

Effects of Failure on Subsequent Performance: The Importance of Self-Defining Goals

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Extending R. A. Wicklund and P. M. Gollwitzer's (1982) self-completion theory, 2 experiments examined the role of self-defining goals in predicting performance effects of failure among students committed to professional goals such as becoming a physician (Experiment 1) or a computer scientist (Experiment 2). Results of Experiment 1 revealed that failure on a task characterized as being relevant to students' professional self-definition led to (a) enhanced performance on a subsequent task relevant to the same self-definition and (b) impaired performance on a subsequent task unrelated to the self-definition challenged through prior failure. Experiment 2 replicated these findings. In addition, performance effects due to self-definitional failure were annulled when participants experienced intermittent social recognition for the aspired-to self-definition.

The effects of failure on subsequent performance have been an issue of much debate among motivation researchers and personality psychologists for quite some time. This interest has been fueled by the observation that although experiences with failure mostly undermine subsequent performance, they are also frequently found to stimulate it. Some researchers have focused on the detrimental effects of failure, whereas others have been concerned with its positive effects on performance.

Spearheading the concern for detrimental effects have been helplessness researchers (Mikulincer, 1994; Seligman, 1975), who suggested that performance decrements are a consequence of uncontrollable failures. Repeated failures in a so-called training task are assumed to decrease control expectations on future tasks (i.e., test tasks), which in turn produce motivational deficits that translate into weak performances. Exceptions to the rule have been accounted for in terms of individual differences in the interpretation of experienced failures (Abramson, Seligman, & Teasdale, 1978). Individuals who attribute failures to stable and global causes are seen as helplessness prone (they expect future failures to be forthcoming), whereas a preference for instable and specific attributions is expected to immunize an individual against performance deficits after failure (future failures on other tasks are not expected). Helplessness effects may be caused not only by a motivational (expectational) deficit but also by functional deficits. Failure often induces rumination that in turn blocks effective task per-

formance (Brunstein, 1994; Brunstein & Olbrich, 1985; Diener & Dweck, 1978). As Kuhl (1981, 1984; Kuhl & Weiss, 1994) pointed out, state-oriented people characterized by persevering thoughts about failure do indeed display more performance shortcomings after failure than do action-oriented people who do not engage in persevering thoughts.

Classic expectancy-value theories, such as Atkinson's (1964) risk-taking model, also predict a negative effect of failure on future performances, albeit on similar performance tasks. It is argued that failure experiences will reduce outcome expectations. Because the motivational tendency to perform a given task is conceived of as the product of outcome expectation times the valence (expected utility) of the desired outcome, motivation is reduced whenever failure experiences impair outcome expectations. A weakened motivational tendency in turn should undermine performance. Attributional reinterpretations of expectancy-value notions of motivation point to the mediating role of causal attributions for changes in outcome expectations after failure (Weiner, 1985).

More recent motivational theories have considered not only outcome expectations but also the individual's sense of being able to achieve a desired task performance. Most notably, Bandura (1986, 1991) assumed that a person's sense of self-efficacy directly relates to effort expenditure on a given task. Accordingly, failure that manages to impair a person's feelings of self-efficacy should in turn reduce the motivation to perform the respective task. On the other hand, people who possess a strong sense of self-efficacy that remains unaffected by failure should continue to persist. Similar considerations apply to Vroom's (1964) concept of action/outcome-expectation as spelled out in the context of work motivation or to Heckhausen's (1977) inclusion of the concept of action/outcome-expectation into a general expectancy-focused theory of motivation.

Finally, research on test anxiety has also addressed the issue of the negative effects of failure on performance. This line of thought is concerned with worry cognitions triggered by the experience of failure (Coyne, Metalsky, & Lavelle, 1980; Wine, 1971). Worry cognitions are considered to be distractive, like

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any other task-irrelevant cognitions. Because such cognitions use valuable cognitive resources, they commonly do undermine successful task performance (Mikulincer, 1989; Mikulincer & Nizan, 1988).

Let us now turn to approaches that predict and find performance improvements after failure. Wortman and Brehm (1975) suggested that responses to repeated failures need to be seen from a time course perspective. Individuals may fight back in the face of initial failures in a reactive attempt to reestablish control. It is only when failure experiences keep piling up that people are expected to give up and become helpless. Also, Ford and Brehm (1987) argued that prior failure may lead to perception of a subsequent task as comparatively more difficult. Because more difficult tasks commonly elicit more effort than easy tasks—at least up to a certain point (Wright & Brehm, 1989)—this may result in enhanced effort expenditure on the subsequent task.

But even among individuals working on one and the same task, the experience of setbacks may stimulate effort and foster performance. According to Carver and Scheier's (1990, 1991; Carver, Blaney, & Scheier, 1979) cybernetic theorizing, failure feedback induces a discrepancy between a desired outcome (standard or reference value) and the status quo (input). Given that the expectation of achieving the desired outcome is high, individuals will renew their efforts and thus try to produce outputs that meet the reference value. Similar ideas have been advanced by Locke and Latham (1990) in their goal-setting theory. Here, reference values are conceived of as self-set goals or as goals assigned by others. Given certain properties of these goals (e.g., specificity, challenge, proximity), the experience of a goal discrepancy will fuel effort and hence better task performance. Recent notions on goal achievement that construe its course as an issue of the individual's successfully traversing various action phases (Heckhausen, 1991; Gollwitzer, 1990) also assume that failure may stimulate enhanced effort by the individual to achieve a threatened goal. Here, the concept of goal commitment is highlighted. If a person's desires are furnished with little commitment and thus still qualify as elusive wishes, failure is expected to lead to retreat. But if a person has decided to achieve the wish, that is, has traversed from the predecisional action phase to the postdecisional phase, failure should induce increased effort that leads to better performance.

Finally, a distinction in terms of the quality of goals people pursue also allows predictions on whether failure leads to enhanced performance. Dweck and Leggett (1988) suggested that people may hold either entity or incremental beliefs about people's talents and that entity theorists prefer to set themselves performance goals, whereas incremental theorists adopt learning goals. Because failure implies information in regard to where one stands on a given talent or skill for entity theorists, it becomes associated with helplessness responses. However, because incremental theorists interpret failure in terms of a valuable feedback on how to improve their talents or skills, failure becomes associated with increased efforts to master challenges (Elliott & Dweck, 1988).

It seems to us that notions which conjointly address both phenomena, increased as well as decreased performances after failure, are the most promising for revealing the processes that underlie the effects of failure on future performances. In the

present article, we propose that a goal commitment approach in the realm of identity achievement, the *self-completion theory* (Wicklund & Gollwitzer, 1982), allows a focus on both performance increases and decreases within the same theoretical framework. Notably, however, this theory has not yet been used to analyze the effects of failure on subsequent task performances. Because to date no study has directly assessed performance effects of failure related to self-definitional pursuits, we attempted to do so in the research reported here.

The Symbolic Self-Completion Theory

According to Wicklund and Gollwitzer (1982), commitments to self-defining goals, such as becoming a competent psychologist, parent, athlete, or musician, elicit a persistent striving to acquire the respective identity. Committed individuals set out to accumulate evidence that points to their possession of the attributes and skills associated with the particular self-definition or identity in question. Such evidences are referred to as *symbols of completeness*, because they indicate possession of the aspired-to identity. Symbols can take the form of material objects (e.g., an instrument for a musician), positive self-descriptions (e.g., "I am an award-winning musician"), the influencing of others (e.g., teaching children how to play an instrument), and successful performances (e.g., giving a successful recital). When people recognize a shortcoming (i.e., a lack of one type of symbol) in making progress toward achieving a self-definition, they experience a sense of incompleteness that motivates self-symbolizing efforts. Such efforts either pertain to the acquiring of alternative symbols or point to their possession. These alternative symbols function as substitutes for the experienced lack of a certain symbol and reinstall a sense of completeness.

In support of this line of reasoning, studies on symbolic self-completion show that individuals who perceive deficits in one type of symbol (a) describe their own personalities as being more consistent with the aspired-to ideal (Gollwitzer & Wicklund, 1985; Wicklund & Gollwitzer, 1983), (b) attempt to persuade and to influence others in their area of interest (Wicklund & Gollwitzer, 1981), (c) display visible symbols focusing on the meaning of their self-definitions (Braun & Wicklund, 1989; Schiffmann & Nelkenbrecher, 1994), (d) devalue others as incompetent in the same domain (Wagner, Wicklund, & Shaigan, 1990), and (e) fail to admit to relevant shortcomings (Gollwitzer, Wicklund, & Hilton, 1982).

These results suggest that self-symbolizing activities may take many different forms but that they all point to the possession of the aspired-to identity. They are mutually substitutable so that an individual who lacks one type of symbol may compensate by pointing to the possession or acquiring of any alternative symbol. The substitution is particularly effective when self-symbolizing is noticed by others and thus wins social reality (Gollwitzer, 1986). Because most self-definitions have a host of different indicators or symbols, a person's commitment to achieve a self-definition or specific identity spurs an enduring goal pursuit (Gollwitzer, 1987).

How does self-completion theory relate to task performances following failure on a given task? Successful task performance qualifies as a symbol of completeness whenever it indicates the possession of identity-related talents or skills. Unsuccessful performance, on the other hand, indicates self-definitional incom-

pleteness. According to self-completion theory, incompleteness is an aversive self-evaluative state that occurs as people realize that they are falling short (Gollwitzer, 1987; Wicklund & Gollwitzer, 1982). If there is access to self-symbolizing activities, this state propels individuals to self-symbolizing efforts aimed at winning back a renewed sense of completeness. Such access may take the form of a positive performance on a further identity-relevant task, and this should be true even if this second task tests another type of identity-relevant skill. Accordingly, individuals who have just failed on one type of identity-relevant task and thus feel incomplete should be highly motivated to achieve success on other identity-relevant tasks, because successful performance allows them to compensate for experienced failure.

However, if there is no access to self-symbolizing task performance or any other route to self-symbolizing, the individual is caught up in the aversive self-evaluative state called *incompleteness*. When incomplete individuals are required to perform a further task unrelated to the self-definition challenged by the prior failure, performance should now be hampered. Because incomplete individuals are preoccupied with their feelings of incompleteness, task performance should suffer from interference effects.

Experiment 1: Predicting Performance Effects of Identity-Relevant Failure Experience

In our first study, we examined the performance effects of failure in the realm of a self-definitional pursuit among students committed to the identity of becoming a physician. The participants first received either no feedback or failure feedback while performing a social competence task that was presented either in the context of their professional self-definition or not. Participants were then asked to work on a so-called mental concentration task that demanded high levels of effort and attention. The skill involved in that task was described as either relevant or nonrelevant to the profession of a physician. In addition to performance data on this task, we collected self-report measures that assessed participants' motivational involvement and preoccupation with experienced failure while working on the test task of the study.

We used this set of measures to test the following two hypotheses: First, after having failed on an identity-relevant task, students should improve their performance while working on a subsequent task if that task provides another indicator of self-definitional success. According to this *compensation hypothesis*, students should intensify their task-related efforts when failure in a self-defining task is followed by a subsequent task described as relevant to the same type of self-definition. Performance of a further self-definitional task is assumed to meet an individual's attempt to reinstall a sense of completeness in the realm of the striven-for self-definition. Second, after having failed on an identity-relevant task, students working on a subsequent task perceived to be irrelevant to the self-definition in question should show deteriorating performance. According to this *interference hypothesis*, failure on a self-defining task should distract an individual from concentrating on performing a further task irrelevant to the respective identity goal.

In comparison, performance effects of failure on a task unre-

lated to participants' professional identity pursuit (or any other self-definition) were expected to be less pronounced. This expectation derives from the assumption inherent in self-completion theory that the intensity of both motivational (enhanced effort) and cognitive (preoccupation) effects of failure is contingent on the relevance of failure to a self-definitional pursuit.

Method

Participants

Ninety-six medical students (43 women and 53 men) from introductory courses at the University of Erlangen, Germany participated in the study for a remuneration of 12 Deutsche Marks (approximately \$8). The average age of the sample was 22.5 years. To obtain a sample of participants truly committed to the goal of becoming a physician, we asked all potential participants two questions before they were recruited for the experiment: "Have you been seriously involved in studying medicine in the current semester?" and "Did you consider dropping out of medical school in the recent past?" All students participating in the study answered positively to the first question and negatively to the second one. Indeed, only one potential participant was excluded.

Design

The experiment was conducted in two consecutive phases: the treatment situation and the test situation. A 2 (type of treatment task: relevant vs. nonrelevant) \times 2 (type of feedback: no feedback vs. failure) \times 2 (type of test situation: relevant vs. nonrelevant) factorial design was used. In the treatment situation participants received a series of tasks that supposedly indicated their social competence either in medical or in daily life situations. One half of the participants were assigned to a no-feedback control condition, and the other half were exposed to failure feedback that indicated a low level of social competence. In the test situation, students were asked to work on a mental concentration task. In the relevant test situation the ability to concentrate on a given task was explained to be characteristic of highly qualified doctors, whereas in the nonrelevant test situation the same task was administered without any reference to the profession of a physician. Thus, the experimental design consisted of eight groups, with 12 participants randomly assigned to each group.

Treatment Situation

In the treatment situation, students received a series of 12 social competence tasks in a multiple-choice format. The tasks were presented in successive order on a computer display. On each trial, participants were asked to read a brief outline of a social problem followed by four choices that suggested different solutions. The students were told to imagine themselves in each situation and to consider each of the four alternative solutions. They were then asked to indicate their preferred solution. For this purpose, participants were seated in front of a button-press panel with four keys.

Manipulation of treatment condition. In the relevant treatment task condition, participants received a series of problems that physicians typically encounter in dealing with patients. Students in this condition were instructed as follows:

The following problems have been designed to examine medical students' social competence in professional situations. The social skills assessed by these problems are important in dealing efficiently with patients. Each situation will illustrate one of the many social problems physicians encounter at work. Along with each problem, four possible solutions are presented. We have asked a

team of highly experienced doctors to rate the level of social competence indicated by each of these solutions. According to the judgment of these practitioners, the various solutions differ in terms of expressed competence in coping with social problems in medical situations.

The following example depicts one of the 12 medical problems presented:

A little girl is admitted at the children's ward of your hospital. During the examination, she is extremely scared. She cries so much that you cannot make a diagnosis. How would you respond to this situation?

1. I would postpone the examination for another day and ask the child's mother to accompany her.
2. I would interrupt the examination and try to find out what it is that makes her so frightened.
3. I would ask an experienced nurse to look after the little girl and wait till she has calmed down.
4. I would look for a toy and try to divert the little girl's attention until the examination is over.

In the nonrelevant treatment task condition, students received a series of social problems people typically encounter in daily life. The instructions read as follows:

The following problems have been designed to examine people's social competence in everyday life situations. The social skills assessed by these problems are important in dealing efficiently with other people. Each situation will confront you with one of the many social problems people encounter in everyday life. Along with each problem, four alternative solutions are presented. We have asked a team of social scientists to rate the level of social competence indicated by each of these solutions. According to the judgment of these experts, the various solutions differ in terms of expressed competence in coping with social problems in everyday life situations.

The social problems used in this condition were carefully yoked to those administered in the medical task condition. The problem matched to the medical problem described earlier read as follows:

While strolling through a park, you run into a lonely and scared little girl. She is crying and sobbing incessantly. You cannot find out about her name or where she lives. How would you respond to this situation?

1. I would tell the little girl that I can only help her if she stops crying.
2. I would buy the little girl an ice cream and then try to find out her name and where she lives.
3. I would take the little girl to the next police station.
4. I would ask passersby if they know the little girl and where she lives.

Manipulation of feedback. Students received either no feedback or a series of predominantly negative instances of feedback. No-feedback control participants were told that they would be informed about the quality of their performance at the end of the experiment. For students pretreated with failure, feedback was given immediately after they had pressed one of the four keys. Faked expert judgments were presented on the computer display along a 4-point scale with endpoints labeled *low level* (0) and *high level* (3) of social competence. Failure students received feedback in the form of the following series of faked expert judgments, prearranged in random order: 3 (once), 2 (twice), 1 (five times), and 0 (four times).

Upon their completion of the social problem solving test, a brief pro-

cedure was exposed on the computer display which provided failure students with the following information: (a) the total score actually achieved (12), (b) the maximum score possible (36), and (c) the average score achieved by students in previous studies (20). Depending on the type of treatment condition, the latter information referred either to medical students (relevant tasks) or to students pursuing various academic majors (nonrelevant tasks). We included the protocol to ensure that participants would view their own performances as failures.

Test Situation

Test task. In the test situation, all participants were administered the d2 Mental Concentration Test (Brickenkamp, 1981). The d2 test is a letter cancellation task that consists of 14 rows, each row containing a random sequence of the letters *d* and *p*. Placed above and below each letter, there are one, two, or no apostrophes. Participants were given 15 s to check in each row as many *d*s having two apostrophes as possible. All participants were told to work through each row as quickly and precisely as possible.

Following Brickenkamp's (1981) recommendation, we measured students' test performance by subtracting both errors of commission (non-d2s erroneously marked) and errors of omission (d2s not marked) from the total number of symbols checked. This measure (number of correctly identified symbols) reflects intensity of effort in addition to resistance against interference effects (Brickenkamp, 1981). Kuhl (1981) reported that performance on the d2 Mental Concentration Test is sensitive to the facilitating and debilitating effects of prior failure experiences.

Manipulation of test condition. The d2 test was administered under two different conditions. In the nonrelevant test situation, students were told that this test had been designed to compare the ability to concentrate on a task among various age groups (juveniles, adults, elderly people). In the relevant test situation, this ability to concentrate on a given task was suggested to be an important characteristic of highly qualified doctors. Students assigned to this condition received the following information:

You know, working as a physician requires a great deal of mental concentration. Indeed, the ability to concentrate on a given task constitutes a very important skill of highly qualified doctors. There also is evidence that medical students who complete their education with great success achieve high performances at mental concentration tests. The following test has been designed to measure the ability to concentrate on performing a given task among medical students.

Questionnaires

To check the effect of the failure manipulation, we administered two bipolar scales after participants had completed the social competence test. The scales concerned feelings of *confidence* (7) versus *pessimism* (1) and of *satisfaction* (7) versus *dissatisfaction* (1). Upon completing the d2 test, students were administered four items with endpoints labeled *strongly disagree* (1) and *strongly agree* (7). Two items were designed to examine participants' motivational involvement in the test task: "I was strongly involved in working on the mental concentration test" and "I was highly motivated to prove that I can concentrate on performing this test." The two remaining items examined the extent to which students ruminated on the social competence test "while performing the mental concentration test": "I still felt preoccupied with the preceding task" and "I ruminated on how good or bad my answers were on the social competence test."

Procedure

When students signed up for the study, they were told that two consecutive experiments would require them to perform a series of cogni-

tive and social competence tests. When students arrived for the study, this information was given a second time along with the instruction that they were free to decline participation at any time of the study. No student refused to participate or withdrew from the study.

Two experimenters (one woman and one man) were randomly assigned to either the treatment situation or the test situation. The first experimenter conducted the social competence test and was responsible for manipulating the feedback. The second experimenter administered the d2 test at a different location in the laboratory. She or he was ignorant of students' preceding assignments to both treatment and feedback conditions. At the end of the experiment, students were thoroughly debriefed about the study. Students exposed to failure were assured that poor performance had been manipulated by the experimenter. Participants were also given a description of the theoretical principles underlying the study. At the end of the experiment, all participants reported that they understood that their performances throughout the study were completely irrelevant to becoming a good or bad physician.

Results

Manipulation Check

Self-assessments of confidence and satisfaction subsequent to the social competence test were submitted to a 2 × 2, Treatment Task × Feedback multivariate analysis of variance (MANOVA). Results revealed a main effect of feedback condition, $F(2, 93) = 16.26, p < .001$ (Wilks's lambda). Compared with participants receiving no feedback, those exposed to failure indicated that they felt less confident ($M = 4.72$ vs. 5.39) and satisfied ($M = 3.43$ vs. 5.22 ; both $ps < .01$).

Performance on the Test Task

A 2 (treatment task) × 2 (feedback) × 2 (test situation) analysis of variance (ANOVA) of students' performance on the d2 test yielded a significant triple interaction effect, $F(1, 88) = 6.31, p < .05$. By inspecting the means presented in Table 1, one

Table 1
Means and Standard Deviations of Number of Correctly Identified Symbols on the d2 Test: Experiment 1

Test condition	Feedback condition	
	No feedback	Failure
Relevant treatment task		
Relevant		
<i>M</i>	418.75	461.33
<i>SD</i>	27.13	42.48
Nonrelevant		
<i>M</i>	399.50	349.58
<i>SD</i>	63.37	36.49
Nonrelevant treatment task		
Relevant		
<i>M</i>	411.66	395.33
<i>SD</i>	60.19	64.69
Nonrelevant		
<i>M</i>	411.83	403.26
<i>SD</i>	42.18	40.13

Note. d2 Test refers to the d2 Mental Concentration Test (Brickenkamp, 1981).

can see that this effect is largely attributable to the performance of failure students working on the medical treatment test. Subsequent analyses revealed that the two-way interaction between feedback and test situation was significant among students in the relevant treatment task condition, $F(1, 44) = 13.02, p < .001$, but not among students who worked on the nonrelevant treatment task ($p > .10$). Notably, no significant main effect of type of test situation or of feedback condition was found for students assigned to the nonrelevant treatment task condition.

To elucidate the nature of the significant interaction effect, we conducted a series of planned contrasts among groups of participants who had performed the medical social competence test. After negative performance feedback on this relevant treatment task, students in the relevant test condition performed better on the d2 test than those working on the same test in the nonrelevant test condition, $t(22) = 6.91, p < .001$. Compared with their counterparts in the no-feedback conditions, students pretreated with failure on the relevant treatment task showed both higher performances in the relevant test condition, $t(22) = 2.93, p < .01$, and lower performances in the nonrelevant test condition, $t(22) = -2.36, p < .05$.

Motivational Involvement in Test Task and Rumination on the Treatment Task

The correlation between the two items indicating students' motivational involvement in the d2 test was $.51 (p < .001)$. The two scales tapping participants' preoccupation with ruminative thoughts about the treatment task were also highly correlated ($r = .78, p < .001$). Thus, for both variables, two-item composite scores (involvement and rumination) were created, which correlated $-.34 (p < .001)$ with one another.

Two 2 × 2 × 2, Treatment Task × Feedback × Test Situation ANOVAs revealed a significant triple interaction effect on both motivational involvement, $F(1, 88) = 5.88$, and rumination on the treatment task, $F(1, 88) = 4.32$ (both $ps < .05$). As shown in Table 2, for each of the two dependent variables, the triple interaction is mainly attributable to the relevant treatment task condition, in which for both motivational involvement, $F(1, 44) = 7.08, p < .05$, and rumination, $F(1, 44) = 10.98, p < .01$, a significant Feedback × Test Situation interaction occurred. Subsidiary analyses revealed the following: (a) After having failed on the relevant treatment task, students assigned to the relevant test situation felt more involved in the d2 test than either failure students in the nonrelevant test situation ($p < .001$) or no-feedback control students in the relevant test situation ($p < .05$). (b) Given the same (relevant) treatment task, failure students working on the d2 test in the nonrelevant test situation felt more preoccupied with ruminative thoughts about the treatment task than either failure students in the relevant test situation or no-feedback control students assigned to the nonrelevant test situation (both $ps < .001$). For students working on the nonrelevant treatment task, the following effect emerged. Compared with students in the respective no-feedback condition, students pretreated with failure reported that they felt less involved in the mental concentration test, $F(1, 44) = 4.95, p < .05$.

Mediational Analyses

Students' performance on the mental concentration test was significantly correlated with motivational involvement in the

Table 2
*Means and Standard Deviations of Motivational Involvement
 in Test Task and Rumination on the Treatment Task:
 Experiment 1*

Test condition	Feedback condition			
	No feedback		Failure	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Relevant treatment task				
Relevant				
Involvement	8.50	3.47	11.08	2.15
Rumination	2.91	1.78	5.00	3.30
Nonrelevant				
Involvement	7.00	2.52	5.33	2.74
Rumination	3.58	1.78	10.50	2.84
Nonrelevant treatment task				
Relevant				
Involvement	9.75	2.13	7.33	3.08
Rumination	3.75	3.25	5.50	4.44
Nonrelevant				
Involvement	8.41	3.28	7.25	2.49
Rumination	5.50	4.25	6.58	3.17

Note. Scores on the two-item measures could range from 2 to 14, with higher scores reflecting greater motivational involvement in the test task and higher rumination on the treatment task, respectively.

test task ($r = .41, p < .001$) and rumination on the treatment task ($r = -.24, p < .02$). To further illuminate the relationship between performance effects of identity-relevant failure and each of the two self-report measures, we carried out two mediational analyses along principles specified by Baron and Kenny (1986). Specifically, we examined the extent to which motivational involvement and ruminative thoughts may have accounted for the significant effects of identity-relevant failure on students' subsequent test performance.¹

The first analysis included both failure students and control students who received the relevant test instruction after completion of the relevant (i.e., medical) treatment task ($n = 24$). For this group of participants, motivational involvement in the mental concentration test was a significant correlate of test performance ($r = .41, p < .05$). In contrast, the correlation between test performance and rumination on the treatment task failed to be significant for this group of participants ($r = -.04$). The result of the subsequent mediational analysis was as follows: The portion of variance explained in participants' test performance by the type of feedback given on the treatment task (failure vs. no feedback) decreased markedly, from 28.0% to 15.3%, after motivational involvement was partialled out. Yet even with motivational involvement statistically held constant, the performance effect that was due to type of feedback remained significant ($p = .04$). This result suggests that, among participants exposed to failure feedback while performing the relevant treatment task, enhanced performance at the identity-relevant test task was partially mediated by increased task motivation.

In the second analysis, we included both failure students and

control students who received the nonrelevant test instruction after completion of the relevant (i.e., medical) treatment task ($n = 24$). Among these participants, ruminative thoughts about the treatment task were negatively correlated with performance on the mental concentration test ($r = -.50, p < .05$). In contrast, the correlation between test performance and motivational involvement was not significant for this group of participants ($r = .28, p > .10$). The subsequent mediational analysis yielded the following result: The portion of variance explained in participants' test performance by the type of feedback given on the treatment task (failure vs. no feedback) decreased from 20.2% to 0.3% after rumination was partialled out. Accordingly, with rumination statistically held constant, the effect of type of feedback on participants' test performance was no longer significant ($p = .76$). This result indicates that, among participants exposed to failure feedback while performing the relevant treatment task, impaired performance in the nonrelevant test situation was strongly mediated by ruminative thoughts participants experienced while taking the mental concentration test.

Summary and Discussion

The data of Experiment 1 provide strong support for our predictions. The performance findings obtained in this study corroborate both the compensation and the interference hypothesis. In line with the compensation hypothesis, medical students exposed to failure concerning their social competence as physicians performed—compared with a no-feedback control group—better on a subsequent test task when it was introduced as assessing an aptitude relevant to being a successful physician. Compared with all other groups of participants, this group achieved the highest performance level at the test task. In contrast, medical students exposed to failure concerning their social competence as physicians performed—compared with the respective no-feedback control group—worse when test task performance was described as irrelevant to being a good physician. Consistent with the interference hypothesis, this group of participants showed the worst performance on the mental concentration task.

Students' self-reports lend additional support to the hypotheses underlying this study. After being exposed to failure feedback on their social competence in medical situations, students assigned to the relevant test situation reported a higher level of motivational involvement in the test task than did no-feedback control students. Results of a mediational analysis in which motivational involvement was statistically removed indicated that increased task motivation mediated to a considerable extent performance increments displayed by this group of failure students. In contrast, compared with the respective no-feedback control group, a high level of rumination related to the social competence test while working on the nonrelevant mental concentration test prevailed among students exposed to failure feedback on their social competence in medical situations. Furthermore, after rumination was statistically removed, the type of feedback given on the medical treatment task had no signifi-

¹ We are grateful to an anonymous reviewer for his or her recommendation to perform the mediational analyses reported here.

cant effect on students' subsequent performance in the nonrelevant test situation. Together, these findings are consistent with the idea that individuals who experience failure relevant to a self-definition (or identity goal) are highly motivated to compensate for that failure on a subsequent identity-relevant task but remain preoccupied with failure-related cognitions if no such opportunity is given.

Students exposed to failure feedback on their social competence in daily life situations did not differ from no-feedback control students in their test task performance, regardless of whether test task performance was described as relevant or irrelevant to being a good physician. The only difference was that failure students felt less involved in performing the test task. This pattern of data demonstrates that the relevance of failure to students' professional identity goals is a precondition for performance effects in subsequent test situations. However, whether facilitating or debilitating effects of failure occur is contingent on the quality of the test task. When the new task allows the individual to strive for an alternative indicator of self-definitional completeness and thereby to compensate for the preceding identity-relevant failure experience, performance increments are observed. When the new task is irrelevant to the individual's threatened identity goal, performance deficits prevail.

Experiment 2: Annulling Performance Effects of Identity-Relevant Failure by Restoring a Sense of Self-Definitional Completeness

To provide additional support for our hypotheses, we carried out a second experiment. Our first objective in this experiment was to conceptually replicate Experiment 1 by testing the same predictions among students majoring in computer sciences. Similar to the situation in Experiment 1, participants received either no feedback or failure feedback on an initial (treatment) task characterized as being relevant to their professional self-definition and were subsequently given a test task presented as being either relevant or nonrelevant to their professional ambition. Because no significant performance effects were observed for students assigned to nonrelevant failure in Experiment 1, we excluded this condition from the present experiment.

Our second objective in Experiment 2 was to analyze participants' incitement to act on the test task. We conceptualized such activity incitement as a self-report variable indicating the extent to which participants felt energized versus blocked in exerting task-related efforts. Compared with participation in a no-feedback condition, failure on an identity-relevant task was expected to induce self-critical reflection until a subsequent task allowed the participant to strive for an alternative indicator of self-definitional completeness. At that point, participants should become determined to act. In contrast, provided that a subsequent task would be unrelated to the self-definition previously challenged through failure, participants should continue to feel worried and blocked.

Our third objective in Experiment 2 was to provide a reliable test of the notion of substitutability that underlies self-completion theory. Specifically, we examined whether different types of identity-relevant indicators or symbols, such as identity-related performances and self-descriptions, would be mutually substitutable. Notably, and consistent with the position guiding the present research, Wurf and Markus (1991) recently claimed

that in the domain of identity strivings, "failure of particular routes to achievement will often lead to enhanced rather than decreased striving, because the person's self-image and self-esteem are at stake and the person will flexibly and creatively try multiple pathways to achievement" (p. 58). However, Wurf and Markus also argued that symbolic validation of the self (e.g., claiming the possession of a self-definition via a positive self-description) might probably be less satisfying than actual achievements (e.g., mastering performances implied by the self-definition). In comparison, from the standpoint of self-completion theory, positive self-descriptions might be as effective in generating a sense of self-definitional completeness as self-defining task performances—provided that the given self-description is recognized by others and thereby becomes a social reality (Gollwitzer, 1986).

To address this issue, in Experiment 2 we included a completeness-inducing intervention for half of the participants who had been exposed to an identity-relevant failure experience. This group of participants received positive personality feedback corroborating their professional self-definitions. As a powerful symbol of completeness, this intervention was assumed to dispel feelings of incompleteness and thereby to annul the effects of identity-relevant failure on participants' subsequent task performances. More specifically, in contrast to participants exposed to failure in the absence of this intervention, personality feedback participants were expected to display neither performance increments in an identity-relevant test task nor performance decrements in a test task unrelated to the identity goal in question.

Method

Participants

Ninety students (14 women and 76 men) from introductory computer science courses at the University of Erlangen, Germany participated in the study for a remuneration of 12 Deutsche Marks (approximately \$8). The average age of the sample was 21.8 years. As in Experiment 1, only students who were seriously involved in studying computer science and who had not considered terminating their education in the recent past were recruited for the experiment. Two students who had considered dropping out were excluded from participating in the experiment.

Design

The experiment consisted of three phases: treatment task, intervention, and test task. A 3×2 , Pretreatment \times Test, factorial design was used. The pretreatment factor comprised manipulations performed at the treatment task and the intervention phase. A concept formation test was administered as the treatment task. For all participants, the skills assessed by this test were described as being characteristic of highly qualified computer scientists. While one third of the participants ($n = 30$) received no performance feedback, two thirds ($n = 60$) were exposed to failure. Thereafter, during the self-completion intervention, participants were administered a personality questionnaire. One half of the failure group ($n = 30$) was assigned to a bogus personality feedback manipulation. They were led to believe that their self-described personality was quite similar to that obtained from highly qualified computer scientists. Thus, the pretreatment factor consisted of three conditions: no feedback, failure only, and failure followed by a completeness-inducing intervention.

As a test task, the d2 Mental Concentration Test was administered under two different conditions: In the identity-relevant test condition, good performance on the d2 test was described as being characteristic of highly qualified computer scientists; in the nonrelevant test condition, the same task was administered without any reference to computer scientists. In summary, the study consisted of six groups, with 15 participants randomly assigned to each group. Treatment and test tasks were run by two different experimenters (A and B), who both cooperated in carrying out the intervention.

Treatment Task

Preliminary instruction. At the onset of the experiment, all participants received the following instructions from Experimenter A:

Previous research has indicated that highly qualified computer scientists are endowed with a set of certain cognitive skills. For instance, in one study, computer scientists who had reached a high standard of excellence at their job were asked to perform a series of mental ability tests. They were found to achieve extraordinarily high levels of performance at the following skills: (a) logical reasoning, (b) working memory, (c) efficient information processing, (d) visual search, (e) precision in performing mental tasks, and (f) speed of performance. The purpose of the present study is to examine these skills among students of computer science.

Participants assigned to the nonrelevant test condition were advised that the following (treatment) task would serve as a measure of the total set of skills listed in the preceding instructions. Students assigned to the relevant test condition were told that the following task would allow them to assess only the first half of the skills (a through c) and that the second half (d through f) should be inferred from a different type of task administered later in the study.

Concept formation test. Eight four-dimensional, bivalued concept formation problems were used as the treatment task. The stimulus material was adopted from Brunstein and Olbrich (1985). Each task consisted of a series of four successive figures. For any given figure, two complementary combinations of stimuli were projected on the left and right parts of a 28-cm display screen in front of the seated participant (a horizontal or vertical rectangle, a point or star centered in the rectangle, a beam placed above or below the rectangle, and a curved or zig-zagged line connecting the rectangle with the beam). The stimuli were presented in a counterbalanced succession. For each task, participants had to find out which stimulus had been preselected by the experimenter out of the eight possible options. Participants were told to form a hypothesis about the experimenter's choice and to indicate in each trial whether the chosen stimulus was present on the right or on the left part of the figure. Each figure was presented for 8 s, followed by the instruction "please respond." Participants indicated their decision by pressing one of two keys labeled "left" and "right" on a button-press panel. After participants had responded, a "right" or "wrong" message appeared on the screen followed by presentation of the next figure. "Right" and "wrong" messages were equal in number but randomly distributed over the eight tasks. At the end of each task, participants were asked to indicate their solutions. For this purpose, the button-press panel was supplied with eight additional keys, each referring to one of the eight possible solutions.

Performance feedback. Control participants received no performance feedback but were told that they would be informed about the quality of their performance at the end of the study. In contrast, failure participants were provided with feedback immediately after they had indicated their solutions. After they had pressed one of the eight keys, a "correct" (C) or "incorrect" (IC) message appeared on the screen. Across the eight problems, the pattern of feedback was predetermined in such a way that an initial period of alternating successes and failures

(C-IC-C-IC) was followed by a period of continual failure (IC-IC-IC-IC). According to Brunstein and Olbrich (1985), this procedure induces a strong failure experience.

Self-Completion Intervention

Personality Profile Questionnaire. After participants had finished the concept formation test, they were taken to an adjacent room where they received the following instructions from Experimenter B:

As you have been told in the preceding session, we already know a bit about cognitive characteristics of highly qualified computer scientists. However, referring to the aforementioned study, computer scientists were also asked to fill out a series of personality questionnaires. This procedure revealed various personality attributes characteristic of successful computer scientists. Based on these findings, a Personality Profile Questionnaire was developed in order to measure the extent to which students of computer science possess these "ideal" personality attributes.

The so-called Personality Profile Questionnaire consisted of a series of 16 adjective pairs (e.g., *gregarious-individualistic*, *active-contemplative*, *passionate-harmonious*, *conservative-progressive*), each pair connected by a 7-point scale. By circling a number on each scale, participants were asked to indicate the degree to which one of the two characteristics was predominant in their own personality. After participants completed the questionnaire, the numbers they had marked were connected by a line, which thus displayed their self-reported personality profile.

Personality feedback manipulation. Participants assigned to the no-feedback and failure-only conditions did not receive further information on their personality profiles. However, in the failure-with-intervention condition, Experimenter B passed the participant's personality questionnaire to Experimenter A, who was waiting in an adjacent room in order to prepare the feedback. For this purpose, Experimenter A drew the so-called "ideal" personality profile of computer scientists very close to the participant's own marks (for a similar procedure, see Gollwitzer & Wicklund, 1985). Experimenter A then returned the questionnaire to the participant, who was waiting with Experimenter B in the experimental room. Experimenter A commented that the personality profile obtained from the participant was very close to that obtained from successful computer scientists. He or she also stated that such a high degree of similarity was rather exceptional in light of the results obtained from other students. While Experimenter A was leaving the room, Experimenter B continued with the experiment.

Test Task

The test task (d2 test) and performance measure were identical to those used in Experiment 1. Participants in the relevant test condition received the following message:

We are now going to continue assessing the cognitive skills listed at the beginning of the study. The following task has been designed to assess skills in the area of visual search, precision in performing mental tasks, and speed of performance. As you may remember, these skills are characteristic of highly qualified computer scientists.

Participants in the nonrelevant test condition were told that the d2 test measures people's vigilance in road traffic situations but that the test norms were outdated and needed some updating. All participants were told to do their best on that task.

Activity Incitement

At three points in time—before the concept formation test (Time 1), upon completion of the concept formation test (Time 2), and before the d2 test (Time 3)—a self-report questionnaire was administered which asked participants to indicate their current level of activity incitement on two positive (*energetic, vigorous*) and two negative (*worried, blocked*) adjective scales. The students were asked to indicate how much these adjectives described how they were feeling “right now” by circling a number on a 7-point scale. As assessed by coefficient alpha, the reliabilities of the scales were .61, .66, and .65 at Times 1, 2, and 3, respectively. Thus, for each of the three points in time, we created a total activity incitement score by averaging across the four adjective scales (scores of negative items were recoded).

Procedure

The study was described to participants as an inquiry into cognitive skills and personality attributes among students of computer science. The two experimenters (one woman and one man) were randomly assigned to the treatment situation and the test situation of the study. Experimenter A provided the preliminary instruction, administered the concept formation test, and gave the personality feedback. Experimenter B presented the Personality Profile Questionnaire and administered the d2 test. As in Experiment 1, all students were thoroughly debriefed at the end of the study.

Results

Performance on the Test Task

A two-factor ANOVA on students’ d2 test performance revealed a significant Pretreatment × Test Condition interaction, $F(2, 84) = 14.61, p < .001$. As shown in Table 3, the significant interaction primarily resulted from students exposed to failure only. For this group of participants, working on the d2 test in the relevant test condition led to better performance than did working on the d2 test in the nonrelevant test condition, $t(28) = 7.14, p < .001$. No significant effect of type of test condition was found among the no-feedback and failure-with-intervention groups ($ps > .10$).

After breaking down performance according to test condition, we found students’ test performance to vary as a function of pretreatment for both the relevant $F(2, 42) = 9.66, p < .001$,

and the nonrelevant, $F(2, 42) = 5.36, p < .01$, test conditions. Results of simple main effect analyses followed by Tukey comparisons ($\alpha = .05$) can be summarized as follows: Among students assigned to the relevant test condition, those exposed to failure only performed significantly better than both those pretreated with no feedback and those pretreated with failure followed by intervention. In contrast, among students receiving the nonrelevant test instruction, failure-only students performed significantly worse than both those exposed to no feedback and those exposed to failure with intervention. Students in the failure-with-intervention group did not differ from their respective no-feedback controls in either of the two test conditions.

Activity Incitement

Repeated judgments of activity incitement at Times 1 through 3 were subjected to a $3 \times 2 \times 3$, Pretreatment × Test Condition × Time of Assessment, ANOVA, with the latter as a within-subjects factor. Results revealed a significant triple interaction, $F(4, 166) = 4.51, p < .001$ (Wilks’s lambda). The pattern of means underlying the interaction is shown in Figure 1. Among students in the no-feedback control condition, activity incitement continuously increased from the Time 1 to the Time 3 assessment: main effect of time of assessment, $F(2, 27) = 7.71, p < .002$. For students in the failure-with-intervention condition, negative performance feedback led to a significant decrease in activity incitement from Time 1 to Time 2 ($p < .02$), followed by a significant increase in activity incitement from Time 2 to Time 3 ($p < .001$): main effect of time of assessment, $F(2, 27) = 16.58, p < .001$. In contrast, for students exposed to failure only, a significant Test Condition × Time of Assessment interaction was found, $F(2, 27) = 5.58, p < .01$. Although both groups of failure-only students displayed a significant decrease in activity incitement following negative performance feedback ($ps < .01$), only those who received the relevant-test instruction showed a reliable increase in activity incitement from Time 2 to Time 3 ($p < .001$). In comparison, failure-only students who expected to work on the nonrelevant d2 test did not display a significant change in activity incitement from Time 2 to Time 3 ($p > .20$).

Because Time 3 activity incitement turned out to be a strong correlate of students’ subsequent test performance ($r = .45, p < .001$), we carried out mediational analyses in order to examine the extent to which this variable might account for performance differences between failure-only groups and their appropriate control groups. Students in the failure-with-intervention condition were excluded from the following analyses. Before we controlled for activity incitement, the type of feedback (failure vs. no feedback) given to students accounted for 41.5% and 26.4% of the variance in performance in the relevant and nonrelevant test situations, respectively. In comparison, the portion of variance explained in students’ test performance decreased to 22.6% in the relevant test condition and to 8.1% in the nonrelevant test condition when activity incitement was statistically removed. Notably, after we controlled for activity incitement at Time 3, no statistically significant effect of feedback was found in the nonrelevant test condition ($p = .065$). Yet for students assigned to the relevant test condition, the effect of feedback still remained significant ($p < .005$).

Table 3
Means and Standard Deviations of Number of Correctly Identified Symbols on the d2 Test: Experiment 2

Test condition	Pretreatment condition		
	No feedback	Failure only	Failure with intervention
Relevant			
<i>M</i>	426.46	506.60	439.13
<i>SD</i>	57.70	38.88	61.36
Nonrelevant			
<i>M</i>	454.66	393.80	448.13
<i>SD</i>	57.40	47.24	61.89

Note. d2 Test refers to the d2 Mental Concentration Test (Brickenkamp, 1981).

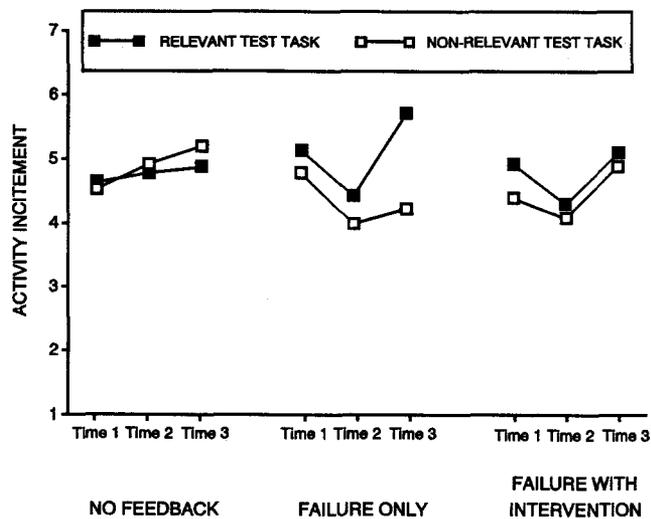


Figure 1. Activity incitement at Time 1 (prior to the treatment task), Time 2 (after the treatment task), and Time 3 (prior to the test task) in each experimental condition of Experiment 2.

Summary and Discussion

The effects of failure on performance as observed in Experiment 1 were replicated in Experiment 2. Compared to their respective control groups, participants exposed to failure on an identity-relevant treatment task showed (a) enhanced performance on a mental concentration task when it was said to assess an aptitude relevant to their professional self-definition, and (b) impaired performance on the same test when it was presented as being nonrelevant to the self-definition in question.

In contrast to receiving no feedback on task performance, receiving failure feedback readily decreased participants' activity incitement. Yet, failure-only participants who were given the opportunity to strive for an alternative indicator of self-definitional success displayed a marked increase in activity incitement right before taking the test task. Among failure-only participants assigned to the nonrelevant test situation, however, lowered activity incitement in response to failure persisted. Medial analyses revealed that impaired activity incitement may have accounted for performance decrements observed among failure participants in the nonrelevant test situation. However, because the facilitating effect of identity-relevant failure on a subsequent identity-relevant task remained significant after activity incitement prior to taking the test task had been statistically removed, additional research on further potential mediator variables seems warranted (e.g., increases in aspiration level or intended effort expenditure).

Finally, the completeness manipulation used in the present experiment turned out to be an effective intervention that nullified performance effects that were due to identity-relevant failure. In contrast to students in the failure-only condition, students in the failure-with-intervention condition displayed neither performance increments on the identity-relevant test task nor performance decrements when the test task was unrelated to their professional identity goal. In addition, independent of the identity relevance of the test task, failure participants' activ-

ity incitement immediately recovered after they had been exposed to the completeness manipulation. These findings are consistent with the idea that social recognition for possessing a self-definition fosters a sense of completeness, even if the recognition is directed not to self-definitional performances but to simple self-descriptions that only claim possession of the aspired-to self-definition. As a result, performance effects stemming from incompleteness experiences caused by failure on identity-relevant tests are readily abolished when a self-definitional recognition based on self-descriptions intervenes.

General Discussion

Our objective in the present research was to highlight the importance of self-defining goals in people's performances following failure. The results of two experiments revealed that the relevance of failure to a self-definition, in conjunction with the relevance of a further task to the same self-definition, predicted both beneficial and detrimental effects of failure on subsequent task performances. Specifically, the following conclusions can be drawn from the data:

1. In both experiments, students exposed to failure relevant to their professional self-definitions (becoming a physician or a computer scientist) displayed performance increments on a subsequent task presented as being relevant to those self-definitions. This result lends support to the hypothesis that individuals who experience failure in an identity-relevant domain are highly motivated to compensate for their self-definitional shortcomings. Accordingly, when a subsequent task affords an opportunity to win back a sense of completeness, they become motivated and energized in order to reassure themselves that they are capable of achieving the self-definition in question.

2. In both experiments, failure on an identity-relevant task led to impaired performance on a subsequent task unrelated to the identity goal challenged through prior failure. As expected, participants assigned to this condition felt (a) preoccupied with failure-related cognitions (Experiment 1) and (b) blocked in performing the subsequent test task (Experiment 2). These findings are consistent with the idea that individuals who experience failure relevant to a sought-after self-definition are caught up in a state of incompleteness that subsequently interferes with non-self-definitional task achievements.

3. In Experiment 1, students exposed to failure unrelated to their professional self-definitions did not differ in their test performance from students assigned to no-feedback control conditions. Hence, when performance effects occurred, they did so only when the task on which the students had failed was said to be relevant to the domain of their professional ambitions. This result suggests that failure per se was not responsible for the performance findings obtained in our studies. Rather, it was the challenge created by identity-relevant failure to participants' professional self-definitions.

4. In Experiment 2, the completeness-inducing intervention effectively countered identity-relevant failure experience because it annulled both facilitating and debilitating performance effects. This finding supports the assumption that gaining social recognition for a threatened self-definition is quite effective in dissipating feelings of symbolic incompleteness. Because winning social recognition for a self-definition may serve as a sym-

bol of completeness, it can also substitute for self-defining task achievements. In addition, as shown in Experiment 2, after having restored a sense of completeness, individuals are able to fully concentrate on performing tasks unrelated to the respective self-definition.

Taken together, this pattern of findings might be interpreted in terms of a dynamic fit between person and situational variables. From the standpoint of self-completion theory, the person is viewed as striving for a self-definition that has become incorporated into his or her identity. This self-definition corresponds to situational opportunities to strive for identity-relevant achievements. Accordingly, and different from the situation in earlier failure studies, the present research focused on performance effects of failure in the domain of self-definitional commitments. Both of the present experiments revealed that individuals who experience failure on identity-relevant tasks become both concerned with their self-definitional shortcomings and highly motivated to compensate for them. Thus, although high relevance of failure to a self-definition guarantees high intensity of performance effects, it does not determine the direction of these effects (i.e., whether identity-relevant failure leads to enhanced or impaired test performances). Rather, the direction of performance effects following identity-relevant failure depends on the functional relationship between the original failure situation and the subsequent test situation. Following the substitutability idea inherent in self-completion theory, this functional relationship relies on the extent to which a new task situation offers the individual an alternative way of striving for an identity-relevant achievement and thereby compensating for the prior identity-relevant failure experience. Thus, the present research extends traditional research on the performance effects of failure (as reviewed in the introduction of this article) because it considers the substitutability of tasks in the service of a person's striving for self-definitional goals.

Consistent with this line of theorizing, the findings of both experiments suggest that failure relevant to a self-definition may produce both benefits and costs in people's subsequent task performances. From a self-definitional perspective, however, it appears that the benefits easily outrun the costs. Self-definitional goal pursuits are long-term endeavors because there is always a host of different indicators to acquire (think, for instance, of becoming a successful physician). These indicators may even grow in numbers as one advances in one's goal pursuit from beginner to expert status (e.g., from being a medical student to being a successful surgeon to successfully running an emergency hospital). All of this implies that the pursuit of self-defining goals is best described as a never-ending story (Gollwitzer, 1987) and that individuals committed to such long-term pursuits are prone to run into many failures. Accordingly, successful goal pursuit needs effective coping with failure, and this is exactly what we have observed in our experiments when identity-relevant failure participants were offered an opportunity to work on further identity-relevant tasks. Participants' feelings of incompleteness fueled performance increments on these tasks. Yet self-definitional incompleteness was also associated with performance decrements on identity-irrelevant tasks. But this seems a modest price, because this effect was quickly removed through an intervening completeness experience that was based on socially validated self-descriptions. One might speculate,

however, that extensive use of this type of self-symbolizing would become destructive if it started to undermine compensatory efforts aimed at acquiring identity-relevant skills (cf. Wicklund & Gollwitzer, 1982).

Limitations and Future Perspectives

All students participating in our research were administered the same performance task (i.e., the d2 Mental Concentration Test). Accordingly, performance effects of failure were solely attributable to the presence versus absence of identity-sensitive contextual features. However, in future studies the generality of the performance findings reported here should be examined by varying such task characteristics as novelty, difficulty, and complexity. One might speculate, for example, that incomplete individuals who are highly motivated to regain a sense of completeness may become prone to overmotivation effects as they engage in more complex task activities (cf. Atkinson, 1974; Baumeister, 1984; Heckhausen & Strang, 1988). Thus, the conclusions drawn from the present research await further examination in cross-validation studies, which should also consider self-definitional pursuits in nonacademic life domains (cf. Wicklund & Gollwitzer, 1982).

In the present studies we did not examine the potential influence of commitment strength on participants' motivation to engage in self-symbolizing task activities. Rather, to test the validity of our predictions, we preselected participants from highly prestigious academic majors in which students are generally found to be highly committed to their professional ambitions (Braun, 1990). Yet earlier research on symbolic self-completion showed that individuals who are not or who are only weakly committed to a particular identity or self-definition do not engage in self-symbolizing efforts (Wicklund & Gollwitzer, 1982). Rather, when they experience an identity-relevant shortcoming they suspend the respective self-definitional pursuit. In line with this reasoning, Brunstein and Olschner (1993) recently reported that uncommitted individuals tend to respond to failure by retreat, that is, with an impulse to withdraw and to dissociate from further self-definitional task attempts. Thus, in future studies investigators should examine how differences in goal commitment account for differences in people's behavioral responses to identity-relevant failure experiences.

In a model of self-affirmation processes, Steele (1988; Liu & Steele, 1986) argued that people's responses to self-threatening events are not confined to the domain in which the self-threat occurred. Rather, according to Steele, people strive toward a global sense of self-integrity or self-esteem. This superordinate goal or motive enables individuals to engage in a variety of highly flexible compensation processes while they try to cope with self-threatening information. Following the logic of this argument, people who realize that they are falling short in a certain identity domain may try to reaffirm the integrity of their selves in a quite different identity domain. To address this issue, future researchers investigating the performance effects of identity-relevant failure should include an extra opportunity for participants to engage in fluid compensation processes. Thus, by extending the procedures used in the present experiments, the test tasks administered in such studies should be varied along several self-definitional dimensions, and the same should

be done with respect to the intervention right after the failure experience.

Finally, in the present research we did not address the issue of how people respond to self-relevant failure in so-called contingent action paths defined as "a series of steps to a goal in which success in a more immediate step is necessary to earn the opportunity to move on to the next step of the path" (Raynor & Entin, 1982, pp. 19–20). As Raynor (1982, pp. 287–288) pointed out, self-relevant failure in a contingent path not only means a negative identity achievement but also rules out a host of future opportunities to strive for the respective identity goal (e.g., consider a student who fails in getting his or her diploma and therefore cannot move on in the path of striving for the respective professional career). Thus, failure in contingent paths drastically reduces a person's options to acquire further indicators of an aspired-to self-definition. Under these circumstances, failure might even prompt a reappraisal of identity goals and result in disengagement from the respective self-definition. Hence, further research is needed to examine how people negotiate an identity crisis that is due to a loss of self-definitional opportunities (cf. Raynor, 1982).

To conclude, although traditional models of human motivation have yielded many important insights into how people respond to failure experiences (e.g., Atkinson, 1964; Elliott & Dweck, 1988; Kuhl, 1984; Seligman, 1975; Wortman & Brehm, 1975), we suggest that the consequences of failure in the domain of self-definitional pursuits follow their own principles. The results of the present experiments strongly support this view. Apparently, self-defining goal pursuits do differ from non-self-defining goal pursuits, and future research may want to explore other unique features of people's attempts to meet their identity goals (i.e., not only those that relate to coping with failure).

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