Page Proof Instructions and Queries

Journal Title: JBD
Article Number: 642051

Greetings, and thank you for publishing with SAGE. We have prepared this page proof for your review. Please respond to each of the below queries by digitally marking this PDF using Adobe Reader.

Click “Comment” in the upper right corner of Adobe Reader to access the mark-up tools as follows:

For textual edits, please use the “Annotations” tools. Please refrain from using the two tools crossed out below, as data loss can occur when using these tools.

For formatting requests, questions, or other complicated changes, please insert a comment using “Drawing Markups.”

Detailed annotation guidelines can be viewed at: http://www.sagepub.com/repository/binaries/pdfs/AnnotationGuidelines.pdf
Adobe Reader can be downloaded (free) at: http://www.adobe.com/products/reader.html

<table>
<thead>
<tr>
<th>No.</th>
<th>Query</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Please confirm that all author information, including names, affiliations, sequence, and contact details, is correct.</td>
</tr>
<tr>
<td></td>
<td>Please review the entire document for typographical errors, mathematical errors, and any other necessary corrections; check headings, tables, and figures.</td>
</tr>
<tr>
<td></td>
<td>Please confirm that the Funding statement is accurate.</td>
</tr>
<tr>
<td></td>
<td>Please ensure that you have obtained and enclosed all necessary permissions for the reproduction of artistic works, (e.g. illustrations, photographs, charts, maps, other visual material, etc.) not owned by yourself. Please refer to your publishing agreement for further information.</td>
</tr>
<tr>
<td></td>
<td>Please note that this proof represents your final opportunity to review your article prior to publication, so please do send all of your changes now.</td>
</tr>
<tr>
<td>AQ: 1</td>
<td>Please confirm if ‘Skinner et al. (2013)’ should be 2013a, 2013b, or both. Please note that they have been transposed in the reference list to appear in alphabetical order.</td>
</tr>
</tbody>
</table>
Predictors of changes in students’ motivational resilience over the school year: The roles of teacher support, self-appraisals, and emotional reactivity

Jennifer Pitzer and Ellen Skinner

Abstract

Students perform better in school to the extent they are able to engage fully, cope adaptively, and bounce back from obstacles and setbacks in their academic work. These three processes, which studies suggest are positively inter-connected, may comprise a self-sustaining system that enables motivational resilience. Using self-determination theory to frame hypotheses about such a motivational system, this study examined (1) whether a set of personal factors (self-perceptions of relatedness, competence, and autonomy), interpersonal resources (perceptions of teacher warmth, structure, and autonomy support), and emotional reactivity predicted changes in motivational resilience over the school year; (2) whether motivational resilience in turn predicted improvements in students’ achievement and also fed back to increases in their personal and interpersonal resources; and (3) whether teacher support could shift established motivational patterns. A latent path model depicting these processes showed a good fit with self-report data from 1020 students in Grades 3 through 6 collected in fall and spring of the same school year (including achievement data from a random subset, n = 365). Multiple regressions predicting changes from fall to spring refined the proposed model. Moreover, teacher support was crucial: Students who began the year with at-risk profiles, but also experienced high teacher support, ended the year on par with low-risk students; whereas students who began with resilient profiles but experienced low levels of teacher support ended the year at-risk. Discussion focused on identifying levers for intervention and the essential role teacher support plays in these dynamics.

Keywords

achievement, coping, emotional reactivity, engagement, motivational resilience, persistence, reciprocal effects, self-determination theory, teacher support

Intuitively, it seems that students should learn more when they engage actively in academic activities, deal constructively with challenges they encounter while working on these tasks, and persist in the face of obstacles and setbacks. Empirical evidence corroborates this intuition: Separate lines of study show that students’ engagement (Fredricks, Blumenfeld, & Paris, 2004), their academic coping (Hess & Copeland, 2001), and their persistence (Martin & Marsh, 2009) each predict academic success (i.e., learning, classroom grades, and achievement), starting in the elementary grades and continuing through middle and high school. The most robust body of research examines the effects of classroom engagement, that is, students’ ongoing, active, enthusiastic participation in academic activities, as an important driver of learning, retention, and academic performance, as well as a protective factor against negative outcomes such as gang involvement and school dropout (Christenson, Reschly, & Wylie, 2012; Fredricks et al., 2004; Upadyaya & Salmela-Aro, 2013). This research also shows that students’ disengagement or disaffection from school (including lack of effort, passivity, boredom, apathy, and frustration) can exacerbate these risky behaviors and contribute to underachievement (Blondal & Adalbjarnardottir, 2012; Henry, Knight, & Thornberry, 2012; Li & Lerner, 2011; Morrison, Robertson, Laurie, & Kelly, 2002).

Although not as definitive as research on engagement, studies of academic coping also link markers of school success to the strategies students utilize when they encounter challenges and setbacks in their schoolwork. This research points to advantages for students who use more productive ways of coping (especially problem-solving and help-seeking, but also reappraisal and emotion regulation strategies like self-encouragement, comfort-seeking, and commitment) and to disadvantages for those who rely on more maladaptive strategies (such as avoidance, escape, concealment, self-pity, rumination, or blaming others). Together, these adaptive and maladaptive ways of coping, which can be considered a profile or repertoire of strategies that children draw upon when they encounter academic stressors (Boekaerts, 1993), have been shown to predict better school performance during late elementary (Causer & Dubow, 1992; Lau & Nie, 2008; Tero & Connell, 1984), middle (Leung, & He, 2010; MacCann, Fogarty, Zeidner, & Roberts, 2011), and junior high school (Swanson, Valiente, Lemery-Chalfant, & O’Brien, 2011). At least in part, students’ adaptive coping seems to benefit their academic performance.
through its effects on persistence or re-engagement in the face of challenges (Lau & Nie, 2008; Lemos, 2002; Skinner, Pitzer, & Steele, 2013a).

**A systems perspective on motivational processes**

Although motivational researchers have long posited connections between students’ engagement and their coping and persistence (Boekaerts, 2002; Dweck, 2006; Lemos, 2002; Martin & Marsh, 2009; Thompson & Gaudreau, 2008), empirical evidence linking these processes has only begun to accumulate in recent years. For example, elementary and middle-school students higher in engagement (or the kinds of positive emotions that characterize engagement) also report utilizing a range of more adaptive strategies, including more positive coping (Kaplan & Midgely, 1999), more self-reliance/problem-solving and social support-seeking (Reschley, Huebner, Appleton, & Antaramian, 2008), and more strategizing, help-seeking, comfort-seeking, self-encouragement, and commitment (Skinner, Pitzer, & Steele, 2013b). In contrast, students who show higher levels of behavioral or emotional disaffection also report greater reliance on a range of unproductive ways of coping, including more denial, projection, and anxiety amplification coping (Kaplan & Midgely, 1999), more avoidance coping (Lau & Nie, 2008), and more escape, confusion, concealment, self-pity, and blaming others (Skinner et al., 2013).

Recent theoretical efforts have begun to consider whether, rather than studying engagement, coping, and persistence as separate motivational processes (as has largely been the case up to now), it might be useful to examine them as inter-connected components of the same developing motivational system (Leung & He, 2010; Martin, 2013; Martin & Marsh, 2009; Skinner & Pitzer, 2012; Skinner et al., 2013a, 2013b). Conceptualizations and studies that explicitly bring these constructs together may serve to fill gaps in both the research on engagement (which can be expanded by incorporating coping’s accounts of what happens when engaged and disaffected students encounter academic challenges and problems) and the research on coping (which can be expanded by incorporating re-engagement and persistence as proximal outcomes of coping and as pathways to subsequent learning).

Models of motivational resilience (and its opposite, motivational vulnerability) view processes of engagement, coping, and persistence as complementary parts of a dynamic motivational system that work together to promote or undermine students’ learning, academic success, and retention. From this perspective (see Figure 1), students’ ongoing engagement in school can serve as an energetic resource, such that students who are more highly engaged in school are better able to utilize adaptive coping strategies and ultimately to re-engage with challenging tasks. In contrast, students who are disaffected are less equipped to deal constructively with such challenges, leading them to use more maladaptive coping strategies, and culminating in an increased likelihood of giving up rather than persevering.

Situated within the work on “everyday resilience” and “everyday coping” (Martin, 2013; Martin & Marsh, 2009; Skinner & Pitzer, 2012; Wolchik & Sandler, 1997), notions of everyday motivational resilience and vulnerability refer holistically to the idea of an integrated engagement-coping-persistence system, and are used to highlight the dynamic interactions among students’ ongoing engagement, coping, and re-engagement in the face of difficulties and setbacks in school. Such models are useful to the extent that they can inspire researchers to examine these processes simultaneously, to explore whether they seem to function as complementary components of the same system. For example, studies of the internal dynamics of motivational resilience suggest that the positive
feed-forward and feedback effects among these components may create a self-perpetuating feedback loop over time that can sustain resilience for students who are initially high in engagement, but can also amplify motivational vulnerability for students initially high in disaffection (Kaplan & Midgley, 1999; Lau & Nie, 2008; Reschly et al., 2008; Skinner, Furrer, Marchand, & Kindermann, 2008; Skinner et al., 2013a).

Factors that promote motivational resilience. Building on this work, the purpose of the current study was to explore whether outside forces can re-shape students’ otherwise self-sustaining motivational systems. In systems terminology, this study tests a model of the external dynamics of students’ everyday motivational resilience (see Figure 1). Grounded in self-determination theory (SDT; Connell & Wellborn, 1991; Deci & Ryan, 1985), this investigation utilized data from students in Grades 3 through 6 collected in fall and spring of the same school year (as part of a larger project on motivational development during late elementary and early middle school; Skinner, Zimmer-Gembeck, & Connell, 1998) to examine: (1) whether students’ self-appraisals and experiences of teacher support could predict increases in their motivational resilience (captured as the aggregate of their engagement, coping, and persistence) over the school year; and whether emotional reactivity is one pathway through which both personal and interpersonal resources contribute to such increases; (2) whether students’ motivational resilience in turn, not only predicts improvements in their achievement, but also feeds back to enhance their perceptions of personal and interpersonal resources; and (3) whether teacher support can, over time, shift already established motivational patterns, exploring (a) whether, with high levels of teacher support, at-risk students caught in ongoing vicious cycles could begin to participate in more virtuous feedback loops, and (b) whether low levels of teacher support could contribute to the emergence of motivational vulnerabilities, even for students who began the year with few indicators of risk. Previous research provides evidence supporting each of these proposed links, but to date, no published studies have considered this motivational system as a whole.

Supporting motivational resilience

The first goal of the study was to determine whether students’ personal and interpersonal resources can bolster their motivational resilience over time. According to SDT, students who appraise themselves as belonging in the classroom, as competent and autonomous in their work at school, and who perceive their interactions with teachers to be supportive and well-calibrated to their current needs will show more resilient responses in the face of setbacks and challenges, whereas students who lack this confidence and support will be at greater risk for developing motivational liabilities over time (Reeve, 2012).

Self-appraisals. A central assertion of SDT is that individuals’ well-being is optimized when their contexts support (rather than thwart) their innate psychological needs for relatedness, competence, and autonomy (Connell & Wellborn, 1991; Deci & Ryan, 1985). That is, students will best thrive when they feel they belong and are cared for, are effective in their interactions with their environments, and view their actions as originating from their own authentic core self and desires. Consistent with this notion, long histories of research in the areas of perceived control, self-determination, and attachment show that students’ positive self-appraisals predict multiple favorable motivational, coping, and academic outcomes (Green et al., 2012; Niemiec & Ryan, 2009; Raufelder et al., 2014; Roesser, Midgley, & Urdan, 1996; Ryan & Deci, 2000, 2009; Skinner et al., 1998; Thompson, & Gaudreau, 2008).

Perceptions of teacher support. SDT focuses on three facets of teacher–student relationships that can directly support or undermine students’ needs for relatedness, competence, and autonomy. Supportive classroom interactions include warmth (i.e., caring interpersonal interactions, as opposed to rejecting relationships; Wentzel, 2009), structure (i.e., predictable and consistent classroom contexts, in contrast to chaotic environments; Skinner et al., 1998), and autonomy support (i.e., providing choice and explanations of relevance, versus coercive interactions; Reeve, 2009). These contextual supports are strong predictors of students’ personal resources as well as their motivational states and academic success (e.g., Hughes & Kwok, 2007; Klem & Connell, 2004; Niemiec & Ryan, 2009; Reeve, Jang, Carrell, Jeon, & Barch, 2004; Reyes, Brackett, Rivers, White, & Salovey, 2012; Skinner et al., 2008). Because interpersonal resources seem to exert such a pervasive positive effect throughout students’ motivational systems, we were interested in examining whether teacher support could promote motivational resilience both directly, and by bolstering students’ self-system appraisals (i.e., relatedness, competence, and autonomy).

Emotional reactivity. An important part of this first goal was to explore the role of emotional reactivity in students’ motivational systems. In keeping with studies suggesting that positive emotions predict adaptive coping and negative emotions maladaptive coping in school (Kaplan & Midgley, 1999; Spangler, Pekrun, Kramer, & Hofmann, 2002), emotional reactivity was examined as a predictor of increases in students’ motivational vulnerability. Moreover, it seemed possible that one way in which personal and interpersonal resources might promote motivational resilience would be through their effects on dampening reactivity. For example, anxiety amplification, and other forms of emotional reactivity, have been shown to be lower in students with appraisals of high competence or controllability (Dweck, 2006; Tero & Connell, 1984), a strong sense of autonomy (Lemos, 2002), and solid relatedness to teachers (Lynch & Cicchetti, 1997). Hence, it seemed that one way such personal and interpersonal resources might contribute to greater resilience would be by preventing children from becoming overly distressed in the face of academic obstacles and difficulties. Conversely, lack of these same personal and interpersonal resources could contribute to increases in motivational vulnerability by triggering students’ distress and emotional reactivity.

Motivational resilience and academic achievement

The second goal of the study was to investigate the hypothesized reciprocal link between students’ motivational resilience and their academic achievement. Because engagement is well-established as a significant contributor to students’ academic success (Christenson et al., 2012; Fredricks et al., 2004; Jimerson, Campos, & Greif, 2003; Upadyaya & Salmela-Aro, 2013; Wigfield et al., 2015), it follows that motivational resilience, which brings students back to this essential engaged state, could promote students’ achievement. Therefore, we expected that each component of motivational resilience would be positively and significantly correlated with academic performance at each time point. In addition, we expected
motivational resilience to predict increases in students’ academic achievement across the school year, such that students who began the year highly motivationally resilient would show improvements in their grades, whereas achievement would decline for those who were more motivationally vulnerable. Moreover, we also expected to see feedback effects of achievement on changes in motivational resilience, based on the notion that when a student learns more, this will add fuel to their ongoing engagement and persistence, whereas continued academic struggles could add discouragement and frustration to disaffection, increasing motivational vulnerability.

Feedback from motivational resilience to teacher support and self-system processes

As part of the proposed links between external supports and motivational resilience, this study also examined whether students’ motivational resilience exerted reciprocal effects on teachers’ provision of support across the school year and on their own self-system processes. Student–teacher relationships may exist in a dynamic feedback loop, such that students who are highly engaged tend to elicit teacher more support which in turn leads to further increases in motivation, whereas disaffected students attract more unsupportive teacher behaviors over time and consequently exacerbate their own motivational vulnerabilities (Connell, Spencer, & Aber, 1994; Jang, Kim, & Reeve, 2012; Nurmi & Kiuru, 2015; Skinner & Belmont, 1993; Van Ryzin, 2011). Moreover, higher levels of motivational resilience were also predicted to enhance students’ feelings of competence, autonomy, and relatedness over time (Van Ryzin, Gravely, & Roseth, 2009).

At-risk motivational systems and teacher support

Finally, a special focus of the study was the empirical examination of the extent to which teachers can shape the motivational dynamics of the classroom by interrupting existing detrimental feedback loops and reestablishing positive motivational pathways. We expected that some students would begin the year motivationally at-risk, as marked by a pattern of appraisals in which they interpret the stressful events they encounter at school as having devastating implications for their ability to meet their needs for relatedness, competence, and autonomy. These “catastrophizing” appraisals, because they magnify the negative consequences of stressful events, can intensify students’ emotional reactions and increase their reliance on maladaptive coping strategies (Brown, O’Keefe, Sanders, & Baker, 1986; Friedel, Cortina, Turner, & Midgley, 2007; Kaplan & Midgley, 1999; Mantzicopoulos, 1997; Skinner et al., 2013b; Tero & Connell, 1984). Nevertheless, we hypothesized that even for motivationally at-risk students, high teacher support would be able to lift them off their expected downward motivational trajectories. In contrast, we expected that students who were not at-risk at the beginning of the school year (i.e., who reported low levels of catastrophizing) could still lose their motivational advantage if they experienced low levels of teacher support across the year.

Summary of hypotheses

In order to investigate the external dynamics of students’ motivational resilience across the school year, this study examined: (1) whether higher teacher support and more positive self-appraisals predict improvements in students’ motivational resilience over the school year, as well as (a) whether self-appraisals are an important pathway through which interpersonal resources exert their effects, and (b) whether emotional reactivity is one way in which both kinds of resources shape motivational resilience; (2) whether motivational resilience not only predicts gains in students’ academic performance across the school year, but also enhances students’ personal and interpersonal resources; and whether achievement in turn predicts gains in motivational resilience over time; and (3) whether teacher support is a particularly important factor—one that can help students break out of vicious motivational cycles or, when lacking, one that can put students at risk for the development of motivational vulnerabilities. The primary contributions of the present study are in its short-term longitudinal design, which allows analyses to examine whether each proposed antecedent measured in fall can predict changes in its hypothesized consequences over the same school year; and in its framework, which allows all of these potential feedforward and feedback effects to be considered simultaneously as parts of the same complex and dynamic motivational system during late elementary and early middle school.

Method

Participants

Data for this study were drawn from an existing longitudinal dataset that was part of a large, district-wide evaluation of a rural-suburban school district in upstate New York in which 1608 elementary and middle-school students (Grades 3 through 7) completed surveys about their engagement and coping in school. Fifty-three of their teachers also participated by completing questionnaires about their observations of and interactions with students. Data were collected using a cohort-sequential design, with data collected in fall (October) and spring (May) for four consecutive years. Achievement scores were also obtained from school records for a random subset of the participants. For a complete description of the larger study, see Skinner et al. (1998).

For this study, information from a subset of students from the third year of the project (n = 1020) was used, because these two assessments included measures of academic coping. Participants were a sample of students in Grades 3 through 6, including 138 third-grade students (66 boys and 72 girls), 342 fourth-grade students (172 boys and 170 girls), 170 fifth-grade students (78 boys and 92 girls), and 368 sixth-grade students (192 boys and 176 girls); two students were missing grade and/or gender data. The majority of students were Caucasian, with less than 5% identifying as non-white, and their families’ socioeconomic status (determined by parent occupation and education level) were primarily working to middle class.

Procedures

Pairs of trained interviewers administered questionnaires to students during three 40-minute class sessions. In each session, one interviewer read the questions aloud to students as they marked their answers on the questionnaire, while the second circulated around the classroom to answer students’ questions. The students’ teachers were not present in the classroom during the data collection; most used the time to complete their own questionnaires.
Table 1. Summary of descriptive statistics for each construct in fall and spring.

<table>
<thead>
<tr>
<th>Construct</th>
<th>No. of Items</th>
<th>Fall</th>
<th></th>
<th></th>
<th></th>
<th>Spring</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Interpersonal resources: Teacher support</td>
<td>66</td>
<td>.95</td>
<td>2.98</td>
<td>.43</td>
<td>.96</td>
<td>2.93</td>
<td>.46</td>
<td></td>
</tr>
<tr>
<td>Warmth</td>
<td>16</td>
<td>.86</td>
<td>3.01</td>
<td>.50</td>
<td>.88</td>
<td>2.92</td>
<td>.53</td>
<td></td>
</tr>
<tr>
<td>Structure</td>
<td>29</td>
<td>.87</td>
<td>3.04</td>
<td>.42</td>
<td>.89</td>
<td>3.01</td>
<td>.44</td>
<td></td>
</tr>
<tr>
<td>Autonomy support</td>
<td>21</td>
<td>.86</td>
<td>2.90</td>
<td>.47</td>
<td>.88</td>
<td>2.87</td>
<td>.49</td>
<td></td>
</tr>
<tr>
<td>Personal resources: Self-system processes</td>
<td>44</td>
<td>.91</td>
<td>3.09</td>
<td>.41</td>
<td>.92</td>
<td>3.05</td>
<td>.41</td>
<td></td>
</tr>
<tr>
<td>Relatedness</td>
<td>8</td>
<td>.82</td>
<td>3.15</td>
<td>.59</td>
<td>.83</td>
<td>3.14</td>
<td>.58</td>
<td></td>
</tr>
<tr>
<td>Competence</td>
<td>23</td>
<td>.88</td>
<td>3.35</td>
<td>.44</td>
<td>.90</td>
<td>3.32</td>
<td>.44</td>
<td></td>
</tr>
<tr>
<td>Autonomy</td>
<td>13</td>
<td>.80</td>
<td>2.76</td>
<td>.53</td>
<td>.83</td>
<td>2.68</td>
<td>.55</td>
<td></td>
</tr>
<tr>
<td>Emotional reactivity</td>
<td>11</td>
<td>.86</td>
<td>2.45</td>
<td>.63</td>
<td>.87</td>
<td>2.35</td>
<td>.61</td>
<td></td>
</tr>
<tr>
<td>Motivational resilience</td>
<td>89</td>
<td>.82</td>
<td>3.19</td>
<td>.38</td>
<td>.84</td>
<td>3.13</td>
<td>.40</td>
<td></td>
</tr>
<tr>
<td>Engagement vs. Disaffection</td>
<td>25</td>
<td>.88</td>
<td>3.17</td>
<td>.44</td>
<td>.90</td>
<td>3.14</td>
<td>.45</td>
<td></td>
</tr>
<tr>
<td>Coping profile</td>
<td>55</td>
<td>.86</td>
<td>2.98</td>
<td>.35</td>
<td>.87</td>
<td>2.94</td>
<td>.38</td>
<td></td>
</tr>
<tr>
<td>Re-engagement vs. Giving up</td>
<td>9</td>
<td>.81</td>
<td>3.43</td>
<td>.48</td>
<td>.82</td>
<td>3.33</td>
<td>.49</td>
<td></td>
</tr>
<tr>
<td>Catastrophizing appraisals</td>
<td>27</td>
<td>.94</td>
<td>2.02</td>
<td>.59</td>
<td>.94</td>
<td>2.00</td>
<td>.58</td>
<td></td>
</tr>
<tr>
<td>Cat of relatedness</td>
<td>9</td>
<td>.88</td>
<td>1.88</td>
<td>.65</td>
<td>.89</td>
<td>1.86</td>
<td>.64</td>
<td></td>
</tr>
<tr>
<td>Cat of competence</td>
<td>9</td>
<td>.84</td>
<td>2.11</td>
<td>.65</td>
<td>.86</td>
<td>2.09</td>
<td>.64</td>
<td></td>
</tr>
<tr>
<td>Cat of autonomy</td>
<td>9</td>
<td>.79</td>
<td>2.07</td>
<td>.59</td>
<td>.81</td>
<td>2.05</td>
<td>.58</td>
<td></td>
</tr>
</tbody>
</table>

Note. N = 1020 students in Grades 3 through 6. All scales ranged from 1 (not at all true for me) to 4 (very true for me).

Measures

Students completed sets of items tapping their experiences of interpersonal resources, personal resources, emotional reactivity, motivational resilience, and, as a measure of existing motivational risk, catastrophizing appraisals. Students rated all items using a 4-point Likert scale to indicate whether each item was (1) Not at all true for me, (2) Not very true for me, (3) Sort of true for me, or (4) Very true for me. All negatively worded items were reverse coded, and items were averaged within constructs to create composite scale scores. These scale scores could range from 1 to 4, with higher numbers indicating more of the respective construct.

All the measures used in this study capture multi-dimensional constructs, as demonstrated by confirmatory structural analyses of most of the scales used (e.g., Skinner, Kindermann, & Furrer, 2009). At the same time, the dimensions of all the measures have also been found to be highly inter-correlated enough to allow them to be usefully combined into aggregate overall scale scores, that are both multidimensional and internally consistent (see Table 1). In general, latent variables corresponding to the higher-order target constructs were used in structural analyses. However, in order to examine whether individual dimensions were differentially involved in each process link, inter-correlations and multiple regressions involving both aggregates and subscales were also conducted.

Interpersonal resources: Teacher support. Students completed measures tapping their experiences of support from their classroom teachers along three dimensions (Skinner & Belmont, 1993): (1) warmth versus rejection, measured via 16 items tapping whether teachers spent time with students, showed them affection, and were available, knowledgeable, and dependable (e.g., “My teacher is always there for me”); (2) structure versus chaos, captured by 29 items tapping whether teachers offered clear expectations, contingent responses, help and support, and attuned teaching strategies (e.g., “Every time I do something wrong, my teacher acts differently,” reverse coded); and (3) autonomy support versus coercion, assessed using 21 items tapping the extent to which teachers provided students with choices, exerted control over them, offered respect for their ideas and opinions, and explained the relevance of learning activities (e.g., “My teacher gives me a lot of choices about how I do my schoolwork”).

Personal resources: Self-system processes. Students also responded to measures of their perceptions of relatedness, competence, and autonomy. Students’ sense of relatedness was measured using eight items that described their feelings of connectedness and belonging to their teachers and classmates (Furrer & Skinner, 2003) via four items for each social partner (e.g., “When I am with my teacher, I feel accepted”). Perceived competence was measured using 23 items from the Student Perceptions of Control Questionnaire (Skinner, Wellborn, & Connell, 1990; e.g., “If I decide to learn something hard, I can”). Perceptions of autonomy were measured using 13 items depicting reasons for participating in academic activities (Ryan & Connell, 1989), that varied on a continuum of self-regulation from external (e.g., “Because the teacher says we have to”) to identified (e.g., “Because I want to learn new things”), to intrinsic (e.g., “Because it’s fun”). Summary scores averaged the three autonomy subscales, with external reverse coded.

Emotional reactivity. Students reported on 11 items measuring the extent to which they experience negative emotional responses when they encounter obstacles and setbacks in school (Skinner et al., 2013b; e.g., “I get really upset when something bad happens in school”).

Motivational resilience. Students responded to measures of motivational resilience, including their engagement in school, academic coping, and re-engagement. The three components were combined to form a summary score, with negative items reverse coded.

Engagement versus disaffection. Students responded to 25 items tapping their ongoing engagement versus disaffection in the classroom (Skinner et al., 2009): (1) five items measured behavioral...
engagement (e.g., “I work hard when we start something new in class”); (2) five tapped behavioral disaffection (e.g., “When I’m in class, I just act like I’m working”); (3) six measured emotional engagement (e.g., “When we start something new in school, I feel interested”); and (4) nine items tapped emotional disaffection, including boredom, frustration, or anxiety (e.g., “When I’m doing my work in class, I feel worried”).

Academic coping. Students responded to 55 items tapping their academic coping in school (Skinner et al., 2013b). Items were divided into 11 subscales consisting of five items each. Each subscale prompted students to describe their responses to stressful events in school, utilizing one of four different item stems (e.g., “When I have difficulty learning something . . . ”). Five of the subscales measured students’ adaptive ways of coping, including (1) Strategizing (e.g., “I try to figure out what I did wrong so that it won’t happen again”); (2) Help-seeking (e.g., “I ask the teacher to explain what I didn’t understand”); (3) Comfort-seeking (e.g., “I discuss it with someone who will help me feel better about it”); (4) Self-encouragement (e.g., “I tell myself I’ll do better next time”); and (5) Commitment (e.g., “I remind myself that it’s something that I really want to do”). The six maladaptive ways of coping included (1) Confusion (e.g., “It’s difficult for me to think”); (2) Escape or avoidance (e.g., “I say I didn’t care about it”); (3) Concealment (e.g., “I don’t tell anyone about it”); (4) Self-pity (e.g., “I ask myself, ‘Why is this always happening to me?’”); (5) Ramination (e.g., “I can’t get it out of my head”); and (6) Projection, or blaming others (e.g., “I say it was the teacher’s fault”). Profile scores were computed which averaged the sets of adaptive and maladaptive coping scores, with the maladaptive scores reverse coded, indicating the balance of overall coping that was adaptive versus maladaptive (Skinner et al., 2013b).

Re-engagement vs. giving up. Students reported on nine items tapping their reactions to encounters with challenges in school (Skinner et al., 2013b). Four items tapped persistence or re-engagement (e.g., “If a problem is really hard, I keep working at it”), and five items tapped giving up (e.g., “If I don’t understand something right away, I stop trying”). Items were averaged to form a summary score, with giving up items reverse-coded.

Outcomes: Achievement. For a random subset of students (n = 365), achievement data were available, including students’ report card grades for reading, language arts, spelling, and math. Scores were converted from letter grades to numbers ranging from 1 (F or U—) to 12 (A or V), and composite scores were calculated by averaging students’ grades across these subjects.

Motivational risk: Catastrophizing appraisals. Students also reported on three kinds of catastrophizing appraisals (Skinner et al., 2013b). Nine items tapped catastrophizing of relatedness, in which appraisals of stressful events magnified their negative implications for interpersonal relationships (e.g., “When something bad happens to me in school [like not doing well on a test or not being able to answer an important question in class], I feel like I let everybody down”). Nine items targeted catastrophizing of competence, in which appraisals focused on negative events as demonstrating low ability and forecasting future problems (e.g., “I worry that I won’t do well on anything”). Finally, nine items measured catastrophizing of autonomy, in which appraisals emphasized guilt, self-blame, or loss of self-worth (e.g., “I feel like it’s all my fault”).

Results

Missing data

Means, standard deviations, and internal consistencies for each variable at each time point are presented in Table 1. In general, students reported high levels of personal and interpersonal resources, moderate levels of emotional reactivity, and relatively low levels of catastrophizing. They were actively engaged in classroom activities, and, when faced with challenges, they tended to utilize more adaptive than maladaptive coping strategies, and to persist after encounters with obstacles or setbacks. In school, students earned above-average marks, typically between a B and a B—.

Correlations among all variables at both time points and their cross-time stabilities are presented in Table 2. As expected, engagement, coping, and re-engagement were positively and significantly related to one another, while emotional reactivity was negatively correlated with these constructs at both time points. Likewise, students’ interpersonal resources, personal resources, and catastrophizing appraisals were all significantly related in both fall and spring as expected. For all constructs, as expected, cross-time stabilities were high, making it difficult to predict change over time due to the limited variance remaining after controlling for students’ scores in fall.

Structural model of the external dynamics of motivational resilience

Latent structural modeling was used to examine the predicted links among students’ personal and interpersonal resources, emotional reactivity, motivational resilience, and academic achievement simultaneously. For each latent variable, items were distributed among three parcels (Little, Cunningham, Shahar, & Widaman, 2002). Students’ personal and interpersonal resources (i.e., teacher support and self-system processes, respectively) were hypothesized to predict both their emotional reactivity and their motivational resilience, which in turn predicted their academic achievement. We compared two alternative models: one in which interpersonal and personal resources made independent contributions, versus one in which interpersonal resources also exerted an effect through personal resources. Although both models showed a good fit with the data, the second model was a significantly better fit than the first. The final structural model, presented in Figure 2, also included cross-time stabilities for all constructs (e.g., interpersonal resources in fall to interpersonal resources in spring), but for the sake of clarity, they are not shown; see Table 2 for the zero-order correlations. Fit to the data was good, CFI = .988; RMSEA = .034 (Hu & Bentler, 1999). As can be seen, three of the predicted links
Table 2. Intercorrelations among components of motivational resilience, among personal resources, among interpersonal resources, and among catastrophizing appraisals in fall and spring.

<table>
<thead>
<tr>
<th></th>
<th>Interpersonal resources</th>
<th>Personal resources</th>
<th>Emotional reactivity</th>
<th>Motivational resilience</th>
<th>Achievement (n = 365)</th>
<th>Catastrophizing appraisals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fall</td>
<td>Spring</td>
<td>Fall</td>
<td>Spring</td>
<td>Fall</td>
<td>Spring</td>
</tr>
<tr>
<td>Interpersonal resources</td>
<td>.64</td>
<td>.75</td>
<td>.76</td>
<td>–25</td>
<td>–24</td>
<td>.73</td>
</tr>
<tr>
<td>Warmth</td>
<td>–</td>
<td>–</td>
<td>.71</td>
<td>.71</td>
<td>–22</td>
<td>–21</td>
</tr>
<tr>
<td>Structure</td>
<td>–</td>
<td>–</td>
<td>.71</td>
<td>.72</td>
<td>–21</td>
<td>–22</td>
</tr>
<tr>
<td>Autonomy support</td>
<td>–</td>
<td>–</td>
<td>.68</td>
<td>.72</td>
<td>–27</td>
<td>–26</td>
</tr>
<tr>
<td>Personal resources</td>
<td>.75</td>
<td>.76</td>
<td>–.34</td>
<td>–.29</td>
<td>.82</td>
<td>.84</td>
</tr>
<tr>
<td>Relationality</td>
<td>.65</td>
<td>.67</td>
<td>–26</td>
<td>–22</td>
<td>.56</td>
<td>.59</td>
</tr>
<tr>
<td>Competence</td>
<td>.61</td>
<td>.62</td>
<td>–33</td>
<td>–30</td>
<td>.80</td>
<td>.83</td>
</tr>
<tr>
<td>Autonomy</td>
<td>.51</td>
<td>.51</td>
<td>–23</td>
<td>–18</td>
<td>.61</td>
<td>.60</td>
</tr>
<tr>
<td>Emotional reactivity</td>
<td>–.25</td>
<td>–.24</td>
<td>–34</td>
<td>–29</td>
<td>.56</td>
<td>.56</td>
</tr>
<tr>
<td>Motivational resilience</td>
<td>.73</td>
<td>.72</td>
<td>.82</td>
<td>.84</td>
<td>–37</td>
<td>–35</td>
</tr>
<tr>
<td>Engagement</td>
<td>.69</td>
<td>.70</td>
<td>.80</td>
<td>.83</td>
<td>.42</td>
<td>.40</td>
</tr>
<tr>
<td>Coping profile</td>
<td>.70</td>
<td>.69</td>
<td>.76</td>
<td>.75</td>
<td>–39</td>
<td>–37</td>
</tr>
<tr>
<td>Re-engagement</td>
<td>.61</td>
<td>.60</td>
<td>.67</td>
<td>.71</td>
<td>–21</td>
<td>–21</td>
</tr>
<tr>
<td>Achievement</td>
<td>.17**</td>
<td>.22</td>
<td>.19</td>
<td>.28</td>
<td>–.09**</td>
<td>–.02**</td>
</tr>
<tr>
<td>Catastrophizing appraisals</td>
<td>–.49</td>
<td>–.49</td>
<td>.58</td>
<td>.54</td>
<td>.67</td>
<td>.70</td>
</tr>
<tr>
<td>Cat of relatedness</td>
<td>.47</td>
<td>.47</td>
<td>.55</td>
<td>.51</td>
<td>.56</td>
<td>.57</td>
</tr>
<tr>
<td>Cat of competence</td>
<td>.44</td>
<td>.44</td>
<td>.53</td>
<td>.49</td>
<td>.69</td>
<td>.72</td>
</tr>
<tr>
<td>Cat of autonomy</td>
<td>.47</td>
<td>.47</td>
<td>.56</td>
<td>.52</td>
<td>.64</td>
<td>.67</td>
</tr>
</tbody>
</table>

Note. N = 1020. Cross-time stabilities are reported in bold. All correlations are significant at p < .001 except as noted.

**p < .01; *p < .05; ^p < .10; ns = not significant.

Figure 2. Time-ordered latent structural model depicting the external dynamics of motivational resilience, in which students’ personal and interpersonal resources predict their emotional reactivity and motivational resilience, which in turn predicts achievement. N = 1020 students in Grades 3 through 6. All coefficients significant at p < .001 except as noted. **p < .01. *p < .05. Dashed lines were not significant. χ²(264) = 575.168, CFI = .988, RMSEA = .034, 90% CI (.030, .038). Model included indicators for each latent construct and cross-time stabilities, but they are not shown for the sake of clarity.

Involving emotional reactivity were not significant—from interpersonal resources to emotional reactivity, in both fall and spring, and from grades in fall to emotional reactivity in spring. Additionally, two of the predicted feedback loops involving interpersonal resources were not significant: from motivational resilience and grades in fall to interpersonal resources in spring. These refinements suggested that students’ self-appraisals were more central to their emotional reactivity and motivational resilience than were their perceptions of teacher support.

Predictors of motivational resilience

The foregoing latent structural analyses of all the main components of the proposed motivational system were supplemented by a series of more differentiated multiple regression analyses which used markers of proposed antecedents in fall to predict changes in potential consequences from fall to spring. These analyses were designed to allow us to refine the proposed model by examining each link in the system using both aggregated and individual dimensions of each component. As a whole, these analyses could either show that all the components of the aggregate constructs showed the same pattern of effects, or they could suggest that specific components of the aggregate constructs were more likely to be the “active ingredients” with respect to particular consequences.

The first set of analyses focused on the proposed antecedents of motivational systems. Correlations between students’ motivational resilience and each of the proposed predictors from the model (see Table 2) showed that, as expected, in both fall and spring, motivational resilience was positively and significantly related to each interpersonal and personal resource (average r = .73 and .83, respectively).
Table 3. Multiple regressions in which students’ personal resources, interpersonal resources, and emotional reactivity in fall predict changes in emotional reactivity and motivational resilience from fall to spring.

<table>
<thead>
<tr>
<th>Predictor in Fall</th>
<th>Emotional reactivity</th>
<th>Motivational resilience</th>
<th>Engagement vs. Disaffection</th>
<th>Coping profile</th>
<th>Re-engagement vs. Giving up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b (SE) 95% CI</td>
<td>b (SE) 95% CI</td>
<td>b (SE) 95% CI</td>
<td>b (SE) 95% CI</td>
<td>b (SE) 95% CI</td>
</tr>
<tr>
<td>Personal resources</td>
<td>–.10 (.04) [.02, .25]</td>
<td>.17 (.04) .18</td>
<td>.29 (.04) .26</td>
<td>.16 (.03) .18</td>
<td>.24 (.04) .20</td>
</tr>
<tr>
<td>Relatedness</td>
<td>–.08 (.03) [.01, .07]</td>
<td>.03 (.02) .05*</td>
<td>.08 (.02) .10</td>
<td>.04 (.02) .06*</td>
<td>.06 (.02) .07**</td>
</tr>
<tr>
<td>Competence</td>
<td>–.08 (.06) [.01, .14]</td>
<td>.07 (.03) .08*</td>
<td>.04 (.12) [.00, .07]</td>
<td>.01 [.01, .10]</td>
<td>.07 .20</td>
</tr>
<tr>
<td>Autonomy</td>
<td>–.02 (.03) [.01, .03]</td>
<td>.13 (.05) .15</td>
<td>.10 (.02) .14</td>
<td>.13 (.03) .15</td>
<td>.18 .10</td>
</tr>
<tr>
<td>Interpersonal</td>
<td>–.06 (.04) [.02, .14]</td>
<td>.08 (.03) .09**</td>
<td>.12 (.03) .11</td>
<td>.12 (.03) .14</td>
<td>.17 (.04) .15</td>
</tr>
<tr>
<td>Warmth</td>
<td>–.04 (.03) [.01, .10]</td>
<td>.06 (.02) .07*</td>
<td>.08 (.03) .08**</td>
<td>.09 (.02) .12</td>
<td>.12 (.03) .12</td>
</tr>
<tr>
<td>Structure</td>
<td>–.04 (.04) [.02, .12]</td>
<td>.06 (.03) .07*</td>
<td>.10 (.03) .09**</td>
<td>.10 (.03) .11**</td>
<td>.17 (.04) .15</td>
</tr>
<tr>
<td>Autonomy support</td>
<td>–.07 (.04) [.01, .12]</td>
<td>.10 (.03) .11</td>
<td>.10 (.03) .11**</td>
<td>.10 (.03) .11**</td>
<td>.17 (.04) .15</td>
</tr>
<tr>
<td>Emotional reactivity</td>
<td>– – – [.02, .12]</td>
<td>– – – [.01, .02]</td>
<td>– – – [.01, .02]</td>
<td>– – – [.01, .02]</td>
<td>– – – [.01, .02]</td>
</tr>
</tbody>
</table>

Note. N = 1020 students in grades three through six. All regressions significant at p < .001 except as noted. **p < .01; *p < .05; ^p < .10.

respectively). Also as expected, students’ emotional reactivity was negatively and significantly related to motivational resilience in both fall and spring (average \( r = -.36 \)). Of all the antecedents, students’ perceptions of competence and teachers’ provision of structure seemed to have the strongest concurrent relationships with motivational resilience.

Most interesting were analyses examining whether these proposed antecedents, both individually and in combination, could predict changes in students’ motivational resilience over the school year. Despite the high stability of motivational resilience, multiple regression analyses revealed support for each of these antecedents and their sub-components as significant predictors of changes in students’ motivational resilience (see Table 3). Students who were high in personal or interpersonal resources in fall showed increases in their motivational resilience across time, whereas students who reported high initial levels of emotional reactivity tended to decrease in motivational resilience from fall to spring. There appeared to be some specificity in the feedforward effects; students’ personal resources primarily predicted their engagement and re-engagement, while interpersonal resources most strongly predicted changes in coping profiles and re-engagement. Students’ personal resources predicted changes in their emotional reactivity from fall to spring. At the same time, however, teacher support did not predict changes in emotional reactivity, indicating that students’ interpersonal resources did not protect them from feeling bad when things went wrong.

**Reciprocal relationship between motivational resilience and academic achievement**

The next set of reciprocal relationships examined more closely were between students’ motivational resilience and their academic achievement. Correlations among students’ report card grades and components of their motivational resilience at both time points for the subset of students for whom achievement data were available (n = 365; see Table 2) revealed that, as expected, motivational resilience was positively and significantly related to academic performance both in fall and in spring, slightly higher in spring (\( r = .29 \)) than in fall (\( r = .19 \)).

Of greatest interest were multiple regressions examining whether students’ motivational resilience in fall predicted changes in their academic achievement from fall to spring. As expected, despite the high stability in achievement from fall to spring (\( r = .75 \)), motivational resilience in fall did predict students’ achievement in spring, even when controlling for fall achievement scores, \( \beta = .10, B = .40, SE = .14, p < .01, 95\% CI (.12, .67) \). Additionally, to examine whether reciprocal effects on students’ motivational resilience were evident, we conducted a second multiple regression analysis in which academic achievement was used as a predictor of students’ motivational resilience in spring, controlling for their previous levels of motivational resilience; this regression also approached significance in the predicted direction, \( \beta = .06, B = .02, SE = .01, p = .06, 95\% CI (.00, .05) \), despite the high stability in motivational resilience from fall to spring (\( r = .71 \)).

**Reciprocal effects of motivational resilience on changes in personal and interpersonal resources**

Because of the dynamic relationship between teachers and students in the classroom, we expected to find feedback effects from students’ motivational resilience and emotional reactivity to changes in their personal and interpersonal resources. In line with these expectations, and despite high stabilities in the dependent variables,
multiple regression analyses showed that both motivational resilience and emotional reactivity predicted changes in students' personal and interpersonal resources and catastrophic appraisals from fall to spring (see Table 4). Students who began the school year high in motivational resilience experienced increases in each of their personal resources over time, including higher levels of perceived relatedness, competence, and autonomy, while their more motivationally vulnerable peers showed the opposite pattern. Likewise, students who began the year high in emotional reactivity experienced decreases in personal and interpersonal resources as the year progressed, whereas students who were less emotionally reactive reported increases in both resources from fall to spring. And (in contrast to the structural model in which this link was not significant), students who reported high levels of motivational resilience in fall experienced increased warmth, structure, and autonomy support from their teachers as the year progressed, whereas students low in motivational resilience attracted fewer of these interpersonal resources.

There appeared to be some specificity in these feedback loops indicating that students who took more initiative and bounced back were in turn granted additional freedoms by teachers (i.e., autonomy support). Moreover, students' motivational resilience in fall had a particularly strong effect on changes in their feelings of competence as the school year progressed; students who showed a greater capacity to rebound from struggles in the fall subsequently experienced higher perceptions of control, whereas students who were initially less motivationally resilient reported experiencing increases in helplessness.

**Effects of teacher support on at-risk motivational systems**

In order to examine the role of teachers in re-shaping the trajectories of students who were at-risk for the development of motivational vulnerabilities, students' reports of catastrophic appraisals were used as an indicator of existing motivational risk. Although students reported relatively low levels of catastrophicizing, both correlations and multiple regressions were consistent with the notion of catastrophicizing as a marker of risk: Students who reported higher levels of catastrophicizing also showed significantly higher levels of emotional reactivity (average r = .69) and lower levels of motivational resilience (average r = -.67) than students who did not have this motivational risk factor (see Table 2). Moreover, high catastrophicizing was associated with increases in emotional reactivity from fall to spring, ß = .28, B = .29, SE = .04, p < .001, 95% CI [.22, .36] and decreases in motivational resilience, ß = -.09, B = -.06, SE = .02, p < .01, 95% CI [-.10, -.02] across the school year.

To examine the effects of teacher support on changes in students' established motivational systems, we compared the subset of students who began the school year reporting high (i.e., above median) levels of catastrophicizing appraisals with those who were less motivationally at risk (i.e., who reported low—below median—levels of catastrophicizing), to determine whether changes in students' motivational resilience over the school year differed as a function of the level of teacher support they received. Specifically, for students who were motivationally at-risk at the beginning of the year, we looked to see whether those who received consistently high or increasing levels of teacher support (i.e., who had supportive teachers) would be able to recover their motivational resilience, whereas those who received low or decreasing levels of support (i.e., who had unsupportive teachers) would stay caught in the negative motivational space. Conversely, for students who began the school year without such motivational risk, we examined whether those with unsupportive teachers would become increasingly more vulnerable, while those with supportive teachers would maintain their motivational resilience. Ultimately, we wondered if teacher support could intervene in these self-amplifying systems to help pull students out of detrimental feedback loops.

As can be seen in Figure 3, students who began the year motivationally at-risk (i.e., high in catastrophicizing) reported significantly lower levels of motivational resilience than students who showed fewer risk factors in fall, t(1018) = 28.48, p < .001, 95% CI (0.46, 0.53). Repeated measures analyses of variance
(ANOVAs) showed significant interaction effects between level of teacher support (supportive vs. unsupportive) and time point (fall vs. spring) for each risk group, F(1, 523) = 49.29, p < .001, for the low-catastrophizing group, and F(1, 493) = 54.26, p < .001 for the high-catastrophizing group, indicating that changes in students’ motivational resilience across time depended on which type of teacher support they experienced. Specifically, for the high-risk (i.e., high catastrophizing) students (n = 495), those with supportive teachers increased in motivational resilience from fall to spring, paired t(163) = 7.83, p < .001, 95% CI (−0.20, −0.12), whereas those who reported unsupportive teachers remained low in motivational resilience, paired t(330) = 1.71, ns, 95% CI (−0.00, 0.05). For the low-risk (i.e., low-catastrophizing) students (n = 525), also consistent with expectations, those with supportive teachers stayed high in motivational resilience across the school year, paired t(345) = 5.32, ns, 95% CI (−0.02, 0.04), whereas those who reported unsupportive teachers decreased from fall to spring, paired t(178) = 8.09, p < .001, 95% CI (0.14, 0.23). Moreover, by the end of the school year, students who reported high-catastrophizing appraisals in fall but received consistently high or increasing levels of teacher support from fall to spring actually reported significantly higher levels of motivational resilience than their classmates who began the school year with few risk factors but received consistently low or decreasing levels of teacher support, t(341) = 2.76, p < .01, 95% CI (0.02, 0.14).

**Discussion**

Consistent with other research that documents reciprocal feedback among the factors contributing to students’ engagement (e.g., Green et al., 2012; Jang et al., 2012; Van Ryzin, 2011), the findings of this study reveal the dynamic relationships that exist among students’ motivational resilience and their social contexts, personal resources, emotional reactivity, and achievement outcomes. This study confirmed the typical strong feedforward effects from students’ self-system processes (i.e., personal resources) and also documented effects of teacher support (i.e., interpersonal resources) on changes in their motivational resilience. Students’ motivational resilience, in turn, predicted changes in their academic achievement over the school year. Perhaps surprisingly, feedback effects were also found for many of the links in the proposed model. Students who evinced high motivational resilience in fall showed small improvements in their achievement as the year progressed along with increasing feelings of relatedness, autonomy, and especially competence. They also reported experiencing increases in warmth, structure, and especially autonomy support from their teachers. In contrast, students who began the year with greater motivational vulnerabilities were likely to show small declines in their achievement from fall to spring accompanied by decreases in their positive self-perceptions; they also experienced their teachers as withdrawing from them and becoming more controlling over time.

Together, these feedforward and feedback effects may form dynamic, potentially self-perpetuating cycles, such that students who start the school year high in personal and interpersonal resources are likely to exhibit higher levels of motivational resilience, which in turn elicits increases in those resources. In contrast, students who are initially low in motivational resilience tend to experience erosion of their existing resources over time, which has ever increasing deleterious effects. Taken together with evidence that the internal dynamics of motivational resilience are also self-sustaining (Skinner et al., 2013a), it seems that, without outside intervention, these virtuous and vicious feedback cycles are likely to persist, in the classic “rich get richer, poor get poorer” dynamic. However, findings suggested that teacher support might be a good candidate as an external lever, because (compared to personal resources) it is not as tightly coupled to students’ previous motivational resilience and academic performance. In fact, even though multiple regressions suggested a feedback effect from motivational resilience to increases in teacher support from fall to spring, no such feedback effect was apparent in the overall structural model, when other important factors, such as students’ self-appraisals, were taken into consideration.

Hence, a key interest of this study was to examine whether teacher support can reshape these otherwise self-sustaining motivational systems. Comparisons of students who were motivationally at-risk (as marked by high levels of catastrophizing appraisals) with students who showed less risky profiles demonstrated the important role teachers play in classroom dynamics: Students who began the school year high in catastrophizing appraisals but received high levels of teacher support were able to bounce back such that they ended the year with higher levels of motivational resilience than even students who began with less risky profiles but received low levels of teacher support.

**Study strengths and limitations**

Of course, these findings must be interpreted in light of the study’s strengths and limitations. Although it is a significant strength of this

![Figure 3. Mean levels of students’ motivational resilience across the school year according to initial vulnerability status and level of teacher support over the school year. Responses could range from (1) Not at all true for me to (4) Very true for me.](image-url)
study that it is embedded in the larger SDT framework, the conceptualization does not encompass all the constructs that potentially are relevant to motivational resilience. For example, students’ goal orientations and mindsets (Dweck, 2006) likely play key roles in how they appraise and respond to challenges and setbacks in school, as would their self-regulatory strategies (Schunk & Zimmerman, 2012) and other factors important to academic buoyancy, such as high levels of planning or support from parents and the community (Martin & Marsh, 2008).

In terms of measures, all of the information in the current study was acquired via surveys, relying on students’ own self-reports of their experiences. Although students’ perspectives are crucial to access internal processes, many constructs are also observable in the classroom, and future studies would benefit from the inclusion of observational methods and other reporters’ perspectives on student engagement and teacher–student interactions. Moreover, in terms of design, it will be important in future studies to examine how motivational resilience and its reciprocal relationships with students’ personal and interpersonal resources operate over longer periods, potentially accumulating in their effects as self-amplifying cycles play out over time. Experimental designs will also be essential to assess issues of causality more directly.

In terms of sampling, having the participation of an entire school district is a significant strength of this study. However, the district consisted of predominantly working-class, Caucasian families. Classrooms themselves are also changing, with policy changes and increasing integration of technology in learning environments. According to SDT, these should be universal motivational principles (Deci & Ryan, 1985), but, it will be necessary to replicate this study on more diverse samples in order to assess their generalizability over time and populations.

Implications and future research

This study adds to a growing understanding of how the dynamics of motivational resilience function. Previous research provided initial evidence suggesting that students’ ongoing engagement fuels their reactions to challenges: Students who are enthusiastic and actively involved in academic tasks tend to use adaptive coping strategies to bounce back from difficulties, contributing to a virtuous feedback loop that sustains engagement. In contrast, students who begin the school year relatively more disaffected show increasing emotional reactivity, maladaptive coping, and eventually, giving up, which together form a detrimental self-reinforcing cycle that can be difficult to escape (Skinner et al., 2013a). Building on this earlier work, the current study focused on how these internal dynamics can be influenced by external contributors such as students’ own self-system processes and supports from their classroom teachers. Taken together, these studies provide evidence for almost all of the links in the proposed model (see Figure 1); and although findings suggest that neither students’ achievement nor their close relationships with teachers protected them from increasing emotional reactivity, results from the current study reveal that internal dynamics, which are otherwise self-amplifying, can be reduced, and in some cases reversed, by factors external to this system.

Emotional reactivity. In early iterations of the model of motivational resilience, we assumed that high levels of emotional reactivity signaled a motivational vulnerability, and would interfere with students’ capacities to cope adaptively and bounce back after failure. However, taken together with previous research, current findings suggest that the role of emotional reactivity is more complex (Lemos, 2002). Based on students’ reports of how upset they become following setbacks in school, previous studies showed that students who were disaffected from and doing poorly in school could indeed be highly emotionally reactive, but so too could students who were highly engaged and doing well. And, although emotional reactivity did not prevent students from re-engaging with challenging academic tasks, it did make them more likely to give up (Skinner et al., 2013a). Thus, emotional reactivity, at least as measured in this study, seems to contain not only elements of risk, but also elements of how much students care (Lemos, 2002): If things are going well, emotional reactivity seems to be a marker for commitment or investment, but if things are going poorly it can exacerbate ongoing negative cycles and undermine students’ motivational resources.

Additional complexities in the functioning of emotional reactivity were uncovered in the current study. Neither academic success nor teacher support prevented students from feeling bad after a stressful event. Students who reported high levels of teacher support were just as likely to report being upset by difficulties as the year progressed as students who reported less supportive relationships. And, although emotional reactivity seemed to have some impact on changes in students’ motivational resilience, it did not mediate the stronger effects of students’ personal and interpersonal resources on their motivational resilience. Instead, reactivity seems to be buffered only by students’ own personal resources, suggesting that teacher support or academic accomplishments will be effective in reducing emotional reactivity only to the extent they help strengthen students’ own internal assets, such as a sense of belongingness, confidence, or autonomy. Moreover, results from the multiple regressions suggested that students who reported higher levels of emotional reactivity in the fall also experienced losses over the school year in all three kinds of teacher support.

More work is needed to understand the role students’ emotional reactions play in classroom dynamics. Because it provides observable information to teachers, emotional reactivity may be a particularly important target for future study. In such work, it may be instructive to further examine what types of reactivity are being expressed. A teacher may respond differently, for example, to a student who is worried or sad than one who is angry or frustrated, and the same type of support offered for varying emotional responses would likely have differential effects. Most importantly, future investigations may benefit from the use of person-centered analysis to identify different profiles of motivational resilience, distinguishing students who are high versus low on emotional reactivity and on the components of resilience (engagement, coping, and re-engagement) in order to better elucidate how these features function in combination (Luo, Hughes, Liew, & Kwok, 2009; Wang & Peck, 2013).

Ideally, students would be motivationally resilient and exhibit low levels of emotional reactivity, bouncing back from setbacks without being derailed by their emotions, and instead just busily learning from each experience. Indeed, such students may display very different patterns of functioning than students who are generally motivationally resilient but also highly reactive. In the same vein, students who are low in motivational resilience but who nevertheless get very upset when they run into difficulties may at least still show the “spark” of caring about their academic work, and so their enthusiasm may be more easily re-ignited with well-calibrated support. The toughest combination to rekindle may be a profile that is low on motivational resilience and low in emotional reactivity,
perhaps manifest as apathy or amotivation, which is particularly detrimental (Ratelle, Guay, Vallerand, Larose, & Senécal, 2007). Future studies could also examine profiles that incorporate students’ achievement—emotional reactivity may influence students’ motivational resilience differently for students with consistently high achievement compared to those with persistent academic difficulties.

It is also possible that, compared to emotional reactivity, a more important element to incorporate into the model of motivational resilience would be recovery from emotional distress. It seems plausible that it may not be whether (or how far) students fall emotionally, but rather how quickly they recover or bounce back that truly matters to their motivational resilience. To more thoroughly investigate this idea, future studies would benefit from the inclusion of a measure of emotional bounceback, or what Davidson (1998) refers to as affective chronometry.

Reciprocal effects. In research on coping and resilience, examination of feedforward effects is standard practice. Researchers typically attempt to determine the kinds of factors in students’ school or family contexts that encourage them to try hard, cope well, and bounce back. However, the findings from this study underscore the importance of looking for both feedforward and feedback effects: Both directions of effects were evident in the proposed model. It seems that when students perform well in school, this learning and success naturally feed back into their motivational resilience. In the same vein, the experience of motivational resilience enhances their personal resources and may even influence the availability of their interpersonal resources. To more thoroughly elucidate the functioning of such complex dynamics over time, future studies would benefit from designs that allow researchers to measure these constructs on time scales more closely aligned with the actual timing of how these reciprocal loops likely play out and stabilize (i.e., across days or weeks, or even moment by moment, rather than months).

Importance of self-appraisals and of teacher support. Results from the current study highlight the centrality of students’ self-appraisals to the functioning of their motivational systems. In this sample of third- through sixth-graders, self-system processes were the only kinds of resources that buffered students’ emotional reactivity and they were the strongest predictors of motivational resilience. In addition, they represented a key pathway through which interpersonal resources exerted their effects. Self-appraisals were also more tightly coupled in feedback effects: They registered the effects of both previous academic performance and motivational resilience, suggesting an amplifying dynamic. For students who are already doing well, the self-reinforcing feedback loops are beneficial, but that same cyclical dynamic can also prevent students from escaping an existing adverse feedback loop organized around motivational vulnerability and self-depreciating appraisals.

Findings from this study also underscore the crucial role played by teachers in the dynamics of their students’ motivational resilience. Importantly, these typically self-sustaining dynamics should not be taken as evidence that the system is fixed or impervious to intervention. In fact, the present study suggests that this system may indeed be open to influence—teachers are not as likely to be drawn into vicious cycles, and they may even disrupt maladaptive dynamics by providing compensatory well-calibrated support. Next steps for examining this process may include studies that are more longitudinal in nature, where researchers could observe students as they encounter new teachers across different school years and note the extent to which motivational resilience is either preserved or undermined by the kinds of support they subsequently receive. Such studies, especially if they include at least three time points, may be well suited for following up on some of the findings from the present investigation that suggest multiple meditational processes within students’ motivational systems.

Certainly, supporting students’ motivational resilience is not an easy task. Without mindful intention to positively intervene in these processes, it is all too easy for teachers to participate in ways that sustain or amplify existing negative motivational dynamics. It is understandable that one default for teachers may be to reciprocate—providing more support for motivated students while at the same time withdrawing support and increasing pressure on students who are actively disaffected in class, emotionally reactive, cope maladaptively, or give up in the face of challenges. After all, teachers too have needs to feel related, competent, and autonomous (Klassen, Perry, & Frenzel, 2012; Niemiec & Ryan, 2009; Spilt, Koomen, & Thijs, 2011), and dealing with demands such as student disruption, emotional outbursts, or helpless behaviors can directly undermine each of these needs (Furrer, Skinner, & Pitzer, 2014). However, the knowledge that these vulnerabilities will otherwise multiply over time can motivate the urgency of early intervention efforts.

Teachers will themselves need support if they are to participate in these dynamics in ways that counteract vulnerability and sustain resilience. Educators may need training to be able to simultaneously monitor all the components of the complex motivational system, vigilantly watching for multiple indicators of vulnerability and attempting to provide students with appropriately well-tuned support. It is essential for schools and administrators to recognize the important role students’ social contexts play both in bringing students out of vulnerability and in helping those who are already doing well to maintain their momentum. Facilitating teachers’ capacities to provide students with optimally calibrated support can have powerful effects on students’ motivational systems. The present study demonstrated that teachers can indeed provide compensatory dynamics within this motivational system, which encouragingly, once re-calibrated, can become fueled by its own self-sustaining nature. Teachers are in a unique position to intentionally intervene in this process, and their support has the capacity to have a lasting impact on students’ profiles of motivational resilience.

Funding
This study was supported by the National Institutes of Mental Health (Training Grant No. 527594), U.S. Department of Health and Human Services 10.13039/100000016 (Research Grant No. HD19914), and the W. T. Grant Foundation.

References


