

MEASURING ELEMENTARY TEACHER STRESS AND COPING IN THE CLASSROOM: VALIDITY EVIDENCE FOR THE CLASSROOM APPRAISAL OF RESOURCES AND DEMANDS

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The Classroom Appraisal of Resources and Demands (CARD, elementary version) was used to investigate teacher stress among a sample of elementary teachers ($n = 521$). The CARD measures teacher stress by examining the subjective experience of both classroom demands and resources provided by the school, and thereby attempts to capture the situationally specific nature of teacher stress. This study attempted to examine whether the CARD can provide reliable and valid information that addresses the call by experts in the field of teacher stress research for measures that consider each teacher's specific occupational circumstances. Specifically, the factor structure of the CARD was supported empirically. Further evidence was offered for the construct and concurrent validity by correlations between CARD scales scores and other measures theoretically relevant to teacher well-being: general health, teacher efficacy, self-critical attitudes, and burnout symptoms.
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Teaching is widely recognized as a stressful occupation (Dunham & Varma, 1998; Kyriacou, 2000; Kyriacou, 2001; Lambert & McCarthy, 2006; Travers & Cooper, 1996). The National Center for Education Statistics (NCES) reported that approximately 8% of teachers transfer to a different school each year and another 7% leave the profession altogether. Among the reasons given for such decisions by both groups of teachers were their dissatisfactions with pay and benefits, lack of support from administrators, and a sense that overall working conditions were not positive (NCES, 2004). The costs of teacher attrition range from disrupted continuity of the instructional program, to a constant need to mentor and assist new teachers, to the resources and time that educational administrators spend recruiting and attempting to retain new hires.

To help elementary teachers prevent excessive work-related stress, further efforts aimed at understanding teachers' experiences of occupational stress have been called for (Cocco, Gotti, de Mendonca, & Carles, 2003). One potentially powerful paradigm for better understanding teacher stress and coping is the transactional model proposed by Lazarus and Folkman (1984). They suggested that when a person encounters life demands, a cognitive process is triggered in which perceived demands of the event are weighted against a person's perceived capabilities for coping with those demands. When this transaction results in a perception that one is facing demands that exceed the resources one has for coping, the stress response ensues (Sapolsky, 1998). According

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to current models of stress and coping, teachers who experience excessive demand levels vis-à-vis their resources are at risk for the negative effects of stress, which can include health problems and psychological burnout (McCarthy, Kissen, Yadley, Wood, & Lambert, 2006). In fact, teachers are the largest homogenous occupational group investigated in burnout research, comprising 22% of all samples (Schaufeli & Enzmann, 1998).

Although transactional models of stress and coping emphasize the importance of subjective evaluations of situational demands and perceived resources in determining whether demands are experienced as stressors (Matheny, Aycock, Pugh, Curlette, & Cannella, 1986), most stress research continues to treat stress as a single construct rather than the difference between two distinct constructs: resources and demands (McCarthy, Lambert, O'Donnell, & Melendres, 2009). The current study was designed to provide validity evidence for the Classroom Appraisal of Resources and Demands (CARD; Lambert, McCarthy, & Abbott-Shim, 2001), a measure of a teacher's cognitive appraisals of both the classroom demands hypothesized to contribute to teacher stress and school-provided resources. The CARD is based theoretically on transactional models of stress, but focuses specifically on the demands of the classroom environment and the material resources available to teachers to meet those demands.

The CARD takes into account the unique demands faced by teachers today, who sometimes struggle mightily with ever-increasing pressures both inside and outside of the classroom (McCarthy & Lambert, 2006). McCarthy et al. (2009) noted that the few extant investigations of stress in teachers of young children have identified the following demands: teaching children with problem behaviors (Pratt, 1978), larger class sizes (French, 1993), administrative or policy-related issues, excessive paperwork requirements, workload and time constraints, and pressure from administrators, specifically those related to mandated curricula and instructional strategies (Moriarty, Edmonds, Blatchford, & Martin, 2001).

Although these demands and stressors have consistently appeared in the teacher stress research literature for more than 40 years (Kyriacou, 2000), working conditions for teachers have become more difficult in recent years in several significant ways. Students in the United States may come to school less ready to learn than they did in previous generations. They arrive at school with fewer hours of sleep, less structure in their homes, and more exposure to electronic entertainment (McCarthy & Lambert, 2006). They are more likely to come from homes where English is not the native language, and a higher percentage live in homes with no nonworking parents than in any previous generation of American children. In addition, a cultural shift has taken place over the last generation whereby American parents have moved away from support for and recognition of the authority of educators to a posture of advocacy for their children. All of these factors have combined to make teaching a more stressful occupation than it has ever been (McCarthy & Lambert, 2006).

The situation-specific nature of stress and the subjective experience of both demands and resources mean that individuals may report perceived control in one situation while making a different appraisal of resources and demands under other circumstances. In previous research using data from some of the same schools as the current study, McCarthy et al. (2009) examined levels of elementary teachers' burnout symptoms (1) between schools, with individual/teacher perceptions of demands and resources aggregated to the group level, and (2) at the individual teacher within schools level, so that perceptions of classroom demands and resources, as well as teachers' personal coping resources and experience, were taken into account. McCarthy et al. (2009) assessed classroom demands and resources using the CARD, used the Preventive Resources Inventory (PRI; McCarthy & Lambert, 2006) as a measure of teachers' psychological coping resources, and used the Maslach Burnout Inventory (MBI; Maslach, Jackson, & Leiter, 1996) to measure burnout symptoms.

McCarthy et al. (2009) collected stress and burnout data from 451 teachers and used hierarchical linear modeling to nest teachers within 13 elementary schools. Although there was little

between-school variance in reported burnout symptoms, each of the individual teacher-level CARD variables was associated in the predicted direction with burnout symptoms. These findings were interpreted as supporting transactional models of stress as individual differences among teachers within schools in perceptions of demands and resources were predictive of burnout symptoms whereas differences in school context were not. Therefore, this study demonstrated that the CARD is sensitive to between-teacher differences, within the same school, in perceptions of both the classroom environment and school climate.

Understanding the importance of teacher perceptions of demands and resources seems especially relevant to examine in an educational context, where perceptions of both resources and demands can vary considerably depending on classroom characteristics, teacher background, and school environment (McCarthy & Lambert, 2006). Furthermore, experts in the field of teacher stress research have called for measures that consider each teacher's unique classroom conditions, particularly their perceptions of excessive administrative demands, teacher-child interactions, and classroom climate (Kyriacou, 2001). The CARD goes beyond the typical measures of management climate to help identify specific sources of teacher stress and stress levels and therefore more closely target specific sources of teacher stress when working with educational administrators. Although numerous measures exist in the literature for measuring various aspects of the stress process (Green et al., 1988; Hammer & Marting, 1988; Sarason et al., 1978), as was noted, few attempt to assess the central theoretical premise of transactional models of stress: that stress symptoms occur when perceived demands exceed perceived resources (Lazarus & Folkman, 1984).

This study attempted to examine whether the CARD can provide reliable and valid information that addresses the call by experts in the field of teacher stress research for measures that consider each teacher's specific occupational circumstances (Kyriacou, 2001). Specifically, three research questions were addressed in this study. The first research question, whether support could be found for the construct and concurrent validity of the CARD, was examined with correlations between the CARD scale scores and other measures theoretically relevant to teacher well-being: general health, teacher efficacy, self-critical attitudes, and burnout symptoms. The second research question addressed whether support could be demonstrated for the central theoretical premise of the CARD, that teacher stress results from an imbalance between perceived demands and resources. To do so, teachers were classified into the following groups based on their CARD scores: reported classroom demands greater than resources, resources greater than demands, and resources equal to demands. Group differences in burnout symptoms were then examined. The third question, whether the hypothesized factor structure of the CARD could be supported empirically, was addressed with a confirmatory factor analysis (CFA) of the CARD scale scores.

METHOD

Participants

The participants for this study were teachers ($n = 521$) working in 16 elementary schools within one county that comprises part of the metropolitan statistical area for a large urban area in the southeastern United States. A metropolitan statistical area is a geographic delineation defined by the U.S. Office of Management and Budget (OMB). The OMB uses U.S. Census Bureau population data and data regarding business interdependence to define areas that have commuting, commercial, and community ties (U.S. Census Bureau, 2009). The current study is part of a larger study ($n = 3,511$) involving cross-cultural comparisons of teacher stress across seven countries (Evereart, 2003). The U.S. sample has been used to make comparisons of high and low poverty schools, and teacher stress and burnout during the fall and spring of the academic year (O'Donnell, Lambert, & McCarthy, 2008). Only data from the U.S. sample was used in this study.

There were no sampling procedures used in this study. The participating county system gave permission to include all of their elementary schools in the study, and an attempt was made to obtain responses from all teachers. The system includes suburban and rural school settings as well as high wealth and low wealth student populations. Eight of the schools (50.0%) are Title I schools, and the building level percentage of minority students ranged from 11% to 52% ($M = 30.75\%$). Title I schools have higher numbers of children living below the poverty level and receive extra federal funding to support initiatives toward school improvement. The schools had an average of 36.74% of their students qualifying for free or reduced lunch, and building level percentages ranged from 10.37% to 73.96%. The state testing program yields a composite score for each school that indicates the percentage of students performing at or above grade level. The mean school composite score was 87.56 (standard deviation [SD] = 4.16) for the academic year preceding the study, and the scores ranged from 79.60 to 93.00.

The teachers had an average of 11.94 years of teaching experience, ranging from less than one year to a maximum of 38 years, and 5.57% of the sample was in their first year of teaching. The teachers had an average of 6.24 years experience in their current school, ranging from less than one year to 34 years, and 18.04% of the sample was in their first year at their current school. The teachers were 90.4% European American (83.1% for the United States), 95.7% female (75.0% for the United States), and 29.0% had master's degrees (40.9% for the United States). Therefore, the teachers in this sample were more likely to be European American, female, and have bachelor's degrees than the total population of U.S. teachers (NCES, 2009).

To ensure confidentiality, the researchers chose not to ask participants to reveal the grade level they taught as the combination of grade level, gender, and ethnicity could reveal the identity of participants in many of the schools. The teachers reported an average class size of 21.50 ($SD = 3.80$) and described their classrooms as having, on average, 3.46 children with problem behaviors ($SD = 2.80$), 3.41 children with learning disabilities ($SD = 3.92$), and 3.15 children who are learning English ($SD = 4.35$).

Measures

The CARD (elementary version; Lambert, McCarthy, & Abbott-Shim, 2001) was used because of its ability to measure teacher stress by examining the perceptions of both classroom demands as well as resources that are provided by the school. The item content of the CARD was constructed based on a review of literature on stress in teachers of young children, as well as teacher and administrator interviews. Several pilot studies were conducted during the development of the instrument so that feedback could be received based on both the content of items, as well as the ability of the instrument as a whole to measure the construct of elementary teacher stress (Lambert, McCarthy, & Abbott-Shim, 2001).

The CARD consists of two scales: Classroom Demands and Classroom Resources. The Demands scale consists of 35 items that ask teachers to rate the severity of demands based on various aspects of the classroom using a 5-point Likert scale that ranges from 1 ("Not Demanding") to 5 ("Extremely Demanding"). The Resources section includes 30 items addressing the helpfulness of various school resources using the same Likert scale described. The original intent during the development process was to construct dimensionally distinct scales so that the demands items could not be construed as potential resources and vice versa. Relatively low correlations have been found across studies ($r = -.208$ to $-.080$), suggesting that the scales yield distinct information.

A previous study (Lambert, McCarthy, O'Donnell, & Melendres, 2007) found sample-specific reliabilities for both the Demands scale score (Cronbach's $\alpha = .92$) as well as the Resources

scale score ($\alpha = .95$). This study demonstrated the dimensional distinctness of the two sections of the CARD, and also yielded factor analysis results that assist in defining the construct validity of the sections by outlining subscales. Specifically, factor analysis was used to explore the underlying dimensions of both the resources and demands sections of the CARD. A four-factor solution emerged that accounted for 56.65% of the variance within the Demands section. The Administrative Demands subscale addresses demands associated with meetings, paperwork, assessments, and various non-instructional duties. The Availability of Instructional Materials subscale involves demands associated with access to materials and supplies. The Children with Problem Behaviors subscale addresses the demands associated with behavior management and interactions with children who disrupt the learning environment. The Children with Other Special Needs subscale outlines demands involved with children who present other needs to the teacher, such as English language acquisition and physical disabilities. For the Resources section, a four-factor solution emerged that accounted for 71.54% of the variance. The Specialized Resources subscale refers to resources designed to help teachers with children who have special needs. The General Program Resources subscale allows the teachers to rate how helpful they find administrators, other teachers, general instructional materials, and staff development opportunities. The Additional Adults in the Classroom subscale refers to the help and support that teachers receive from parents and other volunteers in the classrooms. The Support Personnel subscale involves ratings of the helpfulness of individuals within the school system who are charged with providing assistance to teachers, particularly for working with children having special needs. The Instructional Resources subscale includes ratings of the helpfulness of the supplies and material resources that are provided to the teachers. In this study (Lambert et al., 2007), all of the subscales and the total score for the Resources section yielded sample-specific information with adequate reliability (see Table 1).

Criterion validity was found by associations in the predicted direction between the measure's scale scores and the classroom average number of children with problem behaviors and learning disabilities (Lambert et al., 2007). Specifically, teachers who rated classroom demands as higher than resources also reported on average 2.020 more children with problem behaviors and 1.370 more

Table 1
Measurement properties of the CARD scales and subscales

Measure	Subscale	Number of Items	Cronbach's Alpha Reliability Coefficients			
			Study 1 <i>n</i> = 317	Study 2 <i>n</i> = 276	Study 3 <i>n</i> = 451	Current Study <i>n</i> = 521
Demands	Children with Problem Behaviors	4	.911	.928	.948	.929
	Other Student Related Demands	11	.808	.811	.849	.846
	Administrative Demands	15	.920	.882	.884	.888
	Lack of Instructional Resources	5	.908	.877	.919	.894
	Classroom Demands Total Score (D)	35	.941	.916	.926	.926
Resources	Instructional Resources	9	.891	.877	.861	.889
	Additional Adults in the Classroom	5	.785	.828	.832	.836
	Support Personnel	9	—	.892	.832	.837
	Specialized Resources	7	.944	.951	.950	.940
	Classroom Resources Total Score (R)	30	.950	.954	.940	.940
Stress	Difference Score (D - R)	65	.950	.949	.945	.943

Note. Study 1 = Lambert, O'Donnell, Kusherman, & McCarthy, 2006; Study 2 = Lambert, McCarthy, O'Donnell, & Melendres, 2007; Study 3 = McCarthy, Lambert, O'Donnell, & Melendres, 2007.

children with learning disabilities in their classrooms than teachers who reported that classroom resources were at least equal to demands.

Another previous study (Lambert, O'Donnell, Kusherman, & McCarthy, 2006) found similar reliability and validity evidence in the preschool version of the CARD and demonstrated the following sample-specific reliabilities: Demands scale score ($\alpha = .94$) and Resources scale score ($\alpha = .95$). Also presented in this study were factor analysis results, which help to define the construct validity of the measure by demonstrating that the scales are dimensionally distinct and by identifying a subscale structure to the factors that was similar to the results found with other samples (Lambert et al., 2007). The current study also demonstrated sample-specific reliability, which is demonstrated through the following subscales: Other Student-Related Demands ($\alpha = .85$), Children with Problem Behaviors ($\alpha = .93$), Administrative Demands ($\alpha = .89$), Availability of Instructional Materials ($\alpha = .89$), and Overall Demands ($\alpha = .93$). The Classroom Resources scale includes the following subscale reliabilities: Additional Adults in the Classroom ($\alpha = .84$), Support Personnel ($\alpha = .89$), Instructional Resources ($\alpha = .84$), Specialized Resources ($\alpha = .94$), and Overall Resources ($\alpha = .94$).

Further evidence for the reliability and validity of the CARD is discussed in other reports of the findings of the larger study. For example, Jazzar, Lambert, and O'Donnell (2007) reported that teachers expressing their intention to leave the profession rated their classrooms as more demanding (effect size = .388) and the resources available to them as less helpful (effect size = .344); they also reported higher stress (effect size = .471) than did their counterparts intending to remain in teaching. They also scored higher on the CARD stress score. The same teachers reported that the most demanding components of the classroom environment were disruptive student behavior and the challenges associated with children with a variety of special needs.

The MBI (Maslach, Jackson, & Leiter, 1996) was used to assess burnout symptoms. Respondents are asked to indicate their level of agreement with statements about their occupational experiences. The MBI consists of 22 items and yields scores along three dimensions described earlier: emotional exhaustion (EE), depersonalization (DP), and professional accomplishment (PA). Each MBI item includes a 7-point frequency scale ranging from 0 ("never") to 6 ("everyday"). Nine items comprise the EE scale of the MBI, which asks respondents to rate how frequently they experience such things as fatigue, frustration, and interpersonal stress in their jobs. The DP scale is composed of five items that ask respondents to rate how frequently they have negative experiences with colleagues and clients. The eight items on the PA scale ask respondents to rate how frequently they have positive experiences in their jobs. For both MBI-EE and MBI-DP subscales, higher scores correspond to greater experienced burnout. For ease of interpretation in the current study, we reverse coded scores on the MBI-PA subscale so that higher scores corresponded to higher experienced burnout (i.e., reduced personal accomplishment) on this dimension as well.

The MBI is widely noted in the literature as the foremost measure of burnout, and has been used in more than 90% of the research on burnout (Hastings et al., 2004; Schaufeli & Enzmann, 1998). Maslach et al. (2001) noted that strong support has been found for the psychometric properties of the MBI. The MBI manual (Maslach & Leiter, 1997) reviews the extensive research on the MBI in many countries and notes that numerous psychometric studies have supported the validity of the three-dimensional structure of the measure.

Maslach & Leiter (1997) also detailed studies on the validity and reliability of the MBI-Educators Survey, which was the version of the MBI used in this study, and noted reported Cronbach's alpha values ranging from .88 to .90 for emotional exhaustion, .74 to .76 for depersonalization, and .72 to .76 for personal accomplishment. Each of these values is generally consistent with findings from the more general version of the MBI. The overall Cronbach's alpha for the MBI with this sample was .909, and we obtained values of .903, .684, and .750 for the EE, DP, and PA scales,

respectively. With respect to validity evidence, Maslach & Leiter (1997) reported that research has supported the three-factor structure of the MBI-ES with samples of teachers (for a more extensive review, see Maslach et al., 1996, 2001).

Self-Efficacy. Yoon (2002) developed this six-item instrument to measure teachers' levels of self-efficacy "in establishing a positive relationship with a behaviorally challenging student and in managing disruptive and oppositional behaviors" (p. 488). Items ask teachers about such factors as their ability to build relationships with difficult students and their capacity to handle problematic student behavior when it occurs. Yoon (2002) reported a Cronbach's alpha of .83, and in this study the Cronbach's alpha was .766.

Self-Critical Attitudes. Teachers' self-appraisals were measured using a scale originally developed by Carver and Ganellan (1993) and modified by Wearing, Bell, McMurray, Conn, & Dudgeon (1990) that assesses the extent to which teachers hold critical attitudes about themselves. The resulting self-critical attitudes measure has three items that assess how negatively teachers view themselves in general and specifically when things go wrong in the classroom. Hart, Wearing, and Conn (1995) found that Cronbach's alpha for this scale was .870, and in this study the Cronbach's alpha was .755.

General Health Questionnaire. The General Health Questionnaire (GHQ; Goldberg, 1979) is a 12-item self-report measure of the teacher's perceived current physical and mental health functioning. The Cronbach's alpha reliability using the data from this sample was .874.

Standard Questionnaire–Teacher Stress. The Standard Questionnaire–Teacher Stress (SQ) was developed (Everaert, 2003) to assess teacher perceptions of different types of demanding student behavior and the stress teachers report as associated with these behaviors. The measure focuses on the subjective views of teachers regarding the interaction between students and teachers in the context of normal daily classroom activities. By soliciting perceptions of the most difficult children in an individual teacher's classroom, the measure is designed to assess a broader view of the teacher's perceptions of the stressors that they experience in their workplace. The measure also includes questions about the supports that teachers receive from the parents, colleagues, and the community. The following subscales were included in this study (listed with their respective Cronbach's alpha reliabilities from this sample) as they were hypothesized to yield information that is related to CARD scores: Overactive Sensitive Behaviors (.882), Positive Social Behaviors (.908), Disruption of the Teaching Process (.878), Support of Colleagues (.928), and Parent and Community Support (.949).

Procedures

Due to the practical infeasibility of collecting surveys from all of the schools at the same time, and to accommodate the needs of the larger study (O'Donnell, Lambert, & McCarthy, 2008; Everaert, 2003), schools were randomly assigned to fall or spring data collection. The fall schools received the CARD, the PRI (McCarthy & Lambert, 2001), a measure of coping strategies not used in these analyses, and the MBI, in that order. The spring schools received the same packet at the staff meetings using the same procedure, and a separate more comprehensive packet offered as a take home option, containing measures in the following order: SQ (Everaert, 2003), Self-Efficacy (Yoon, 2002), Self-Critical Attitude (Carver & Ganellan, 1993), and the GHQ (Goldberg, 1979). Teachers receiving the larger take-home packet were given \$10 gift cards when they returned the completed survey packet. Teachers in fall data collection schools where the smaller packet was used were not offered gift cards and were given time in the staff meetings to complete the measures.

A data collection coordinator delivered the study measures to each school, provided introductions and an explanation of the research project to the teachers during an already scheduled staff

meeting, and offered the teachers the opportunity to complete the measures during the meeting. Teachers returned the measures to an envelope provided by the data collection coordinator. A business reply envelope was provided to teachers not able to complete the survey in the allotted time so that completed surveys could be mailed to the researchers. Blank copies of the surveys along with business reply envelopes were placed in the mailboxes of those teachers not able to attend the staff meetings. The response rates from teachers attending the meetings were at or almost 100% in each school. The researchers did not collect information about the attendance levels at the meetings, however. By using total counts of eligible staff, teachers, and assistants, the researchers were able to calculate the overall (77.62%) and school-specific response rates (59.26%–96.77%). Therefore, attendance rates at the staff meetings and the willingness of teachers to complete the surveys outside of the meetings varied across the schools.

Analyses

Analyses were conducted in three phases to address the three research questions: correlations between CARD scale scores and other measures to examine construct and concurrent validity, an examination of differences between CARD stress level groups with respect to stress-related outcomes, and CFA of the CARD scale scores. The CFA was conducted using the pooled within schools covariance matrix to account for the nesting of teachers within schools (Hox, 2002; MacCallum, 1996; Stapleton, 2006). Item parcels were modeled as the observed variables rather than the items themselves to obtain a more parsimonious model and to take advantage of the fact that the item parcel scores were much more normally distributed than the item scores. The subscale scores of the CARD were used as the item parcels as they have much more normal distributions than do the item score distributions that result from a 5-point Likert scale and often had skewed distributions with few discrete values. Item parcels have been shown to yield better fitting solutions with coarsely categorized item data (Bandalos, 2002).

The correlations between the CARD scale scores and each of the scale scores from the other measures in the study were examined to explore the concurrent validity of the CARD. Additional analyses were performed that served to both reformat the associations between the CARD scale scores and the other measures of stress and coping in terms of group differences and to demonstrate the validity of the CARD group classifications (Resources greater than Demands [$R > D$], Resources equal to Demands [$R = D$], Demands greater than Resources [$D > R$]). First, ordinary one-way analysis of variance with Tukey post hoc comparisons was used to compare these three groups across the other measures. Next, a chi-square test of association was used to examine the degree of association between the three groups and the groups formed using the MBI high burnout and low burnout classifications.

RESULTS

The general form of the reliability of a difference score formula that allows for different variances for each of the scale scores (Crocker & Algina, 1986) was used to examine the reliability of the stress score. This strategy necessitates a relatively low degree of correlation between the two scale scores in question along with relatively high reliabilities for each of the scale scores to achieve acceptable reliability. These conditions were met yielding a reliability estimate of .94 for the difference score. The stress score was therefore calculated by subtracting the standardized versions of the scale scores, Demands minus Resources, and the standard error of measurement for the difference score was used to create a 95% confidence interval around a difference score of 0. The upper and lower bounds on this interval were used to classify teachers into one of three groups: $D > R$ (24.2%), $R = D$ (37.8%), and $R > D$ (38.0%). The $D > R$ group is considered to be at risk

for a more stressful experience in the classroom. The scale scores (overall Demands and Resources), the subscale scores, and the Stress, or difference score, were used as the outcome variables in this study. Table 1 presents evidence for the consistency of the reliability evidence for the CARD across multiple studies. It is important to note that the similarities in reliability evidence between Study 3 and the current study are likely related at least in part to the fact that some of the school settings are shared between the studies. Table 2 includes Cronbach's alpha reliability statistics using the current sample for all other measures in the study.

The correlational analyses demonstrated little to no association between CARD scale scores and measures of divergent constructs (see Table 2). Specifically, no CARD scale score was correlated with the GHQ scale score higher than .231. This measure was included to demonstrate that the CARD is tapping into constructs that are distinct from general physical well-being. The Self-Efficacy scale, included to demonstrate that the CARD measures constructs distinct from a teacher's general sense of efficacy about his or her teaching, was correlated no higher than $-.167$ with any of the CARD scale scores. The Self-Critical Attitude scale, included to demonstrate that the CARD measures constructs distinct from teachers' general tendency to have negative thoughts and attitudes about themselves and their jobs, correlated no higher than .236 with any CARD scale score.

The correlational analyses demonstrated moderately strong associations between CARD scale scores and some of the measures of similar or related constructs. Moderately strong associations were found between CARD scale scores and MBI burnout scores ($r = .360-.480$). Of all the CARD scale scores, the strongest associations with MBI scale scores were found with the Stress score: Emotional Exhaustion ($r = .460$), Depersonalization ($r = .336$), Lack of Professional Accomplishment ($r = .388$), and Burnout ($r = .480$).

The CARD classifies teachers as rating $R > D$, $R = D$, and $D > R$ (the stress condition). For all three of the MBI scales, Emotional Exhaustion, Depersonalization, and Lack of Professional Accomplishment, teachers in the stress condition scored substantially lower than those in the other groups. Differences between the stress condition and the $R > D$ condition were statistically significant and ranged from an effect size of .810 to 1.171 (see Table 3).

The authors of the MBI measure suggest cut scores that indicate the threshold for the burnout condition on each scale. These cut scores were used to create high (burnout) or low MBI score classifications for each respondent. This classification was cross-tabulated against the three stress categories formed using the CARD scoring system, and the chi-square test of association was applied. This test yielded a statistically significant association between the MBI and CARD classifications for all three MBI scales (Emotional Exhaustion $\chi^2_{(2)} = 27.506$, $p < .001$; Depersonalization $\chi^2_{(2)} = 11.170$, $p < .005$; Lack of Professional Accomplishment $\chi^2_{(2)} = 33.965$, $p < .001$). When the percentage of teachers in the high burnout symptoms range for each scale was compared across the three CARD subgroups, in each case teachers in the stress condition were much more likely to score in the high range than were those in the other groups (see Table 4), and these differences were statistically significant. Specifically, 48.4% of teachers in the CARD stress condition scored in the high range on Emotional Exhaustion as compared to 31.1% for $R = D$ and 16.9% for $R > D$. For the Depersonalization scale, 11.0% of teachers in the stress condition scored in the high range as compared to 5.4% for $R = D$ and 1.3% for $R > D$. For the Lack of Professional Accomplishment scale, 42.9% of teachers in the stress condition scored in the high range as compared to 25.0% for $R = D$ and 10.4% for $R > D$.

The teachers were clustered within schools, but the clusters did not contain equal numbers of participants. Therefore, for the construct validity portion of this investigation, the sample size per group if the clusters were balanced was calculated using the following formula provided by Kenny

Table 2
Association between CARD scales and stress-related outcomes

CARD Scale	General Health	Self-Critical Attitude	Self-Exhaustion	Depersonalization	Lack of Prof. Accomp.	Total Burnout	Overactive Distractable Behavior	Positive Social Behavior	Disruption of Teaching Process	Support of Colleagues	Parent and Community Support
Children with Behavior Problems	.204	-.167	.236	.360	.204	.271	.349	-.407	.415	-.155	-.297
Children with Other Special Needs	.181	.045	.157	.257	.159	.229	.266	-.263	.161	-.085	-.259
Administrative Demands	.206	.059	.152	.429	.261	.391	.441	-.206	.011	-.124	-.144
Availability of Instructional Materials	.062	-.058	.123	.211	.217	.219	.248	-.080	.047	-.187	.010
Classroom Demands Total Score	.223	-.002	.213	.431	.284	.395	.451	-.290	.152	-.164	-.221
Instructional Resources	-.053	.148	-.083	-.235	-.255	-.198	-.270	.165	-.067	.369	.166
Additional Adults in the Classroom	-.140	-.013	-.063	-.158	-.156	-.076	-.159	.229	-.055	.188	.393
Support Personnel	-.082	.048	-.094	-.237	-.204	-.177	-.249	.216	-.079	.350	.192
Specialized Resources	-.145	.049	-.062	-.266	-.148	-.173	-.248	.146	-.105	.196	.265
Classroom Resources Total Score	-.139	.080	-.103	-.282	-.244	-.199	-.293	.232	-.100	.352	.298
Stress	.231	-.040	.201	.460	.336	.388	.480	.077	.160	-.309	-.317
Cronbach's Alpha	.874	.766	.755	.903	.684	.750	.909	.882	.878	.929	.949

Note. All values greater than or equal to .300 are shown in bold. All values greater than .144 are statistically significant at $p < .05$.

Table 3
Differences in burnout levels and teacher perceptions of selected demands and resources by CARD stress level groups

SQ Scale		Group 1	Group 2	Group 3	n = 187	Post Hoc Comparisons	Effect Size f vs. 3
		n = 77 R > D	n = 65 R = D	n = 45 D > R			
Overactive Distractible Behavior	Mean	19.862	22.188	21.111	20.964	—	0.161
	SD	7.764	7.789	6.526	7.314		
Positive Social Behavior ^a	Mean	43.987	40.128	39.178	41.488	1 > 2, 3	-0.694
	SD	6.933	6.537	8.706	7.536		
Disruption of Teaching Process	Mean	13.649	15.609	15.733	14.828	—	0.277
	SD	7.513	7.278	6.054	7.137		
Support of Colleagues ^a	Mean	73.143	70.415	65.337	70.316	1, 2 > 3	-0.763
	SD	10.230	9.939	13.595	11.392		
Parent and Community Support ^a	Mean	3.434	3.033	2.729	3.125	1 > 3	-0.782
	SD	0.902	0.951	1.021	0.985		

MBI Scale		Group 1	Group 2	Group 3	n = 393	Post Hoc Comparisons	Effect Size f vs. 3
		n = 154 R > D	n = 148 R = D	n = 91 D > R			
Emotional Exhaustion ^a	Mean	16.523	22.660	26.361	21.112	1 < 2 < 3	1.107
	SD	8.887	9.456	10.041	10.153		
Depersonalization ^a	Mean	3.055	5.023	6.496	4.593	1 < 2 < 3	0.972
	SD	3.541	4.310	5.251	4.475		
Lack of Professional Accomplishment ^a	Mean	11.496	14.176	16.151	13.583	1 < 2 < 3	0.810
	SD	5.744	4.780	5.102	5.550		
Burnout ^a	Mean	30.629	41.381	48.499	38.816	1 < 2 < 3	1.171
	SD	15.260	15.488	17.068	17.272		

Note. ^a - p value for the overall Anova < .001.

and Judd (1986).

$$n. = \frac{N^2 - \sum_{g=1}^G n_g^2}{N(G - 1)} = \frac{521^2 - \sum_{g=1}^{16} n_g^2}{521(16 - 1)} \approx 32.28$$

The average cluster size for the whole sample was 32.56 with an SD value of 12.09 (Min = 12; Max = 54). So, the calculated sample size per group if the sample size were balanced across groups (n.) was quite close to the average cluster size. Variance components using school ID as the grouping variable and the resulting estimates of the intraclass correlation (ICC) for each of the nine variables are shown in Table 5.

$$ICC = \frac{MS_B - MS_W}{MS_B + (n. - 1)MS_W}$$

The values contained in Table 5 were all small in size (Kreft & de Leeuw, 1998), indicating that approximately 5% of the variance in each of the variables can be attributed to school effects and 95% to individual effects.

Table 4
Percentage of each CARD stress group placing in the high and low burnout groups on the MBI scale scores

MBI Scale			Group 1	Group 2	Group 3	n = 393 Total
			n = 154 R > D	n = 148 R = D	n = 91 D > R	
Emotional Exhaustion ^a	High	%	16.9	31.1	48.4	29.5
		n	26	46	44	116
	Low	%	83.1	68.9	51.6	70.5
n		128	102	47	277	
Depersonalization ^a	High	%	1.3	5.4	11.0	5.1
		n	2	8	10	20
	Low	%	98.7	94.6	89.0	94.9
n		152	140	81	373	
Lack of Professional Accomplishment ^a	High	%	10.4	25.0	42.9	23.4
		n	16	37	39	92
	Low	%	89.6	75.0	57.1	76.6
n		138	111	52	301	

Note. ^a - p value for the χ^2 test of association < .005.

Table 5
Variance decomposition and intraclass correlation coefficients for each variable in the model

Variable	Mean Square Within	Mean Square Between	ICC
Years in Current School	151.18	36.49	0.09
Other Student Related Demands	1.43	0.48	0.06
Children with Problem Behaviors	2.46	1.01	0.04
Administrative Demands	1.39	0.53	0.05
Lack of Instructional Resources	3.79	0.86	0.10
Additional Adults in the Classroom	1.17	0.66	0.02
Support Personnel	2.10	0.50	0.09
Instructional Support	0.60	0.35	0.02
Specialized Resources	2.06	0.76	0.05

The estimates of the between- and pooled within-school covariance matrices were calculated with MINITAB using the following formulas:

$$S_B = (G - 1)^{-1} \sum_{g=1}^G n_g (\bar{y}_g - \bar{y})(\bar{y}_g - \bar{y})'$$

$$S_{PW} = (N - G)^{-1} \sum_{g=1}^G \sum_{i=1}^{n_g} (y_{gi} - \bar{y}_g)(y_{gi} - \bar{y}_g)'$$

The theoretical model (Figure 1) was tested on the pooled within-group covariance matrix only. This model is a measurement model to test the construct validity of the measurement. First, the Demands and Resources latent variables were created by assigning each of the observed CARD

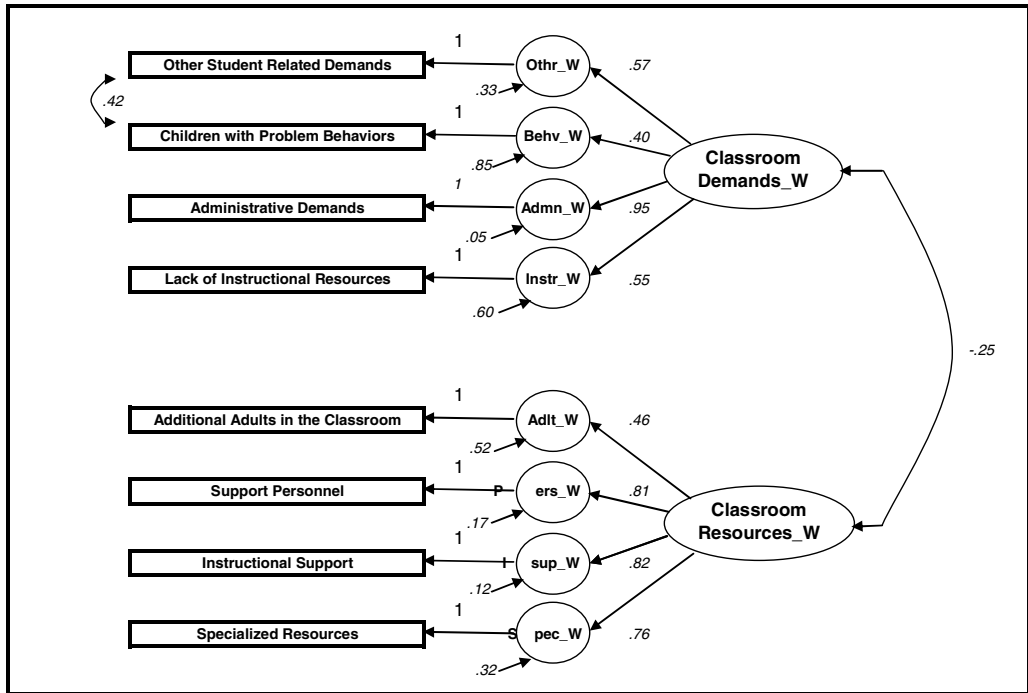


FIGURE 1. Theoretical model of the CARD scale structure using the pooled within-school covariance matrix.

subscales to its respective latent construct. The number of cases was set to $N - G$ (the difference between the sample size and the number of schools). The model fit quite well: $\chi^2_{(18)} = 69.846$, $\chi^2/df = 3.880$, normed fit index = .947, comparative fit index = .959, incremental index of fit = .960, goodness of fit index = .967, adjusted goodness of fit index = .934, standardized root mean square residual = .052, root mean square error of approximation (RMSEA) = .076 (95% lower limit = .057, upper limit = .094). The correlation between the two constructs was estimated to be $-.25$.

In summary, the CFA found favorable fit statistics regarding the factor structure of the CARD. The estimated path coefficient for the relationship between Demands and Resources was low and consistent with previous research (Lambert et al., 2006; Lambert, McCarthy, O'Donnell, & Melendres, 2007). The largest coefficient for the relationships between the latent construct of classroom Demands and its subscales was for the Administrative Demands subscale, and the largest coefficients for the relationships between the latent construct of classroom Resources and its subscales were for the Instructional Resources and Support Personnel subscales.

DISCUSSION

Three research questions guided the current study. The first research question was whether support could be found for the construct and concurrent validity of the CARD, which was examined with correlations between CARD scales scores and other measures theoretically relevant to teacher well-being: general health, teacher efficacy, self-critical attitudes, and burnout symptoms. As can be seen in Table 2, the correlational analyses demonstrated little to no association between CARD scale scores and measures of divergent constructs (see Table 2), with correlations ranging from .231 for the GHQ, to $-.167$ between self-efficacy and .236 with self-critical attitude and the CARD behavior problem scale scores. The latter two correlations are interesting and suggest that behavior problems

in the classroom could both undermine a teacher's sense of efficacy and lead him or her to have a more critical attitude toward their teaching ability.

Paralleling the McCarthy et al. (2009) study, the second research question addressed whether support existed for the central theoretical premise of the CARD that stress results from an imbalance between perceived demands and resources: Teachers were classified into high demand, high resources, and equal demand and resource groups, and differences in burnout symptoms were examined. Teachers classified in the stress condition reported higher levels of emotional exhaustion, a tendency to depersonalize and distance themselves from their students, and feelings of little professional accomplishment as measured by the MBI. They also reported lower levels of positive social behavior among their students and lower support from colleagues, parents, and the community as measured by the SQ. Administrative demands such as testing and paperwork, and children with problem behaviors, were reported as the most challenging aspects of their jobs.

The third question was whether the hypothesized factor structure of the CARD could be supported empirically, which was addressed with a CFA of the CARD scale scores. As was noted, the CFA found favorable fit statistics regarding the factor structure of the CARD, and, as can be seen from Figure 1, the relationship between Demands and Resources was $-.25$, suggesting that in fact these constructs are distinct (Lambert et al., 2006, 2007). As was noted, the largest coefficient for the relationships between the latent construct of classroom Demands and its subscales was for the Administrative Demands subscale (.95), indicating that teachers often find administrative issues to be a significant source of stress. The largest coefficients for the relationships between the latent construct of classroom Resources and its subscales were for the Instructional Resources (.82) and Support Personnel (.81) subscales, which of course are vital components of a teacher's job.

Although teachers are widely recognized as vulnerable to stress given the high demands of their occupation, the existing literature does not yet provide a clear pathway for interventions designed to reduce the harmful effects of stress in educators. The harmful effects of stress exact an individual toll on teachers finding it hard to cope with the demands of their profession and a collective toll on society as a whole when talented professionals leave the field due to fatigue, health problems, and low morale. The current study sought to advance research in this area by providing psychometric support for the use of the CARD with elementary teachers. Such a measurement tool, based on transactional models of stress, may allow school administrators and psychologists working in elementary school to better understand the factors that place teachers at risk for the harmful effects of stress.

Elementary classrooms are important contexts for children's social development. These results suggest that teachers experiencing high rates of stress and burnout may be less capable of creating positive social environments for children and may even become role models for negative social behaviors, particularly as they experience emotional exhaustion and a tendency to see the children as objects rather than as developing individuals. School psychologists often work with the most demanding children in the classroom. These results suggest that such children can contribute to teacher perceptions of negative working conditions.

There are several important limitations to the generalizations that can be made from this study. The participating teachers all work in a single school system. Although the school system does include a diversity of settings with respect to student demographic and socioeconomic variables, the teachers represent a relatively homogeneous sample. In addition, there may be some commonalities with respect to human and material resources across schools within a single system. For example, the administrative corps within the participating system is quite stable, and the system has a tradition of promoting from within the system.

The measures were collected in staff meetings. The researchers made an attempt to follow-up with teachers unable to attend the staff meetings. However, it is possible that teachers attending the meetings are systematically different from those not present, thus presenting some possible biases

in the results. In addition, the measures included in both the spring and fall survey packets were administered in the same order to all participants. Therefore, it is not possible to determine if the survey responses were influenced by order effects.

Currently there are two versions of the CARD, one designed for use with preschool teachers and one for elementary teachers. Future research with the measure could focus on expanding the same approach to measuring stress, examining classroom demands and school-based resources, to middle school and high school teachers as well as other support personnel like school counselors. In addition, future research could focus on using the CARD for cross-cultural comparisons of teacher stress. The work of validation of the CARD will continue as long as the measure is in use. Future research may need to focus on expanding the range of demands and resources addressed by the item content as the working conditions for teachers change and evolve to match both changing student demographics and policy climate mandates.

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