



School burnout: Diminished academic and cognitive performance



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ABSTRACT

Two studies examined relationships between school burnout (school related strain and stress) and indicators of academic and cognitive performance. Study 1 ($N = 790$) investigated school burnout and grade point average over three consecutive academic semesters. Hierarchical multiple regression (HMR) findings demonstrated a consistent, negative association between school burnout and academic performance. Study 2 ($N = 331$) investigated school burnout and individual differences in cognitive functioning through the assessment of problem solving (serial subtraction) and attentional/inhibition processes (word-color matching Stroop task). HMR results indicated that increased school burnout was related to diminished attentional capacity and problem solving success. Limitations of previous school burnout investigations were addressed by extending sampling into American universities and utilizing analyses that controlled for related affective symptoms. These studies are the first to show that school burnout is related to diminished academic and cognitive performance in US tertiary education. Several future lines of research are outlined.

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The American College Health Association–National College Health Assessment II suggests that maladaptive affective functioning (i.e. depression, anxiety, and psychological stress) is a widespread impediment to collegiate academic success across the US (ACHA–NCHA, 2007). Accordingly, attention is being given to understanding and ameliorating psychological risk factors that decrease academic performance, retention, and that negatively impact mental and physical health, particularly stress, depressive symptoms, and anxiety symptoms (Eisenberg, Gollust, Golberstein, & Hefner, 2007; Hamaideh, 2011; Mowbray et al., 2006; Taylor, Bramoweth, Grieser, Tatum, & Roane, 2013). Although stress, and depression/anxiety symptoms are important risk factors that may negatively impact academic success in college students, there is emerging evidence to show that school burnout (school related strain and stress) may be a unique and independent predictor of academic success (Salmela-Aro, Kiuru, Leskinen, & Nurmi, 2009; Salmela-Aro, Kiuru, Pietikäinen, & Jokela, 2008; Walburt, 2014) as well as cardiovascular health (May, Sanchez-Gonzalez, Brown, Koutnik, & Fincham, 2014). However, the school burnout-academic performance association has yet to be documented among US college students and research on the potential impairment of cognitive processes that may contribute to the relationship between school burnout and academic underperformance is greatly limited. Therefore, this research explored the relationship between school burnout and academic performance

in Study 1 and the relationship between school burnout and cognitive functioning in Study 2.

Applied to academic populations, school burnout is conceptualized as a three-dimensional affective response to school-related stress characterized by exhaustion (chronic exhaustion from school-related work), cynicism (cynicism toward the meaning of school) and inadequacy (a belief of inadequacy in school related accomplishment, Salmela-Aro et al., 2008; Salmela-Aro et al., 2009a; Salmela-Aro, Savolainen, & Holopainen, 2009b). There is evidence to show that school burnout is associated with physiology predictive of cardiovascular risk (i.e. increased blood pressure, sympathetic activity to the blood vessels, and arterial stiffness see May et al., 2014a; May, Sanchez-Gonzalez, & Fincham, 2014) as well as psychological and behavioral problems such as depression, absenteeism, school dropout, and academic underperformance (Brown, May, Sanchez-Gonzalez, Koutnik, & Fincham, 2013; Fimian & Cross, 1986; Frydenberg & Lewis, 2004; Salmela-Aro et al., 2009a; Salmela-Aro et al., 2009b; Salmela-Aro et al., 2008; Yang, 2004).

(Salmela-Aro et al., 2008; Salmela-Aro et al., 2009a; Salmela-Aro et al., 2009b; Parker & Salmela-Aro, 2011) has been instrumental in establishing the viability of investigating burnout within a school context and has greatly advanced understanding of the relationship between school burnout and educational outcomes; but major limitations are apparent. For one, Salmela-Aro et al. (2008), Salmela-Aro et al. (2009a), Salmela-Aro et al. (2009b), Parker and Salmela-Aro, (2011) utilized predominantly high-school, European student samples. Extensive research needs to be conducted to establish the utility of school burnout among American college students. Also, the independence of school burnout, in relation to other related affective problems, namely depression and

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anxiety, in predicting indicators of academic performance has not been clearly established.

Indeed, existing data indicate that 3 of the top 6 impediments to academic success are affective in nature (ACH Association, 2013). Our initial pilot data, however, showed that even though burnout, anxiety, and depression are related, school burnout uniquely predicted key academic achievement outcomes (grade point average and retention); accounting for as much outcome variance as both anxiety and depression combined (Brown et al., 2013). Although it can be argued that burnout, depression, and anxiety can conceptually be independent constructs, empirically burnout shares overlapping symptomatology with other affective disorders. For example, Salmela-Aro et al. (2008), Salmela-Aro et al. (2009a) reported correlations exceeding 0.50 between depression scores and the SBI global and subscale scores. Work burnout researchers note the need to control for depressive and anxiety symptoms in designs focusing specifically on burnout (Melamed, Shirom, Toker, Berliner, & Shapira, 2006; Schaufeli & Buunk, 2004; Shirom, 2009). School burnout research similarly requires the control of other related affective symptoms in order to allow a clearer understanding of whether it is burnout, depressive, or anxiety symptoms that are the principal factor that is associated with poor academic outcomes. The current research seeks to address these limitations by investigating school burnout in American universities and through utilizing statistical analyses that account for related affective symptoms.

To date, research examining the relationship between school burnout and cognitive functioning is scarce with cognitive performance indicators limited solely to grade point average (GPA). However, in the occupational literature, research has examined relationships between cognition and workplace burnout. In contrast to traditional theoretical explanations involving either motivational deficits and/or a lack of resource reciprocity that attempt to account for the various negative relationships between burnout and indicators of job performance, the cognition-workplace burnout literature suggests cognitive dysfunction and impairments are key factors in understanding the negative work related outcomes attributable to burnout (Diestel, Cosmar, & Schmidt, 2013; Oosterholt, Van der Linden, Maes, Verbraak, & Kompier, 2012; van der Linden, Keijsers, Eling, & van Schaijk, 2005).

Empirical evidence derived from both self-evaluations of cognitive impairments and objective cognitive tests has identified burnout as being related to chronic impairments on tasks requiring executive control. Executive control refers to the regulation of representational, attentional and motor processes to adaptively engage in novel, complex and changing tasks. Such processes include working memory, verbal reasoning, task switching, cognitive flexibility, abstract thinking, inhibition, sequencing, planning, rule acquisition, and problem-solving. Derived from the theoretical conceptualization of executive control developed by Miyake et al. (2000) and supporting Hacker's (2003) Action Regulation Theory, that purports successful efficient goal-direct behavior at work involves effective executive control, studies have found executive control predicts task performance (Causse, Dehais, & Pastor, 2011; Frese & Zapf, 1994).

The current research seeks to advance the school burnout literature by examining how school burnout is related to indicators of cognitive functioning. This research utilizes two general cognitive tasks, a serial subtraction task and a word-color matching Stroop task. These tasks provide an assessment of general problem solving ability and general efficiency of attentional/inhibition cognitive processes.

Taken together, prior studies and our own research, point toward the conclusion that school burnout is potentially a critical, but often underappreciated factor, impacting health, cognition and academic success in the undergraduate student body in American colleges. Disappointingly, research on school burnout in American universities is lacking and is not recognized in the NCHA II assessment. Therefore investigation of the construct of school burnout in American postsecondary education contexts seems necessary and timely. Accordingly we explored school burnout relationships with academic performance

(GPA) in Study 1 and with individual differences in cognitive functioning via assessment of problem solving and attentional/inhibition processes in Study 2. To address limitations of previous school burnout investigations (as noted earlier) the current research extends study sampling into American universities and uses analyses that control for related affective symptomatology (anxiety and depression).

1. Study 1

Study 1 was conducted to document a relationship between school burnout and indicators of academic performance in the context U.S. tertiary education. Given evidence from European counterparts that burnout can lead to lower academic performance (e.g., Salmela-Aro et al., 2008; Salmela-Aro et al., 2009a), it is prudent to explore this relationship at American universities. Today's US college student is more connected and more involved than previous generations of college students. Moreover, the current competitiveness of the job market adds a great amount of pressure for students to succeed academically — specifically to graduate with high GPAs. The level of involvement coupled with the added pressure of the job market suggests that American college students may be at particular risk for burnout. Understanding the phenomenon of school burnout will allow university educators and administrators to better assist students.

2. Study 1 method

2.1. Participants

Three samples of undergraduate students served as study participants. Students that completed at least 1 collegiate semester were eligible for study participation. Sample demographics include: $N = 790$ (505 females, $M_{age} = 19.74$ years, $SD = 1.89$), 72% Caucasian, 18% African American, 4.0% Asian, and 6% endorsed either biracial or non-disclosed ethnicity; 19% Freshmen, 24% Sophomore, 26% Junior, and 31% Senior.

2.2. Measures

2.2.1. School burnout

School burnout was measured using the School Burnout Inventory (SBI; Salmela-Aro et al., 2008; Salmela-Aro et al., 2009a). The SBI consists of 9 items measuring three first-order factors of school burnout: (a) exhaustion at school (four items), (b) cynicism toward the meaning of school (three items), and (c) sense of inadequacy at school (two items). Summed scores from the first-order factors comprise a second-order overall school burnout score. All the items are rated on a 6-point Likert-type scale ranging from 0 (completely disagree) to 5 (strongly agree). Higher composite scores indicate higher burnout. Reliability for the present sample was $\alpha = .93$.

2.2.2. Depression

Depression was measured using the 10-item Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977; Santor & Coyne, 1997). The CES-D has been widely used as a measure of depressive symptoms in nonclinical samples. It asks participants to respond to a list of ways they may have felt or behaved during the previous week. Sample items include, "I was bothered by things that usually don't bother me," and "I felt hopeful about the future," (reverse coded). Responses ranged from 0 = rarely or none of the time (less than one day) to 3 = most or all of the time (5–7 days). Responses were summed into one overall score, with a possible range of 0 to 30. Reliability for the sample was $\alpha = .77$.

2.2.3. Anxiety

Anxiety was measured using the 20-item State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1970). Participants were asked to respond to anxiety items such as "upset," "calm," "secure," "at

ease,” and “nervous.” Responses were scored on a 4-point Likert scale (1 = Not at all to 4 = Very much so). Half of the items were reverse coded so that higher scores indicated greater anxiety. Items were then summed to create a composite anxiety score with a possible range of 20 to 80. Reliability for the sample was $\alpha = .89$.

2.2.4. Academic achievement

Academic achievement was assessed through self-reported undergraduate, cumulative GPA. GPA ranged from 1.50 to 4.00.

2.3. Procedure

Data collection from all eligible participants was completed via online questionnaires. Questionnaires contained demographic questions and the measurement scales described. All participants were recruited from undergraduate classrooms as an option for voluntary class credit. Data for the fall (Sample 1) and spring (Sample 2) semesters were collected in the middle (weeks 3–9) of the respective semester. Summer semester lasted only 6 weeks; thus, data for this semester was collected between the 2nd and 5th weeks. All participants gave their written consent prior to study participation and approval was obtained from the institutional review board before any data were collected.

2.4. Statistical analysis

Univariate analysis of variance (ANOVA) evaluated ethnicity, gender, and year in school associations with school burnout. Exploratory multiple regression analyses explored whether demographics (ethnicity, gender, and year in school) moderated the relationship between school burnout and GPA. As affective disorders may have overlapping symptomatology, investigators suggest the need to control for depressive and anxiety symptoms in designs focusing on burnout measurements (Melamed et al., 2006; Schaufeli & Buunk, 2004; Shirom, 2009). Therefore hierarchical multiple regression (HMR) analyses were constructed to demonstrate the incremental contribution of school burnout above that of anxiety and depressive symptoms in accounting for variance in GPA. A hierarchical multiple regression (HMR) analysis was conducted on each cross sectional data wave, therefore three different HMR analyses are reported. Model 1 of the HMR contained the anxiety and depression predictors and Model 2 introduced school burnout as a predictor. Listwise deletion was conducted for missing data on measurement scales, occurring for 2.6% (21 out of 811) of all cases in this sample, resulting in 790 complete data cases.

3. Study 1 results and discussion

ANOVA analyses indicated that neither ethnicity $F(3, 786) = 1.82$, $p = .142$, partial $\eta^2 = .022$; gender $F(1, 788) = 0.83$, $p = .363$, partial $\eta^2 = .005$; nor year in school $F(3, 786) = 0.74$, $p = .528$, partial $\eta^2 = .010$ were associated with school burnout scores. Multiple regression analyses indicated the neither ethnicity, gender, nor year in school significantly moderated the relationship between school burnout and GPA (F 's < 1 , $p > .05$). Model 2 of the hierarchical regression analyses showed that, after accounting for anxiety and depressive symptoms, school burnout scores ($p < .05$) accounted for an additional 4% of variance in GPA values during the fall semester (see Table 1). Similarly, school burnout scores significantly accounted for an additional 5% and 6% of GPA variance for spring and summer semesters respectively (Table 1). These results represent the first findings to demonstrate a consistent, negative association between school burnout scores and GPA while controlling for anxiety and depressive symptoms in an undergraduate American sample.

4. Study 2

Study 1 demonstrated a relationship between school burnout and GPA and Study 2 investigates whether school burnout is related to more general cognitive functions. Thus it explores the relationship between school burnout and indicators of individual differences in cognitive functioning. In this study, a classic color-word matching Stroop task serves as a measure of general attentional/inhibition processes and a serial subtraction task serves as a general indicator of problem solving performance. Understanding the relationship between school burnout and these indicators of cognitive functioning will begin to unravel the potential mechanisms underlying the negative relationship between school burnout and academic performance.

5. Study 2 methods

5.1. Participants

Three hundred thirty one undergraduate students ($N = 257$ females, $M_{age} = 19.10$ years, $SD = 1.92$) that completed at least 1 collegiate semester were eligible for study participation. Annual family income reported for the sample indicated 13% grossed $< \$30,000$; 22% grossed $\$30,001$ to $\$50,000$, 33% grossed $\$50,001$ to $\$100,000$, and 32% grossed $> \$100,001$. Reported academic major indicated 34% Biological Sciences (e.g. Biology, Exercise Science), 41% Social Sciences (e.g. Psychology, Sociology, Communication Sciences, Criminology, Education), and 25% Miscellaneous (e.g. Music, Information Technology, Education).

Table 1

Hierarchical multiple regression of depression, anxiety, and school burnout scores accounting for variance in undergraduate GPA cross-sectionally over 3 semesters.

Criterion (<i>M, SD</i>)	Step	Predictors (<i>M, SD</i>)	β	<i>sr</i>	<i>p</i>	R^2	ΔR^2	Model F
Fall semester GPA (3.31, 0.39)	S1	STAI (18.02, 4.11)	-.13	-.12	.001	.13		$F(2,432) = 27.91, p < .001$
	S2	CES-D (9.21, 5.12)	-.28	-.26	<.001	.17	.04	$\Delta F(1, 431) = 18.67, p < .001$
N = 435 Spring semester GPA (3.29, 0.41)	S1	STAI (17.55, 4.71)	-.10	-.09	.045	.14		$F(2,202) = 16.99, p < .001$
	S2	CES-D (9.16, 5.42)	-.31	-.28	<.001	.19	.05	$\Delta F(1, 201) = 11.35, p < .001$
N = 205 Summer semester GPA (3.14, 0.66)	S1	STAI (17.11, 6.95)	-.24	-.20	<.001	.07		$F(2, 147) = 5.26, p = .006$
	S2	CES-D (17.53, 7.25)	-.27	-.21	.001	.12	.06	$\Delta F(1, 146) = 9.25, p = .003$
N = 150		STAI (18.46, 4.89)	-.01	-.01	.929			
		CES-D (9.66, 5.71)	-.26	-.25	.002			
		STAI	-.05	-.05	.528			
		CES-D	-.16	-.14	.069			
		SBI (17.01, 7.45)	-.27	-.24	.003			

Note. *sr*, semi-partial correlation; GPA, grade point average; CES-D, Center for Epidemiologic Studies Depression Scale; STAI, State-Trait Anxiety Inventory; SBI, School Burnout Inventory.

Additional sample demographics include: 73% Caucasian, 18% African-American, 4% Asian, and 5% endorsed either biracial or non-disclosed ethnicity; 20.5% Freshmen, 21.5% Sophomore, 30% Junior, and 28% Senior.

5.2. Measures

5.2.1. Measurement scales

As in Study 1, school burnout was measured using the SBI, depression the CES-D, and anxiety the STAI with sample α of .93, .77, and .91, respectively.

5.2.2. Stroop task

The Stroop task comprised a series of color words, each of which was presented in a color that either matched (congruent) or did not match (incongruent) the semantic meaning of the word. Participants were instructed to identify the color of each word presented by clicking on a computer keyboard key that was colored (red, blue, yellow, green). A trial consisted of a fixation cross “+” presented for 500 ms, followed by the stimulus word presented for 200 ms. Participants completed 4 blocks, each consisting of 25 congruent trials and 25 incongruent trials. Two indices were recorded from this Stroop task: a summed score of the total number of errors in color matching and response time latency in color identification.

5.2.3. Serial subtraction task

This task was a five minute serial subtraction arithmetic task conducted through the DirectRT computer program. An instruction screen informed participants that the task was an arithmetic task in which they would be asked to subtract 7 from a randomly selected number. Participants were not told there was a time limit of 5 min in order to eliminate time pressure as a potential confound. A practice tutorial was conducted prior to data collection trials which demonstrated how a number would appear (e.g. 1107) and how the correct answer (1100) would be accepted through keystroke response and be used as the base number for the next subtraction trial. Five minutes after the testing phase began the program ended. Two indices were collected for analyses: the total number of computation attempts and a frequency count of the total number of computation errors.

5.3. Procedure

After completing an online questionnaire consisting of demographics and measurement scales, eligible participants were scheduled for an appointment to complete a laboratory session. The laboratory session was comprised of the Stroop color-naming task with 100 congruent and 100 incongruent trials and the five minute serial subtraction arithmetic task. All participants completed the serial subtraction task and Stroop task in one experimental session. Experimental task presentation was randomized. All participants were recruited from undergraduate classrooms as an option for voluntary class credit and all data was collected in the middle (weeks 3–9) of the fall semester the year following Study 1. All participants gave their written consent prior to study participation as approved by The Florida State University Institutional Review Board.

5.4. Statistical analysis

As conducted in Study 1, ANOVA and hierarchical multiple regressions were utilized in Study 2. ANOVA evaluated demographics (ethnicity, gender, year in school, annual family income, and academic major) associations with school burnout. Exploratory multiple regression analyses explored whether demographics moderated the relationship between school burnout and the Stroop and subtraction task outcomes. HMR analyses tested the association between school burnout scores and Stroop (congruency errors, response latency) and serial subtraction

task (computation attempts, computation errors) outcomes. Furthermore, the HMR provides an evaluation of the incremental contribution of school burnout scores above anxiety and depressive symptomatology in accounting of variance in the Stroop and serial subtraction task outcomes. Listwise deletion was conducted for missing data on measurement scales, occurring for 0.9% (3 out of 334) of all cases in this sample, resulting in 331 complete data cases. There were no missing data resulting from Stroop and subtraction task measurement.

6. Study 2 results and discussion

As in Study 1, ANOVA analyses indicated that neither ethnicity $F(3, 327) = 2.18, p = .090$, partial $\eta^2 = .019$; gender $F(1, 329) = 0.38, p = .538$, partial $\eta^2 = .002$; year in school $F(3, 327) = 1.63, p = .182$, partial $\eta^2 = .027$; annual family income $F(3, 327) = 1.71, p = .165$, partial $\eta^2 = .027$; nor academic major $F(2, 328) = 0.30, p = .738$, partial $\eta^2 = .005$ were associated with school burnout scores. Multiple regression analyses indicated that demographics (ethnicity, gender, year in school, family annual income, academic major) did not significantly moderate the relationship between school burnout and the Stroop or subtraction task outcomes ($F_s < 1, p > .05$). HMR analyses of the Stroop task outcomes indicate that after accounting for anxiety and depressive symptoms in Model 2, school burnout scores accounted for an additional 4% of variance of congruency matches ($p < .05$) and an additional 9% in variance of response time latency ($p < .05$; see Table 2). HMR analyses of the serial subtraction task outcomes indicated that after accounting for anxiety and depressive symptoms in Model 2, school burnout scores significantly accounted for an additional 6% of variance in computation attempts ($p < .05$) and an additional 3% in variance in computation errors ($p < .05$; see Table 2). In other words, while controlling for anxiety and depression scores, the HMR analyses demonstrated (1) significant associations between higher composite SBI scores and greater congruency matching errors and increased response time matching latencies during the Stroop task and (2) significant associations between higher composite SBI scores and a greater amount of computation errors and solution attempts during the serial subtraction arithmetic task.

7. General discussion

The current studies aimed to extend school burnout research by examining the impact of burnout on academic performance (i.e., GPA) and cognitive functioning among American university students. Together, the results demonstrated a consistent negative relationship between school burnout and GPA (Study 1) as well as diminished cognitive functioning (Study 2). In the remainder of the discussion, we explore these findings in more detail, provide recommendations for research and practice, and note limitations.

Consistent with prior research among European students (e.g., Salmela-Aro et al., 2009a; Salmela-Aro et al., 2009b; Salmela-Aro et al., 2008), these data suggest that increased school burnout as measured by the School Burnout Inventory predicts less academic success. Specifically, data collected in three semesters indicate that school burnout is negatively related to concurrent GPA after controlling for depressive and anxiety symptoms. To the authors' knowledge, this study is the first to report such a relationship in an American college student sample.

Moreover, demographic associations were not significantly related to school burnout scores nor did they moderate the relationship between school burnout and the indicators of academic and cognitive performance measured in this research. The gender equality of burnout in the present research deserves further consideration as this finding is in contrast to the robust gender differences (girls report greater burnout than boys) found in the current adolescent school burnout research (see Walburt, 2014). However, it should be noted that our previous school burnout research using undergraduate student samples have demonstrated that increases in school burnout are associated with

Table 2
Hierarchical multiple regression of depression, anxiety, and school burnout scores accounting for variance in congruency errors, response time, computation errors, and computation attempts.

Criterion (<i>M, SD</i>)	Step	Predictors (<i>M, SD</i>)	β	<i>sr</i>	<i>p</i>	R^2	ΔR^2	Model F
Congruency errors	S1	STAI (19.11, 4.02)	.12	.11	.097	.04		$F(2, 328) = 4.62, p = .011$
		CES-D (8.84, 5.01)	.11	.10	.112			
	S2	STAI	.05	.04	.506	.08	.04	$\Delta F(1, 327) = 9.29, p < .002$
		CES-D	.08	.07	.273			
Response time	S1	SBI (17.39, 6.95)	.21	.19	.002			$F(2, 328) = 3.59, p = .029$
		STAI	.18	.16	.012	.03		
		CES-D	.02	.02	.797			
	S2	STAI	.07	.06	.313	.12	.09	$\Delta F(1, 327) = 23.59, p < .001$
		CES-D	.07	.06	.289			
		SBI	.33	.30	<.001			
Compute errors	S1	STAI	.03	.03	.692	.01		$F(2, 328) = 1.72, p < .181$
		CES-D	.11	.11	.180			
		STAI	.04	.04	.560	.05	.03	$\Delta F(1, 327) = 7.62, p < .006$
	S2	CES-D	.05	.05	.454			
		SBI	.21	.18	.006			
		STAI	.16	.14	.026	.05		$F(2, 328) = 6.24, p = .002$
Compute attempts	S1	CES-D	.11	.10	.130			
		STAI	.07	.06	.337	.11	.06	$\Delta F(1, 327) = 15.92, p < .001$
		CES-D	.06	.06	.374			
	S2	SBI	.27	.25	<.001			

Note. $N = 331$. Compute; computation. Congruency errors ($M = 7.23, SD = 3.74$), response time ($M = 603.17, SD = 76.34$), computation errors ($M = 0.80, SD = 1.31$), computation attempts ($M = 17.07, SD = 9.407$) as criterion, respectively. *sr*, semi-partial correlation; CES-D, Center for Epidemiologic Studies Depression Scale; STAI, State-Trait Anxiety Inventory; SBI, School Burnout Inventory.

poorer cardiovascular function in both males and females (May et al., 2014a; 2014b).

Importantly, the results demonstrated the negative effects of burnout are above and beyond those associated with more commonly assessed maladaptive affective functioning (anxiety and depression). Given that cross-lagged longitudinal studies of adolescents indicate school burnout predicts subsequent depressive symptoms, accounting for sources of negative affect (e.g. depression, anxiety) is essential to help reveal the unique deleterious relationship between school burnout and study outcomes of interest (Salmela-Aro et al., 2009b). As suggested by work burnout research, doing so allows for a clearer understanding of whether it is burnout, depressive, or anxiety symptoms that are the principal factor driving study results (Melamed et al., 2006; Schaufeli & Buunk, 2004; Shirom, 2009). University educators and mental health professionals should be informed of the negative impact of school burnout and provided resources for helping students exhibiting symptoms of burnout.

Furthermore, these findings are the first to report any relationships between school burnout scores and measures of cognitive performance; specifically a measure of problem solving and a measure of general attention and inhibition. Results showed that school burnout was positively related to the number of attempts as well as errors on a serial subtraction arithmetic task and associated with increased congruency error rates and response latency on a traditional word-color Stroop task. These findings provide support for the view that school burnout is associated with diminished performance and with global processes of cognitive functioning.

7.1. Limitations and directions for future research

The primary limitation of both studies is the cross-sectional nature of the data. Although longitudinal research indicates the persistence of school burnout over time during high school education in adolescence populations, longitudinal research of school burnout at the undergraduate level for emerging adulthood populations lacks sufficient investigation (see Parker & Salmela-Aro, 2011; Salmela-Aro et al., 2009b). Although the present design precludes casual interpretation, the findings warrant investigation of the longitudinal relations between school burnout, cognition, and academic performance to determine direction of effects.

Given previous cognition-workplace burnout research and our data, it is imperative that prospective school burnout research continue

utilizing validated cognitive performance tasks to determine both the potential cognitive mechanisms affected by school burnout and the causal relationships that may exist between school burnout and cognitive functioning. For example, the cognition-workplace literature indicates that the strongest and most replicated relationship exists between burnout and working memory updating, especially in contexts where executive control has been depleted by high performance demands (Diestel et al., 2013; Oosterholt et al., 2012; van der Linden et al., 2005). Thus investigations into working memory would be a promising avenue for future school burnout research.

Although our research did not indicate school burnout score differences between cohort years, research demonstrates that the symptomatology associated with work burnout can transfer both with and without direct or close contact among employees (Bakker, Demerouti, & Schaufel, 2006; Gonzalez-Morales, Peiro, Rodriguez, & Bliese, 2012). Within organizational settings, it appears that perceived collective burnout emerges as an organizational-level construct (employees' shared perceptions about how burned out are their colleagues) and that this perceived collective burnout predicts individual burnout over and above indicators of work demands and resources. This suggests that perceived collective burnout is an important characteristic of the work environment that can be a significant factor in the development of burnout. Similarly, school burnout may be socially contagious (Salmela-Aro et al., 2009b). While our research did not indicate school burnout differences between academic majors, continued research into more subtle differences between academic majors as a possible antecedent or predictor of school burnout transmission may prove fruitful (see the distinction between hard and soft science majors used by May & Casazza, 2012). Indeed, research indicates that certain academic majors (medical students) suffer from greater burnout prevalence (Mazurkiewicz, Korenstein, Fallar, & Ripp, 2012; Santen, Holt, Kemp, & Hemphill, 2010). Understanding the transmission of school burnout will give clues to its etiology as well as inform potential interventions aimed at ameliorating its deleterious influence on cognitive and academic performance.

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