics of teachers such as gender and ethnicity were not examined in the studies reviewed here, due in part at least to the relative homogeneity of the samples employed, which were predominantly white and female.

While limited in these ways, studies examining teacher perceptions of classroom demands and resources can provide a more complex picture of stress compared to other studies informing educational policy, such as those defining stress in terms of single item such as hours per week spent at work (cf., Grissom, Nicholson-Crotty, and Harrington 2014). Given that Lambert et al. (2015) were able to replicate the measurement strategy used in CARD research with similar types of items from the nationally representative SASS, future research could further explore the best methods for accurately assessing teachers' perceptions of demands and resources, and the best way to operationalize which teachers are most at risk for stress.

We suggest three basic directions in which future research could be conducted to better understand teacher stress. First, since the CARD instrument is predicated upon a balance model of overall perceived resources and demands (Folkman and Lazarus 1984), which is predominant in stress research but not universally accepted (Hobfoll et al. 1998), future research could be directed at examining if other, often complimentary, models of stress can add to our understanding. Given the prominence of positive psychology, further attention could be given to the role of challenge appraisals that spur effective coping rather than put one at risk for stress (Podaskoff et al. 2007). Adding Hobfoll's (1989) COR emphasis on resource accumulation to studies of teacher demands and resources could also add to our understanding of how to help foster wellness in teachers. Further, since the CARD examines aggregated levels of demands and resources, additional research using the Demand-Induced Strain Compensation (DISC; de Jonge & Dormann 2006) model could be helpful in clarifying conditions under which teacher stress is better understood in terms of corresponding types of demands and resources. In other words, it would be important for researchers to identify if the right combination of classroom demands and specific resources allow for high levels of teacher satisfaction and effective classroom instruction. A more complete picture of the coping process could also be obtained by examining not just the appraisals teachers make of the classroom environment but also the coping strategies employed to manage their demands (Skinner et al. 2003). Lewis, Roache, and Romi (2011), for example, found that teachers were more effective using problem-focused coping when confronted with classroom management situations than emotion-focused coping. Incorporating both teacher appraisals of the classroom and their attempts to cope could allow for more comprehensive models of teacher stress.

Second, research has suggested possible sex (Roberts and Pennebaker 1995) and ethnic differences (Neblett, and Roberts 2013) in cognitive appraisals, and this line of research could be extended to teachers by exploring if the sex and ethnicity of the teacher is associated with appraisals of the classroom. Such research could be particularly important given evidence of differential attrition for teachers. For example, YEŞİL DAĞLIa (2012) found that male kindergarten teachers are less likely to leave their jobs than their female counterparts. It was also found that members of some ethnic/racial groups (African American, Asian, Pacific Islander, Native American, and Native Alaskan) left their jobs at higher rates than White teachers, while Hispanic teachers had lower levels of turnover than White teachers. Interestingly, a study of secondary English teachers found that non-White teachers had lower risk for attrition than White teachers (Hancock and Scherff 2010). Ingersoll et al. (2014) investigated SASS data from 1987 to 2012 and found that, overall, teachers in ethnic minority groups were more likely to leave teaching than their non-minority peers. They found, however, that "the same difficult-to-staff schools that are more likely to employ minority teachers are also more likely to offer less-than-desirable working conditions, according to our data, and these conditions account for the higher rates of minority teacher turnover" (Ingersoll et al., 2014, p. 24). Large, nationally representative data sets such as the SASS seem ideal for future research examining the role of teacher gender and ethnicity with appraisals of the classroom.

Another important area for future research is investigating biological factors underpinning the appraisal process. Brosch and Sander (2013) noted that appraisal theories have greatly advanced our understanding of emotion, but have not integrated neuroscientific concepts or recent advances such as neuroimaging techniques. Denson, Spanovic, and Miller (2009) also noted that while appraisal theory is now a core component of many models of stress and health, links to physiological outcomes stemming from mood states need further specification—such as understanding the impact of specific appraisals on cortisol level and immune

responses. Researchers have begun to cortisol levels as markers of elevated stress in teachers (Moya-Albiol, Serrano, and Salvador 2010; Wolfram, Bellingrath, Feuerhahn, and Kudielka 2012), and linking such findings to appraisals made by teachers could add to a fuller understanding of the stress process in the educational context.

A third line of future research is necessary that addresses existing limitations in CARD research, such as using larger scale, generalizable samples to examine building- and district-level effects associated with teachers. For example, previous research using large national data sets has found that teachers in disadvantaged schools (Grissom 2011) and teachers in high poverty, high minority-enrollment schools leave at much higher rates than teachers in other schools (Ingersoll and May 2012). It would be advantageous to continue using the approach of assessing teacher demands and resources, as was conducted by Lambert et al. (2015), with a national dataset to investigate whether between school differences, such as the differences mentioned above, can be identified with teacher stress.

Future research could utilize the classification system from this study to analyze whether teachers reported high demand levels actually left the profession the following year or transferred schools. Further studies could also be conducted on whether teacher perceptions of classroom factors such as student behavior are due to perception or whether independent data about their classrooms matches these perceptions. There is also evidence to suggest that teacher perceptions of stress and coping are developmental (Goodard et al. 2006; Katz 1972; Lhospital & Gregory 2009; Rust 1994). As new teachers acclimate to their jobs, they begin to recognize discrepancies in their demands and resources and work to mitigate them, thus influencing levels of stress and career outlook. However, currently available CARD research employed only cross-sectional designs. Future research with measures such as the CARD should longitudinally examine the relationship between career status and teacher stress. Future studies could be designed to examine the specific question concerning whether the relationships between CARD scale scores and external measures of teacher stress and coping are more appropriately modeled as nonlinear relationships. For example, are there tipping points to the Appraisal Index above which teachers experience large increases in stress related symptoms?

Conclusion

Unlike previous working conditions research, the CARD and its connected findings use teachers' perceptions of their work environment to identify and anticipate teachers' risk for stress. From a policy standpoint, accurate assessment of teacher perceptions of classroom demands and resources can potentially allow school leaders to intervene in situations where teachers are most at risk of stress before occupational stress, burnout, and eventual attrition develops. The nature of the model (perceived stress vis-à-vis demands) also conceptually allows for more parsimonious analysis of teacher working conditions research. While acknowledging that classification of teachers into three groups according to risk for stress limits the full range of variability in the Appraisal Index, this classification approach offers policymakers, school leaders, and researchers a proactive analytical tool for examining teachers' workplace perceptions and potential occupational stress.

Taken together, these results provide evidence that teachers classified in the Demands group, that is, those experiencing or at substantial risk for occupational stress, have different perceptions of their classroom resources and demands than other teachers. Administrators and

other school personnel interested in retaining a higher proportion of their teachers and in creating and maintaining healthy work environments can benefit from strategies designed to help teachers overwhelmed by classroom demands. This framework can guide administrators through a process of carefully evaluating the areas in which their teachers feel the need for more resources, do not feel that existing resources are helpful enough, and areas where teachers may not be aware of or fully utilizing existing resources. Similarly, these findings suggest that administrators can benefit from being more sensitive to the aspects of classroom conditions in their buildings that teachers perceive as most demanding and to those individual teachers who perceive an imbalance between resources and demands. In addition, this research has the potential to inform teacher education, by offering insight into the workplace attitudes of teachers and how they differ across various professional contexts. Such data might help teacher educators emphasize optimal professional resources in their programming, thereby helping to reduce teacher turnover and improve the overall quality of teaching and learning.

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