

# Stressful events compromise control strivings during a major life transition

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**Abstract** Prior research on stressful events has largely ignored their potential impact on motivational processes. This study prospectively examined the association of a stressful event with control strivings in the school-to-work transition. Five waves of data on stressful events, control strategies, and potential mediating variables were collected from an adolescent sample in Berlin ( $N = 420$ ) during the year before high school graduation. The occurrence of a stressful event (death of family member, parent divorce) predicted a decline in general career-related and specific apprenticeship-related control strivings. This association was mediated by a decline in control-related means-ends beliefs. Proximity to the deadline of graduation exacerbated this association for apprenticeship-seeking control strivings, but this effect was buffered by usage of selective secondary control strategies (cognitive strategies to enhance commitment to a goal). Thus, stressful events can exacerbate challenges and require additional means of control striving.

**Keywords** Stressful events · Control striving · Control beliefs · Transitions · Goals

## Introduction

Do stressful events impair people's motivation to pursue major life goals? A wealth of research indicates that major negative events, such as severe illness, the loss of a loved one, or major relationship upheaval can compromise mental and physical well-being (for an overview, see Carver 2007; Goldberger and Breznitz 1993). It is plausible that such events could also interfere with the pursuit of important life goals. For example, the death of a loved one may lead to difficulty in pursuing one's career, or a community trauma may decrease investment in one's relationships. Plausible though these effects of negative events may seem, past research has largely overlooked the possibility that negative events can also affect motivational processes.

To the extent that motivation has previously been examined in the context of stressful events, it has been as a predictor of other outcomes. For example, Wrosch et al. (2002) demonstrated that primary control striving predicted better adjustment to health stresses. Similarly, an ample body of research has examined the differences in well-being outcomes associated with active (or problem-focused) coping and emotion-focused coping (e.g., Folkman et al. 1993; Jex et al. 2001; Smith et al. 2000).

Motivational processes are not merely important for short-term well-being, however. They also are responsible for much of one's future well-being and development. In particular, the exercise of control over the environment, or *primary control* (Rothbaum et al. 1982), has been widely researched for its role in adaptation and development (e.g., Brandstädter and Lerner 1999; Carver and Scheier 1998; Heckhausen 1999; Lerner and Busch-Rossnagel 1981). Indeed, Heckhausen and Schulz (1995) identified *primary control striving*—goal engagement to further primary

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control potential—as the main force behind human motivation. While no prior studies have examined the role of stressful events in shaping control striving, ample research has examined the effects of stress on a related set of constructs: control-related *cognitions*. For example, research on learned helplessness has documented the ability of uncontrollable stress to affect control-related beliefs and attributions, potentially leading individuals to perceive the world as generally out of their control (e.g., Abramson et al. 1978; Seligman 1975). Similarly, trauma researchers have asserted that individuals' basic beliefs about the world—including the sense that events in the world are controllable—can be threatened by severely stressful events (e.g., Epstein 1973, 1990; Janoff-Bulman 1989, 1992). Empirical research has lent support to the prediction that stressful events can lead one to view the world as less generally controllable (e.g., Magwaza 1999; Schwartzberg and Janoff-Bulman 1991; Tomich and Helgeson 2002; for a review, see Poulin 2006).

A diminished sense that the world is controllable is likely to lead to diminished control *striving*. Beliefs in the attainability of a given goal or of goals in general, called expectancy beliefs, have long been recognized as critical for determining whether individuals engage with goals (e.g., Tolman 1959). Expectancy beliefs with respect to a given goal depend in part on control-related *means-ends beliefs*—that is, beliefs that a goal is in principle controllable (Skinner and Chapman 1984; Skinner et al. 1988). In order for the exercise of control to appear worthwhile, control-related *means* such as effort and ability must be viewed as the way to realize the *end* of the goal, as opposed to means outside of control such as luck and external forces. Thus, if a stressful event reduces one's control-related means-ends beliefs, one's goal engagement will probably suffer, as well.

Of course, stressful events have many effects besides altering control beliefs. Another result of experiencing a major stressor is altered affect balance in the form of increased negative affect and/or decreased positive affect (Goldberger and Breznitz 1993). Positive affect balance, like control beliefs, serves as a motivational resource for control striving in that it facilitates problem-solving and execution of both intrinsic and extrinsic goals (e.g., Isen 2004; Isen and Reeve 2005). In this way, the depleting affective consequences of stressful events may also lead to reduced control striving.

When is control striving threatened?

Stressful events may not always threaten control striving; situational and individual differences may buffer or augment the effects of life stress on motivational outcomes.

While the list of such potential moderators is undoubtedly quite large, the life-span theory of control (Heckhausen and Schulz 1995) suggests two specific factors to consider: the timing of the stressful event and the individual's deployment of control strategies focused on the self, or *secondary control*.

#### *Timing: The role of urgency*

One major factor that may influence whether a stressful event affects goal strivings is the timing of the event itself. Research on developmental transitions suggests that control striving during the pursuit of certain key life goals is facilitated by biological forces, social institutions, and social and cultural norms (e.g., Claessens 1968; Baltes 1991; Heckhausen 2000). For certain developmental transitions, there comes a time when these facilitating processes begin to decline, leading to a condition of *urgency*—and ultimately, to a “developmental deadline” at which the individual is better off disengaging from the now unobtainable goal (Heckhausen 1999). Developmental deadlines apply to many transitions, including the “biological clock” for childbirth (Heckhausen et al. 2001), the formation of intimate relationships such as marriage in adulthood (Wrosch and Heckhausen 1999) and the transition from school to the beginnings of a career (Heckhausen and Tomasik 2002).

The life-span theory of control describes developmental deadlines in terms of the action-phase model of developmental regulation (Heckhausen 1999), a model developed from the Rubicon model of action phases (Heckhausen and Heckhausen 2008; Heckhausen and Gollwitzer 1987). Essentially, this model asserts that as a developmental deadline approaches, declining chances for success and increasing urgency place added demands on individuals in their pursuit of the deadline-encumbered goal. Individuals need to invest increased effort, use creative and compensatory means, and metavolitional strategies to ensure progress towards the increasingly elusive goal. These extraordinary investments in goal pursuit are more vulnerable to disruption than regular efforts under non-urgency conditions. Thus, with increasing urgency, a stressful event may be increasingly disruptive to control strivings.

#### *The role of secondary control*

Control strivings include not only primary control, or control directed at the external world, but also *secondary control* strategies, or control directed towards the self (Rothbaum et al. 1982). Rothbaum et al.'s (1982) original

definition of secondary control identified it as largely in opposition to primary control—that is, as focused on accommodating to circumstances or giving up on a goal (see also Brandtstädter 1998 on antagonism between assimilation and accommodation; and more recently Morling and Evered 2006). However, subsequent research and theory has established that individuals engage in many strategies directed at the self—that is, secondary control strategies—that actually serve to *bolster* primary control strivings (e.g., Haase et al. in press; Poulin and Heckhausen 2006). Examples of this kind of secondary control, called *selective secondary control*, include blocking out competing goals, enhancing perceived control over the goal, boosting the perceived importance and/or attractiveness of the target goal, or vividly anticipating the positive affect (e.g., pride, joy) one will experience upon goal achievement (for a review, see Heckhausen and Schulz 1995). Selective secondary control may, thus, protect control strivings against the impact of a stressful event.

#### The present study

The purpose of the present study was to examine the relations between the occurrence of a stressful event and control strivings. Because of the predicted role of urgency in moderating this effect, we sought to examine control strivings during a transition. Specifically, we studied the career- and apprenticeship-related control strivings of German middle-tier high school (*Realschule*) students in their senior year (i.e., tenth grade) who must make the transition from school to work by applying for a vocational training position (i.e., apprenticeship).

Acquiring an apprenticeship in Germany presents considerable challenges for control striving. Apprenticeships, which most graduates of middle-tier high schools are expected to apply and strive for, are not guaranteed; about 40% of students end up without an apprenticeship two years after graduation, and those with apprenticeships are often still hoping for a better (i.e., more socially prestigious) one (for more information on the unique characteristics of this transition in Germany, see Heckhausen and Tomasik 2002). Moreover, the approach of the deadline of high school graduation at the end of tenth grade leads to a very real sense of urgency. As students get closer to graduating, they are faced with dwindling numbers of open apprenticeship positions, making continued apprenticeship-related control striving increasingly challenging. And yet, maintaining control strivings is critical, since longitudinal studies of middle-tier high school graduates have shown that those who have not attained an apprenticeship two years after graduation never will do so (Blossfeld 1990; Dietrich 2005).

#### Hypotheses

Our general hypothesis was that the occurrence of a stressful event should impair control striving. In light of the research and theory reviewed above, we proposed four sets of specific hypotheses:

- 1) First, the occurrence of a stressful event will be related to a decline in control strivings.
- 2) Second, the associations between stressful event occurrence and control strivings will be mediated by a decline in the control-related resources of control-related means-ends beliefs and positive affect balance.
- 3) Third, while stressful events should affect control strivings in general, they should have a greater impact when individuals are close to a developmental deadline—in this case, high school graduation. This is because opportunities for success diminish as developmental deadlines approach. Of course, this hypothesis implies that the timing of the event should only matter for goals that *have* a deadline. Thus, an additional prediction related to this hypothesis is that stressful events will more strongly affect goal striving for the apprenticeship position, which has a deadline, than they will general goals related to one's occupational future.
- 4) Fourth, because of its role in enhancing motivational resources, use of secondary control—specifically, selective secondary control—in response to a stressful event will moderate the association between stressful event occurrence and control strivings. Specifically, we predicted that individuals who respond to a stressful event by engaging in secondary control will have less of a decline in control striving than will those who do not do so.

#### Method

##### Participants

The data for the proposed analysis were collected from a longitudinal study of developmental regulation in the school-work transition in Berlin. The sample was comprised of 420 Berlin high-school students in tenth grade (approximately 16 years of age), the typical year of high-school graduation in Germany. These students were drawn from classes in four high schools, two each from working-class and middle-class areas of Berlin, as determined by census (*Senatsverwaltung für Gesundheit und Soziales* 1990). One school from each SES group was drawn from the eastern and western parts of Berlin, respectively. A

total of 758 students from three cohorts participated in the study. However, because some scales were revised between the first and second cohorts, this study only makes use of data from the second and third cohorts ( $N = 527$ ), who both used the improved scales. Of these,  $N = 420$  (79.7%) had complete stressful events data for both waves and are included in the analyses.

### Design and procedure

Data were collected at the beginning of tenth grade and then every two months for the duration of the school year, for a total of five time points. Except where noted otherwise, analyses presented below focus on the two time intervals during tenth grade when students could have reported the occurrence of a stressful event: between waves 2 and 3, or the *non-urgent phase*, and between waves 4 and 5, or the *urgent phase*.

At each wave, students completed written questionnaires during regular class time in sessions led by two interviewers that lasted approximately one and a half hours. Each participant received token compensation (candy and a toy worth about one dollar US) in appreciation for their completing the questionnaire. Prior work on this data set has found low attrition, largely due to students' obligation to attend school, and no systematic response bias associated with control strategies or other important variables (Heckhausen and Tomasik 2002).

### Measures

#### *Stressful life events*

At waves 3 and 5 (the middle and end of tenth grade, respectively), respondents were asked to specify whether they had experienced the death of a family member or parental divorce since the last data collection two months before (wave 2 or 4, respectively).<sup>1</sup> A dichotomous variable was then created at each wave representing whether a stressful event had happened to an individual during that time period.

<sup>1</sup> Students also reported whether they experienced a personal illness, the illness of a family member or other important person, personal relationship troubles, relationship troubles between one's parents, a family move, or another event that the respondent could specify. However, the large proportion of students reporting these events (over 30% in some cases) and anecdotal evidence from during the questionnaire sessions suggested that students interpreted these more ambiguous categories to include minor events (e.g., a cold) as well as major stressors.

#### *Control strivings*

Control strivings were measured at all waves as selective primary control (SPC) using German versions of the Optimization in Primary and Secondary Control (OPS) scales tailored to specific domains of goal pursuit (Heckhausen et al. 1998). The domains pertinent to the present study were apprenticeship-seeking and occupational future (i.e., one's long-term career success).

SPC for apprenticeship-seeking was assessed with six items (English translations: e.g., "I am ready to do everything necessary to get a suitable apprenticeship position," "If I get refusals to my applications, I will try even harder to get a suitable apprenticeship position"), and SPC for occupational future was assessed with five items (e.g., "I invest all my energy to get a good occupational future," "I work towards a successful career wherever I can"), agreement with each of which was assessed on a five-point scale (1 = "Definitely wrong," 5 = "Definitely right").

Reliability for both domains was good at waves 1, 3, and 5 ( $\alpha$ s for apprenticeship-seeking ranged from .82 to .86; for occupational future, from .83 to .85).

#### *Positive and negative affect*

Positive and negative affect were assessed using a German translation of the PANAS (Watson et al. 1988). Reliability for both positive and negative affect was good at all waves ( $\alpha$ s ranging from .80 to .86).

#### *Control-related means-ends beliefs*

Means-ends beliefs were assessed at waves 1, 3, and 5 using the Control Agency Means-ends in Adulthood Questionnaire (Heckhausen 1991). Two specific sets of beliefs, pertaining to ability and effort, were used to assess the degree to which students believed that obtaining an apprenticeship was related to control strivings. Each set was assessed and were measured with two items, and scored on a five-point scale (1 = "Definitely wrong," 5 = "Definitely right"). English translations for ability means-ends belief items were: "In order to find a suitable apprenticeship, one has to have good school achievement," and "In order to get an apprenticeship, one has to be suited for the occupation." The translated items for the means-ends belief in effort were: "If one invests much energy in writing many applications, one will find a suitable apprenticeship," and "If one is looking for a suitable apprenticeship, it is important not to get discouraged."

Reliability of the four items together was acceptable at all waves ( $\alpha$ s ranging from .68 to .72).<sup>2</sup>

### Secondary control strategies

Selective secondary control (SSC) in the domain of apprenticeship was also assessed at all waves using the OPS scales and was assessed using five items (English translations: e.g., “In searching for an apprenticeship, I make sure that other things do not distract me from my goal,” “In searching for the right apprenticeship, I often imagine how overjoyed I would be if I found one”). Reliability was acceptable at all waves ( $\alpha$ s ranging from .75 to .80).

### Analytic strategy

The longitudinal study design made it possible to examine stressful events at two different time points, and to investigate how these events predicted control strivings independent of prior levels of control strivings. In order to correctly estimate these longitudinal phenomena, we employed multilevel modeling, also known as mixed-effects modeling or hierarchical linear modeling. Multilevel modeling (MLM) is a statistical technique in which regression coefficients reflect not only between-person differences but also within-person differences over time (Singer and Willett 2003).

In the present study, multilevel modeling offered several benefits. First, since MLM allows for robust estimation of variables assessed repeatedly—i.e., time-varying covariates—it was possible to simultaneously evaluate the association of stressful events with control striving in the non-urgent phase (wave 2–3) and in the urgent phase (waves 4–5) without inflating Type I error or problems with multicollinearity. Second, because MLM allows time to be explicitly modeled as a variable, it was possible to compare the potential moderating role of urgency using time (non-urgent versus urgent phase) as a moderator variable. Finally, the time-structured nature of MLM models made it possible to easily control for control striving assessed before the occurrence of reported stressful events (i.e., at Wave 2 for the non-urgent phase and at Wave 4 for the urgent phase) using lagged variables.

All analyses, including those involving MLM, were conducted using STATA 9.0 (Stata Corp. College Station, Texas). Except where noted, multilevel models were built

using STATA’s xtreg module with maximum likelihood estimation, which allows for evaluation of both within- and between-person effects.

## Results

### Descriptive statistics

#### Participants and non-participants

The final sample ( $N = 420$ ) was comprised of 215 males (51.6%) and 202 females (48.4%), with 3 individuals (0.7%) missing gender data. Those in the final sample differed from those excluded from this sample due to missing stressful event data ( $N = 107$ ) in that participants were slightly younger ( $M = 16.75$ , with 6 individuals, or 1.4%, missing age data) than non-participants ( $M = 16.94$ , with 25 individuals, or 7.4% missing;  $t = 3.41$ ,  $p = .001$ ). They did not differ on any other sociodemographic characteristics (e.g., gender, income).

#### Stressful events

The frequencies of various kinds of stressful events among students in the sample at each time interval are described in Table 1. In the non-urgent phase (between waves 2 and 3), 11.7% of students reported some kind of stressful event; in the urgent phase (between waves 4 and 5), 9.5% reported such an event. A small number of students ( $n = 14$ ) reported stressful events at both intervals. Analyses reported below were also conducted omitting those students, and results remained substantively identical.

#### Apprenticeships

At Wave 5, the end of 10th grade (and the urgency phase), 39.6% of students reported having secured at least one apprenticeship position. A t-test indicates that these students did not have lower apprenticeship-related control strivings at Wave 5 ( $t = -0.48$ ,  $p = .63$ ). In fact, while this difference was not significant, students with apprenticeships had slightly higher control strivings on average ( $M = 3.61$ ) than did students without apprenticeships ( $M = 3.58$ ).

#### Control strategies and proposed mediators

Table 2 shows descriptive statistics and correlations for primary and secondary control (selective secondary

<sup>2</sup> Corresponding control-related agency beliefs (beliefs that one has access to particular means) were also assessed for both effort and ability.

**Table 1** Numbers and percentages of students reporting stressful events in the non-urgent and urgent phases

Event	Number reporting event between waves 2 and 3 (N = 367)	Number reporting event between waves 4 and 5 (N = 337)
Death of father	10 (2.8%)	8 (2.4%)
Death of mother	6 (1.7%)	6 (1.8%)
Death of sibling	9 (2.5%)	6 (1.8%)
Divorce of parents	32 (9.0%)	27 (8.0%)
ALL EVENTS COMBINED	43 (11.7%)	32 (9.5%)

control) and for the proposed mediators of the stressful event-control striving association averaged across waves 1, 3, and 5 (the beginning, middle, and end of 10th grade, respectively). None of these correlations differed by a total of more than  $r = .10$  across the three waves.

Tests of hypotheses

**Hypothesis 1:** Stressful events will predict a decline in control strivings To test the first hypothesis, multilevel regression models were fit for control striving separately for the two domains, general occupational future (career) and apprenticeship-seeking. The dichotomous variable representing stressful event occurrence was entered into the model as a time-varying covariate, with non-urgent phase events predicting Wave 3 control striving and urgent-phase events predicting Wave 5 control striving. Similarly, a variable representing lagged control striving (i.e., control striving at waves 2 and 4, respectively) was entered as a time-varying covariate. Table 3 informs about results from this model, (top section), along with information about further analyses pertaining to the other hypotheses. Across waves, the occurrence of a stressful event predicted

decreased control striving, adjusting for pre-event control striving ( $\beta$ s for both domains of control striving =  $-.08$ ).

**Hypothesis 2:** Means-ends beliefs and affect will mediate the event-striving association The first step in testing the second hypothesis was to examine whether, as expected, stressful events would also predict means-ends beliefs and affect. Multilevel regression models similar to those described above were fit for control-related means-ends beliefs, positive affect, and negative affect. In addition, the associations between stressful events and control-related agency beliefs were examined in order to establish the distinctiveness of means-ends beliefs. Stressful events predicted decreased belief in control striving as the means to achieve an apprenticeship ( $\beta = -.08, p < .05$ ), adjusting for the relation between pre- and post-event means-ends beliefs Moreover, stressful events were associated with increased negative affect ( $\beta = .11, p < .01$ ), adjusting for pre-event negative affect. Stressful event occurrence did not significantly predict levels of positive affect, nor agency beliefs.

Next, these variables were entered one at a time into the models for career- and apprenticeship-related control striving. Results indicated the associations between stressful events and control striving were unchanged by the addition of negative affect to the models. However, as shown in Table 3 (second section), entering means-ends beliefs assessed at the same time as both outcomes (post-events) into the models resulted in stressful events no longer significantly predicting either outcome, while means-ends beliefs remained significant. This pattern of results indicates that means-ends beliefs completely mediated the stressful event-control striving association (Baron and Kenny 1986).

**Hypothesis 3:** Urgency as a moderator The prediction that stressful events would have a stronger impact on control striving in the urgent phase than in the non-urgent

**Table 2** Descriptive statistics and correlations for key variables across all waves

Variable	1	2	3	4	5	6
1. Apprenticeship primary control	–					
2. Career primary control	.71*	–				
3. Secondary control (SSC) <sup>a</sup>	.73*	.60*	–			
4. Positive affect	.27*	.26*	.30*	–		
5. Negative affect	–.11*	–.12*	–.07*	–.08*	–	
6. Control means-ends beliefs	.52*	.48*	.57*	.32*	–.10*	–
M	3.80	4.02	3.80	3.54	2.64	3.88
SD	0.74	0.74	0.71	0.61	0.70	0.65

\* $p < .05$

Note. Means and correlations reflect averaged values across all five waves. <sup>a</sup> Secondary control was specifically selective secondary control for apprenticeships

**Table 3** Multilevel models for stressful events predicting control striving, with significant mediation and moderation effects

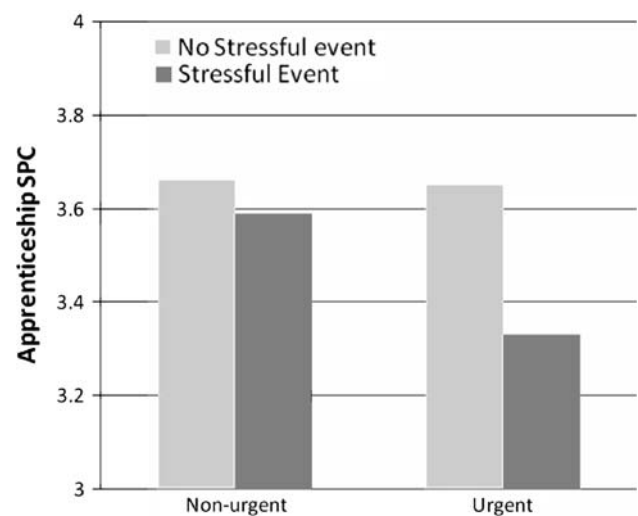
	Career primary control striving		Apprenticeship primary control striving			
	Baseline model	With means-ends beliefs	Baseline model	With means-ends beliefs	By urgency phase	By SSC change and urgency
Lagged control striving	.61***	.51***	.67***	.55***	.75***	.73***
Stressful event	-.08*	-.04	-.08**	-.04	.03	-.04
Urgency					.25*	.06
Urgency X event					-.33**	-.05
Means-ends beliefs		.28***		.30***		
Secondary control (SSC) <sup>a</sup> change						.31***
SSC change X event						-.04
Urgency X SSC change X event						.18*

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

*Note.* Coefficients reported are standardized regression coefficients. All overall models were significant ( $ps < .001$ ). <sup>a</sup>Secondary control was specifically selective secondary control for apprenticeship

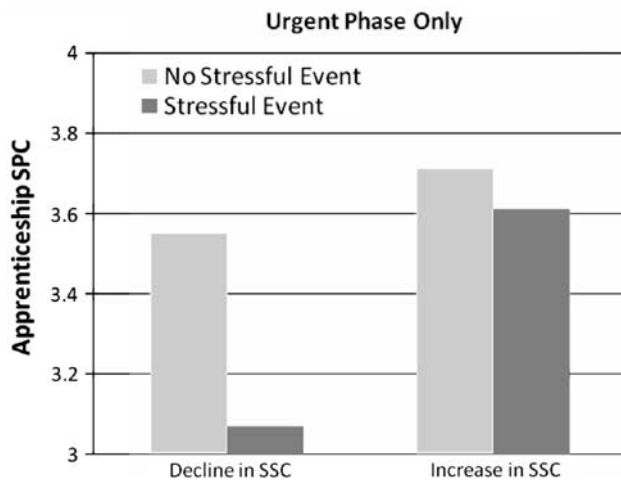
phase was tested by adding a variable representing urgency, corresponding to the waves at which stressful events were assessed (3, non-urgent, and 5, urgent), to the stressful event-control striving models described above and shown in Table 3 (third section). A product-term interaction was then computed between this variable and the variable representing stressful event occurrence. This interaction was not significant for the long-term occupational future, or career domain, for which urgency was not relevant ( $\beta = -.08$ ,  $p > .50$ ). By contrast, as shown in Table 3, this interaction did reach significance in the apprenticeship domain, for which urgency was relevant. To evaluate this interaction, levels of apprenticeship control striving by stressful event occurrence were graphed separately for the non-urgent and urgent phases. As shown in Fig. 1, the difference in control striving between individuals with stressful events and those without stressful events was much greater in the urgent phase.

**Hypothesis 4:** Secondary control as a moderator A product-term interaction was also used to test the hypothesis that an increase in secondary control—specifically, selective secondary control—would buffer the stressful event-control striving association. First, a variable was created representing the difference score in selective secondary control from the beginning to the end of each phase (i.e., from Wave 2 to Wave 3 for the non-urgent phase and from Wave 4 to Wave 5 for the urgent phase). This variable was then entered, along with its product-term interaction with stressful event occurrence, into the models predicting control striving in both domains. Results indicated that the interaction term was not significant for either domain. However, given that urgency was a significant moderator of the stressful event-control striving association, a follow-



**Fig. 1** Apprenticeship-seeking control strivings in the non-urgent (Wave 2 to Wave 3) and urgent (Wave 4 to Wave 5) phases, graphed by the occurrence of a stressful event between the two waves ( $N = 420$ ). *Note.* SPC = selective primary control; range of this variable is 1–5

up analysis examined whether increased secondary control only moderated this association under conditions of urgency. This analysis built on the urgency model predicting apprenticeship control strivings by adding a three-way (urgency X secondary control increase X stressful event) interaction. The bottom section of Table 3 shows the results. The urgency X secondary control increase X stressful event interaction was significant, indicating that secondary control buffered the stressful event-control striving association in the urgency phase, but not in the non-urgent phase. This urgency-phase buffering effect is shown in Fig. 2.



**Fig. 2** Apprenticeship-seeking control strivings in the urgent phase (Wave 4 to Wave 5) among individuals who experienced a stressful event, graphed by direction of change in secondary control ( $N = 310$ ). Note. SPC = selective primary control; range of this variable is 1–5. SSC = selective secondary control for apprenticeship; change in SSC ranged from  $-2.72$  to  $2.18$ . The depicted trend was significant among those who experienced a decrease in secondary control ( $p < .001$ ), but not for those who experienced an increase

### Stressful events and apprenticeship success

A follow-up analysis examined whether stressful events were associated with concrete outcomes in addition to control striving. At each wave, students reported whether they had been accepted into apprenticeship programs since the prior wave. A multilevel logistic regression was used to determine whether stressful event occurrence predicted apprenticeship success in each phase, controlling for apprenticeship success at prior waves. This analysis was similar to those described above but conducted with STATA's *xtgee* module with binomial estimation because of the dichotomous outcome. The results indicated that students were less than half as likely to get an apprenticeship after experiencing a stressful event than if they had not experienced such an event ( $OR = 0.44$ ).

### Discussion

This study sought to clarify whether and how stressful life events are disruptive to control strivings, especially in the context of life transitions with their time-sensitive challenges. To answer these questions, we examined survey data from a longitudinal study of youth in Berlin, Germany, who were seeking apprenticeships and making decisions about their occupational futures. We formulated four broad hypotheses, all of which were at least partially supported. Below, we discuss why and under what conditions stressful

events may lead to diminished control striving, as well as the possible implications of these phenomena.

### The impact of stressful events on control strivings

Our findings, based on prospective data of control strivings assessed both before and after the occurrence of stressful events, strongly suggest that such events can lead individuals to reduce their control strivings. As we have noted, existing research linking control processes to the presence of stressors has tended to focus on control-related processes as predictors, rather than as outcomes (e.g., Folkman et al. 1993; Jex et al. 2001; Smith et al. 2000; Wrosch et al. 2002). To our knowledge, the present study is the first to directly investigate whether stressful life events affect control striving, particularly in a domain as critical for future development and well-being as one's career entry.

The negative association between stressful events and motivational processes such as control strivings may help to explain certain negative outcomes of stressful events. Common outcomes of stressful events, such as poor academic or job performance and relationship difficulties (e.g., Kessler 2000; Stein et al. 1997) are multiply determined, but are all likely to be affected by individuals' control strivings in the relevant domains. To the extent that stressful events lead to a decline in control strivings or other undesirable motivational changes, one's functioning in a variety of life domains not directly related to the stressful event may also suffer. Indeed, our finding that stressful events predict a substantially decreased chance of receiving an offer of an apprenticeship indicates that the motivational impact of stressors can include important real-world outcomes.

### Control beliefs and control strivings

#### *Control-related beliefs*

Our investigation of possible mechanisms by which stressful events could affect control strivings revealed control-related means-ends beliefs to be a significant mediator. In essence, the occurrence of a stressful life event led to a lowered belief that obtaining an apprenticeship is controllable (possible through effort or ability). Levels of this belief, in turn, completely mediated the association between stressful events and a decline in control strivings. As noted previously, past research has connected stressful events to a decreased sense that the world is controllable (e.g., Abramson et al. 1978; Epstein 1973, 1990; Janoff-Bulman 1989, 1992; Seligman 1975). However, this previous research has focused on the implications of



controllability beliefs for psychological well-being, including depression (Seligman 1975), posttraumatic stress disorder (e.g., Dalgleish 2004; Ehlers and Clark 2000; Ozer and Weiss 2004) and posttraumatic growth (e.g., Davis and McKearney 2003; Tedeschi and Calhoun 2004). By contrast, our findings emphasize that stressful event-related change in controllability beliefs may have implications for control striving and even significant developmental outcomes.

### *The role of affect*

Surprisingly, the other motivational resource assessed, affect, did not mediate the associations between stressful events and control strivings. This may be due to two important differences between positive affect and negative affect in the contexts of stress and motivation. First, while stressful events predicted an increase in negative affect, they did not predict a corresponding decrease in positive affect. While not what we anticipated, this pattern is also not unusual: positive affect usually rebounds quite quickly after a trauma and is often not as dramatically affected as negative affect in the first place (Folkman and Moskowitz 2000). Second, recent research suggests that positive affect may be more linked to goal engagement when the goals have an approach or promotion focus, while negative affect is associated with avoidance or prevention goals (Updegraff et al. 2004). Acquiring an apprenticeship or furthering one's career may be goals that are more approach than avoidance in focus, thus making negative affect less relevant to related control strivings.

### Urgency and developmental deadlines

Our data suggest that stressful event-related disruption to control strivings is particularly likely in the context of urgency—that is, near a developmental deadline. Specifically, we found that stressful events predicted a decline in control strivings in the time-sensitive domain of apprenticeship-seeking much more strongly when the events occurred close to the end of high school. The present study shows that non-normative experiences can disrupt engagement even before the deadline has officially passed. In other words, the occurrence of a stressful event could lead to decreased engagement at a time when *increased* engagement would be most adaptive.

The example of apprenticeships in Germany illustrates the potential seriousness of disruption during the urgent phase: as noted earlier, securing or failing to secure an apprenticeship has a critical and nearly irreversible influence on one's future career options and earning power. If

the occurrence of a stressful event led a student to reduce her or his apprenticeship-related strivings, leading to no apprenticeship or a poor apprenticeship, the impact of the stressful event could be felt throughout the student's life. While we did not have sufficient post-graduation data in the present study to examine long-term apprenticeship outcomes, the possibility that developmental deadlines shape the developmental consequences of stressful events is intriguing.

### Secondary control as a buffer

Our results indicate that there is at least one protective factor against the effects of stressful life events on control strivings in conditions of urgency. Under urgent goal conditions, individuals who maintained or increased their use of *secondary control strategies* that enhance volitional commitment to the goal (i.e., selective secondary control) did not experience a decline in control strivings, while other individuals did. This finding is consistent with the life-span theory of control, which proposes that selective secondary control serves to focus motivational resources on a selected target of primary control strivings, particularly under challenging conditions for goal pursuit (e.g., Haase et al. in press; Heckhausen and Schulz 1995; Poulin and Heckhausen 2006).

Secondary control's apparent function in protecting motivation from the impact of stressful events, at least under urgent conditions, suggests that it may play an important role alongside other coping resources such as social support (e.g., Cohen and Wills 1985), or coping strategies such as positive reappraisal or acceptance (e.g., Carver et al. 1989; Wrosch et al. 2000). Secondary control differs crucially from these aspects of coping, however, in that secondary control is not focused on managing the event and its implications for psychological well-being *per se*. Instead, secondary control strategies are directed at counteracting negative effects of stressful events on motivational commitments for primary control strivings. This way, selective secondary control strategies are suited to preserve an individual's capacity to control the environment in order to change and develop.

### Limitations and future directions

Our study lacked some features that an ideal investigation of these issues would have included. One limitation of our study is that not all participants' longitudinal data sets were complete—there was attrition over time, and data on some variables were missing at one wave or more for some participants. A more complete data set

would have been useful, especially for the purpose of testing whether the buffering effects of SSC are truly limited to the urgent phase. A second limitation of our study is that we did not assess all possible mechanisms for the association between stressful events and control strivings. Additional motivational resources, such as attentional focus, social support, available time for goal pursuit, or processes such as ego depletion (Muraven and Baumeister 2000) may act as mediators in addition to means-ends beliefs.

Future research on the role of stressful events in motivation should address each of the limitations listed above; in addition, we see three major ways in which future research could build on the present study. First, our study examined the impact of stressful events on career-related goals, specifically. It is unclear how generalizable our findings are to other domains. It is possible that other categories of goals (e.g., relationship goals) are more or less sensitive to disruption in control strivings. Research that examines the effects of stressful events on multiple goal domains could address this. Second, while we examined secondary control as a protective factor, it is likely that there are other individual differences or situational factors that may protect control strivings against the impact of stressful events. For example, it may be the case that prior experience managing stressful events (e.g., Eysenck 1983; Phifer and Norris 1989) or life expertise such as wisdom (e.g., Kunzmann and Baltes 2003) help individuals to protect their control strivings. Third, our study was conducted among adolescents and in the context of the school-to-work transition. Motivational responses to stressful events may be different at different developmental stages and in the context of different transitions. Stressful events may influence control strivings differently in adulthood, as adults age and optimize their coping skills (e.g., Labouvie-Vief and Medler 2002), and as they face transitions such as the transition to parenthood or to retirement.

More broadly, we hope that future research will integrate perspectives from the fields of stress and coping and of motivation and development, as we have attempted to do in the present study. Historically, research on stress and coping has conceptualized stress as a disruption to homeostasis, or an organism's ability to maintain a constant state (for a review of this construct and its limitations, see McEwen and Stellar 1993). By contrast, research in motivation and developmental psychology assumes that individuals change over time; indeed, they seek out opportunities for change and growth (for a review, see Baltes 1991). Integrating these two perspectives can lead to further inquiry into how stress affects adaptation to new circumstances and pursuit of growth-oriented goals.

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