

# Resilience in the Face of Coping With a Severe Physical Injury: A Study of Trajectories of Adjustment in a Rehabilitation Setting

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**Objective:** Despite the popularity of the concept of resilience, little research has been conducted on populations in physical rehabilitation settings. Our purpose was to identify three trajectories of psychological adjustment to an acquired severe physical injury characterized by resilience, recovery, or distress in a longitudinal design. **Participants:** Eighty inpatients with a severe injury at a rehabilitation hospital. The participants had spinal cord injury or multiple traumas. **Design:** Classification into the three trajectories was based on symptoms of psychological distress (posttraumatic stress disorder, depression, anxiety, and negative affect) and participants' level of positive affect at admission to and discharge from the rehabilitation hospital. **Results:** The most common trajectory was the resilience trajectory (54%), followed by the recovery trajectory (25%) and the distress trajectory (21%). The most interesting differences between the trajectories were the result of optimism, affect, social support, and pain. Trait negative and positive affect predicted classification into the trajectories. **Conclusions:** An adaptation pattern characterized by resilience was found to be the most common response to an acquired severe injury, and trait affect predicts the outcome pattern. Interventions based on resilience are discussed.

**Keywords:** severely injured, spinal cord injuries, resilience, trajectories, positive psychology

Recent research has claimed that most individuals facing different kinds of trauma are resilient (Bonanno et al., 2008; Deshields, Tibbs, Fan, & Taylor, 2006; Hobfoll et al., 2009), but there seems to be a paucity of literature examining the resilience of individuals in physical rehabilitation settings. Until now, it has been unclear whether individuals who acquire a severe physical injury with a sequel of disability (e.g., a spinal cord injury [SCI]) in a life-threatening event, such as a motor vehicle accident, have the same capacity to remain psychologically healthy and to return to previous levels of emotional functioning as individuals experiencing other potentially traumatic events after which physical function returns to normal (White, Driver, & Warren, 2008). An individual who has acquired a severe physical injury must face both the trauma that created the injury and the loss of physical function. The greater severity and the necessity to remain in a rehabilitation hospital for a substantial period posttrauma are likely to influence the expression of distress symptoms in this population (Kennedy &

Evans, 2001). Because of the extreme adversity these individuals experience, there is a need for research that examines the role of resilience in this population (Campbell-Sills, Cohan, & Stein, 2006; White et al., 2008). Our aims in this study were to estimate the prevalence of resilience in a rehabilitation setting and to identify possible predictors for such a psychologically healthy outcome.

## Resilience in Physical Rehabilitation

A widely held cultural assumption is that acquiring a severe physical injury, with a sequel of functional loss, is a devastating event and that a return to normal life is improbable. Individuals with disabilities are often met with strong prejudice and pity in society (Schanke, 2004). However, those individuals with a severe injury are themselves often surprised by their ability to adjust to the physical change and to learn that happiness and living a relatively normal life is possible (Dunn, Uswatte, & Elliott, 2009). This is in accordance with the insider–outsider distinction, and social psychologists within the field of rehabilitation psychology have emphasized this topic (Dunn, 2009). Insiders (people with disability) know what disability is like, whereas outsiders (people without disability) often equate disability with illness and may therefore make erroneous assumptions about the experience of disability. An important difference between the two perspectives is that the insiders generally see their situations in more favorable terms than do outsiders and they take positives into account in their troubling situations (Wright, 1991).

Instead of letting the insiders' (those who know what it's like) perspective inform research and practice, it seems as though the outsiders (who appear to have difficulties with accepting that many individuals with disabilities adjust to their circumstances reasonably well; Dunn et al., 2009) have set the standards of research

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within rehabilitation psychology. Therefore, there has traditionally been an exaggerated focus on identifying risk factors and vulnerabilities. This research has been important for the advancement of our knowledge of why some individuals cope poorly with such life events, to identify these individuals at an early stage, and to give the right intervention. Fortunately, the trend is now shifting, and it is increased interest in the concept of resilience and the assessment of positives in terms of human strengths that individuals use to cope with life challenges (Collard & Kennedy, 2007; White et al., 2008). The trend is now more in line with the insiders' perspective, to emphasize what individuals with severe injuries can do rather than what they cannot do, to strengthen their positive abilities, and to learn from the ones who are coping well.

Resilience is a broad conceptual umbrella, and the construct refers to important psychological skills and to the individual's ability to use family, social, and external support to cope better with stressful events (Campbell-Sills et al., 2006; Friborg, 2005). Most research, in terms of theoretical and conceptual work within the resilience field, is conducted with child populations. Far less is known about how resilience operates in adulthood. It is crucial to differentiate between resilience in children and resilience in adults because childhood resilience is typically understood in response to enduring challenging environments, whereas, by comparison, adult resilience is more often a matter of coping with an isolated and usually brief stressor event. According to George Bonanno (2004), *resilience* is defined

as the ability of adults in otherwise normal circumstances who are exposed to an isolated and potential highly disruptive event such as the death of a close relation or a violent or life-threatening situation to maintain relatively stable, healthy levels of psychological and physical functioning . . . as well as the capacity for generative experiences and positive emotions. (pp. 20–21)

On the basis of Bonanno's (2004) definition, we define *resilience* in the rehabilitation setting as the ability of adults who are facing a severe and potentially disabling physical injury to maintain relatively stable, healthy levels of psychological and social functioning and to maintain positive emotions and a positive perception of self and the future. Resilience is a two-dimensional construct concerning the exposure to adversity and the positive adjustment outcomes to that adversity. *Adversity* refers to any risks associated with negative life events that are related to difficulties with adjustment. Obtaining a severe physical injury is statistically related to difficulties with adjustment and psychological distress such as posttraumatic stress disorder (PTSD; Kennedy & Duff, 2001; Kennedy & Evans, 2001; Starr et al., 2004), anxiety (Kennedy & Rogers, 2000), and depression (Elliott & Frank, 1996; Kennedy & Rogers, 2000). Yet, some individuals manage to remain psychologically healthy and show a positive adaptation. In the rehabilitation setting, it is not uncommon to see individuals who have acquired severely disabling injuries adapting to their new situation in positive ways, by reorienting themselves and adjusting their goals and ambitions in life, despite the adversity that has led to the personal burden and functional and social limitations. Positive adaptation can be explained as doing substantially better than what would be expected given the exposure to an adversity.

There are marked individual differences in the way in which people react to and cope with aversive events, such as acquiring a

severe physical injury. According to Mancini and Bonanno (2006), some individuals suffer from chronic distress, recurrent intrusive memories, or sadness for years after such experiences. Others have a recovery process of first suffering more acute reactions and then gradually returning to former levels of functioning. Still others show a resilient adjustment with surprisingly short-lived reactions and a relatively rapid return to their previous level of functioning (Mancini & Bonanno, 2006). Being resilient does not mean that a person does not experience difficulties or distress. Some emotional pain and sadness is common in individuals who have experienced major adversity in their lives. Even though individuals manifest resilience in their behavior and life patterns, it is argued that resilience is not a trait that someone either has or does not have (Luthar, 2003). Resilience involves behaviors, thoughts, and actions that anyone can learn and develop (American Psychological Association Help Center, 2004). Thus, it is crucial that the level of resilience be detected and evaluated as early as possible in the rehabilitation process because there is a greater chance of increasing resilience and rehabilitation outcomes (Luthar, Cicchetti, & Becker, 2000).

One common assessment of human strength is optimism. According to Carver, Scheier, Miller, and Fulford (2009), optimists expect good things to happen and are persistent in trying to reach their goals, even when things are hard. However, pessimists expect bad outcomes, try to escape the adversity by wishful thinking, and use temporary distractions that do not help solve the problem. Martin Seligman (1998) and the field of positive psychology have defined optimism not only as a trait but as a more active characteristic and as constructive cognitions about the future and have emphasized that optimism is a human strength that can be built in therapy and that optimists are exposed to the same disappointments and tragedies as pessimists, but they are handling them better. Growing evidence in the literature indicates that optimistic individuals respond to adversity in more adaptive ways than do pessimists (Carver et al., 2009). Individuals with an optimistic attitude about their rehabilitation are usually the same individuals who ward off the depression and hopelessness that can compromise progress in therapy (Seligman & Csikszentmihalyi, 2000). Detecting whether the individual displays an optimistic or a pessimistic pattern might help predict rehabilitation outcomes and secondary complications because optimists appear to take action to minimize health risks, know more about risk factors, and make more proactive efforts (Carver et al., 2009).

Some studies have argued that positive emotions, or positive affect, help resilient individuals to construct the psychological resources that are necessary for coping successfully with significant catastrophe, such as the September 11, 2001, terrorist attacks (Tugade & Fredrickson, 2004). As a result, positive emotion experienced by resilient individuals functions as a protective factor to moderate the magnitude of adversity to individuals and assists them to cope well in the future. Conversely, if an individual exhibits behaviors associated with low resilience (e.g., anger, isolation, substance abuse), then there is an increased likelihood that the individual will continue to function in a state of disruption and adapt poorly to the situation (White et al., 2008). Individuals who do not display a resilient adaptation exhibit the difficulties of regulating negative emotions and demonstrate sensitive reactions to stressful life events.

## Severe Physical Injuries

Multiple trauma (MT) and SCI are viewed as severe physical injuries because in most cases they lead to functional loss and disability. Individuals with MT or SCI may perceive trauma as a threat to their physical existence and as a violation of their social and personal integrity. This results in feelings of stress and vulnerability as they confront the possibility of their own mortality. Events including the incident, ambulance journey, surgical procedures, or transfer to an intensive care unit are sudden, unexpected, unfamiliar, and frightening and occur at a time when the individual's abilities to comprehend and adapt have been severely compromised (Mohta, Sethi, Tyagi, & Mohta, 2003). In this study, we operationalized resilience in the face of coping with a severe physical injury as a response pattern consisting of major adversity because of the severe physical injury (with the loss of physical functioning) in the context of minor disruption of psychosocial functioning and low emotional burden (such as no symptoms of anxiety, depression, or PTSD).

## Trajectories of Resilience

The recent literature has proposed that resilience may be best understood and measured as one member of a set of trajectories that may follow adversity and potentially traumatic events (Bonanno et al., 2008; Deshields et al., 2006; Hobfoll et al., 2009). Given that passage of time is an important factor in adapting to a severe physical injury, it seems appropriate to study different trajectories and examine the process of adaptation over time. By studying trajectories, which describe change over time, with data from both the beginning and the end of inpatient rehabilitation, one can look at the process of adjustment rather than at an endpoint. The absence or presence of psychopathology at one point in time does not ensure that it will or will not occur later.

George Bonanno and his colleagues have identified trajectories of psychological functioning or prototypical outcome patterns among bereaved individuals (Bonanno, Moskowitz, Papa, & Folkman, 2005), among individuals who have experienced a potentially traumatic event (Bonanno, Galea, Bucchiarelli, & Vlahov, 2007), and among hospitalized survivors of the severe acute respiratory syndrome epidemic (Bonanno et al., 2008). Others have studied trajectories among a sample under an ongoing threat of mass casualties (Hobfoll et al., 2009) and among breast cancer survivors after the end of treatment (Deshields et al., 2006). Yet another study examined trajectories by personality prototypes in a sample of individuals with SCIs (Berry, Elliott, & Rivera, 2007).

Building on the work of Bonanno and his colleagues, we outlined three trajectories in a longitudinal design. The first trajectory, named the *resilience trajectory*, was characterized by no symptoms of major distress over time. Resilient individuals generally exhibit a stable trajectory of healthy functioning across time, as well as the capacity for generative experiences and positive emotions (Bonanno, 2004). The second trajectory, named the *recovery trajectory*, was characterized by initial symptoms of distress with a significant decrease in symptoms scores later in the rehabilitation process. Bonanno (2004) emphasized a distinction between resili-

ence and recovery because the term *recovery* connotes a trajectory in which normal functioning temporarily gives way to threshold or subthreshold psychopathology (e.g., symptoms of depression or PTSD), usually for a period of several months, and then gradually returns to pre-event levels. By contrast, *resilience* reflects the ability to maintain a stable equilibrium. The third trajectory, named *distress*, was characterized by high levels of distress throughout the rehabilitation process. To separate recovery trajectories from resilient and distress trajectories may be especially important in a physical rehabilitation setting because the medical trauma is extensive and physical improvements that may affect the psychological reactions are expected. In studies similar to the present one (Bonanno et al., 2008; Hobfoll et al., 2009), a fourth trajectory has been identified, the *delayed onset trajectory*. Because other studies have found that delayed onset of reactions occurs in only 2%–3% of the total sample (for a review, see Bonanno & Field, 2001), we decided not to take this perspective into account here.

Previously, *resilience* has been defined according to PTSD symptoms (Bonanno et al., 2007) and according to depression symptoms (Bonanno et al., 2002; Deshields et al., 2006). However, recently it has been argued that resilience is more than just the absence of psychopathology (Bonanno, 2004) and that it, in addition, includes the capacity for positive affect (Bonanno et al., 2005). Studies with patients with rheumatoid arthritis (Strand et al., 2006) and with chronic pain (Zautra, Johnson, & Davis, 2005) have concluded that positive affect appears to be an important resilience factor within these populations. Positive affect has also been shown to be a meaningful predictor of long-term bereavement outcome (Bonanno et al., 2005). Our operationalization is based both on symptoms of PTSD, anxiety, depression, and state negative affect and on state positive affect, thus incorporating both the most frequently reported symptoms of psychological distress in this population and a more specific concept of resilience, namely positive affect. Although it has not previously been used, we wanted to investigate whether this operationalization is meaningful in detecting severely injured individuals' pattern of psychological adaptation.

## Aims of the Study

The main aim of this study was to estimate the prevalence of resilience, recovery, and distress trajectories in individuals with a severe injury during inpatient rehabilitation. Relatively little is known about human strengths in rehabilitation and how resilient individuals manage to cope so well. Our clinical impression is that many of our patients in the rehabilitation hospital show a resilient adaptation and that these patients are more likely to exhibit positive adaptive behaviors to the injury and the event (e.g., setting goals, accepting support from others). Moreover, we wanted to examine differences between the three trajectories and try to identify possible predictors of the trajectories. We see it as important to establish methods to detect resilience and to find out how individuals displaying a resilient adaptation are different from those who are not. Finally, we discuss implications for resilience-based interventions in rehabilitation settings.

## Method

### Participants

The study was conducted at Sunnaas Rehabilitation Hospital (SRH), the most specialized rehabilitation hospital in Norway. The study population consisted of inpatients, between 16 and 68 years old, admitted to SRH during a 2-year period from February 2003 to January 2005. People with MT, SCI, or both were consecutively included. Exclusion criteria were severe cognitive deficits or practical problems with carrying out the interview because of severe medical complications, psychosis, or other major psychiatric illness or foreigners who had insufficient understanding of the Norwegian language. We excluded 14 patients on the basis of these exclusion criteria. Twenty-three patients admitted during this period were not included because of vacations and turnover among the psychologists or for unknown reasons. This left us with 110 patients eligible for participation. Of these, nine refused to participate and 21 missed the follow-up at discharge. We then ended up with a total of 80 participants and a response rate of 73%.

A MT was defined by having a New Injury Severity Score (NISS) higher than 15 and at least two injuries classified in the Abbreviated Injury Scale (Association for the Advancement of Automotive Medicine, 1998). A NISS score higher than 15 is considered a serious injury. *SCI* was defined as damage to the spinal cord resulting in a loss of function such as loss of mobility or sensation. All individuals with SCI who came to SRH were included. This included participants with both traumatically acquired SCI (i.e. accidents) and non-traumatically acquired SCI (i.e., caused by infections and vascular lesions).

### Design

Semistructured psychological interviews and standardized questionnaires were administered 1–3 weeks after admittance to the rehabilitation hospital or when the participants' somatic condition allowed it (median days since injury = 38.5 days; quartiles = 24–61) and within a week before discharge (median days since injury = 121 days; quartiles = 93–175). Norwegian-language versions of all scales were used, and the interviews were performed by clinical psychologists. Written consent was obtained from the participants, and participation involved no changes in the psychological treatment during the stay at SRH. The study was approved by the Data Inspectorate and by the Regional Committee for Medical Research Ethics, South-East Norway.

The participants were classified into one of the three trajectories (resilience, recovery, or distress) on the basis of their level of psychological distress (PTSD, depression, anxiety, and state negative affect) and their level of state positive affect (see Table 1). The resilience trajectory was operationalized as having low distress and high state positive affect at both admittance and discharge. The recovery trajectory was operationalized as having improvements (from below to above a set threshold) on at least one of symptom scales. The distress trajectory was operationalized as having high distress, high state negative affect, or low state positive affect at both admittance and discharge.

Table 1  
*Descriptions of the Classification in the Three Trajectories*

Group	Admission	Discharge
Resilience	Below threshold on the symptoms scales for posttraumatic stress symptoms (PTSS), anxiety, depression and state negative affect and above threshold for state positive affect	The same as at admission
Recovery	Above threshold on at least one of the symptoms scales for PTSS, anxiety, depression, and state negative affect or below threshold for state positive affect	Below threshold on at least one scale that indicated the individual was above threshold at admission
Distress	Above threshold on at least one of the symptoms scales for PTSS, anxiety, depression, and low state negative affect or below threshold for high state positive affect	The same as at admission

### Assessments

**Psychological interview.** The semistructured psychological interview was developed to assess a holistic view of the participants' situation, in addition to demographics such as age, gender, marital status, occupational status, and level of education. The interview was developed by a research group of five experienced psychologists and was based on clinical experiences and relevant literature.

Satisfaction with social support was measured on a visual analog scale ranging from 0 to 10. *International Classification of Functioning, Disability and Health* criteria were followed to diagnose PTSD (World Health Organization, 1992). To explore participants' subjective experience of change in their mental health, we used one question from the Late Effects of Accidental Injury Questionnaire (Malt, 1988): "How do you think your psychological health has been after the injury compared with before the injury?" There were three response alternatives: worsened, unchanged, or better. In the interview, special attention was paid to pre-morbid and comorbid stressors. We asked for potential stressors consisting of psychological topics often reported by patients such as comorbid or pre-morbid (a) serious illness, (b) psychiatric illness (in need of therapy or medication), (c) serious illness or death in close family, (d) marital problems, (e) substance abuse, (f) feeling isolated or lonely, and (g) other stressors (such as relational problems, being refugees, difficulties in childhood, emotional problems, and social problems including criminal behavior). We also asked for potentially event-related stressors such as (a) fear of dying, (b) whether they felt safe when they got help, (c) whether they got enough support in the acute phase, and (d) feelings of guilt associated with the event.

**Injury severity.** The severity of the injuries was assessed with the Abbreviated Injury Scale (Association for the Advancement of Automotive Medicine, 1998). Ratings ranging from 1 (*minor*) to 6 (*lethal*) are made for injuries in each of six body areas. The NISS is the sum of squares of the three highest Abbreviated Injury Scale scores, regardless of body region (Osler, Baker, & Long, 1997).

The injury-related data were collected from medical records at the participants' acute care hospital, primarily from the Trauma Registry at Ullevål University Hospital (Ullevål Trauma Registry, 2003). Injury-related data were only collected for the traumatically injured participants. Maximum pain experience during the past week was measured, both at admission and at discharge, on a visual analog scale ranging from 0 to 10.

**Questionnaires.** To measure symptoms of PTSD, we used the Impact of Event Scale—Revised (Weiss & Marmar, 1997). The Impact of Event Scale—Revised is a 22-item scale that measures all three core phenomena of PTSD: intrusion, avoidance, and hyperarousal. However, in our analysis we used only the combined subscale score of intrusion and avoidance (15 items), and we weighted the items on a 4-point Likert scale ranging from 0 to 5, according to the original weighting for the Impact of Event Scale by Horowitz, Wilner, and Alvarez (1979). We used a cutoff of 36 for the combined score of the Intrusion and Avoidance subscales, which is considered to be optimal for detecting PTSD with a sensitivity of .77 and a specificity of .51 (Witteveen, Bramsen, Hovens, & Van der Ploeg, 2005). Internal consistency for the Impact of Event Scale—Revised total scale was good in our sample, with a Cronbach's alpha of .92.

The Hospital Anxiety and Depression Scale (HADS) was used to identify symptoms of anxiety (HADS-A) and depression (HADS-D). The two subscales are added separately, and both HAD-A (Cronbach's  $\alpha = .82$ ) and HAD-D (Cronbach's  $\alpha = .81$ ) showed adequate psychometric abilities in our sample. The HADS has also shown good psychometric abilities, with a Cronbach's alpha greater than .60 in populations in both medical and psychiatric settings and in the general population (Bjelland, Dahl, Haug, & Neckelmann, 2002). A review of the literature shows that a cutoff of 8 or more is most commonly used (Zigmond & Snaith, 1983), and we adapted this to our model.

Positive affect and negative affect were measured using the Positive Affect and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988). The Positive Affect and Negative Affect Schedule consists of two subscales of 10 adjectives, one subscale for positive affect (PA) and one for negative affect (NA). The adjectives for PA are *interested, strong, inspired, attentive, enthusiastic, proud, alert, lively, active, and determined*; for NA, *distressed, upset, nervous, scared, hostile, irritable, ashamed, jittery, afraid, and guilty*. The participants were asked to indicate on a 5-point scale (1 = *very slightly/not at all*, 2 = *a little*, 3 = *moderately*, 4 = *quite a bit*, and 5 = *very much*). The PA score represents the mean for the 10 PA items, and the NA score represents the mean for the 10 NA items. We used both a state and a trait version. For the state version, the participants were asked to indicate to what extent they experienced each of the adjectives during the previous week. For the trait version, the participants were asked to indicate to what extent they, before they were injured, experienced the same adjectives. Internal consistencies for the PA and NA scales have shown good reliability among a sample of patients receiving inpatient medical rehabilitation, with Cronbach's alphas of .85 and .90, respectively (Ostir, Smith, Smith, & Ottenbacher, 2005). The internal consistency of both the state and the trait version of the PA and NA scales in this study sample was also good (Cronbach's  $\alpha = .85-.92$ ). The Positive and Negative Affect Schedule does not have established cutoff scores, but on the basis of normative data from 1,003 adults from the general U.K. population (Crawford &

Henry, 2004), we calculated cutoff scores for PA and NA by adding or subtracting 1 standard deviation from the mean in the nonclinical sample. For NA, we were interested in those showing high negative affect, so we took the norm mean (16) plus the standard deviation (5.5), which resulted in a cutoff of 21. For PA, we were interested in those showing low positive affect, so we took the norm mean (31.31) minus the standard deviation (7.65), which resulted in a cutoff of 24.

We measured optimism and pessimism using the Life Orientation Test—Revised (LOT-R; Scheier, Carver, & Bridges, 1994). The LOT-R consists of 10 items; three items assess optimism, three items assess pessimism, and four items are filler items. Respondents indicate the extent to which they agree with each item on a 5-point Likert scale ranging from *strongly agree* (0) to *strongly disagree* (4). Higher scores are indicative of optimism. The LOT-R exhibits an acceptable level of internal consistency with a Cronbach's alpha of .78 (Scheier et al., 1994). In our sample, the Cronbach's alpha was .80.

## Statistical Analyses

We used descriptive statistics to characterize the total sample and the three trajectories. Bivariate analyses (analysis of variance for continuous variables and cross-tables, with Pearson chi-square tests and Fisher's exact tests for categorical variables) were used to explore the statistical significance of the associations between the different trajectories and possible predictor variables. We used correlation analysis to explore the association between the Positive and Negative Affect Schedule state and trait versions, as well as associations between the covariates. Regression analysis was used to explore crude and adjusted estimates of the covariates on the three trajectories. Results presented are those from multinomial logistic regression with backwards variable selection. However, because of the restricted sample size, both results from parallel bivariate logistic regression and ordinal logistic regression were used to support the findings. All statistical analyses were performed using SPSS 15.0 except the Fisher's exact test for  $2 \times 3$  table, which was done in R, version 2.6.2 (R Project for Statistical Computing, 2009). We considered  $p$  values less than or equal to .05 significant.

## Results

The most common trajectory of adaptation to a severe physical injury was the resilience trajectory (54%), followed by the recovery trajectory (25%) and the distress trajectory (21%). All of the participants were classified into one of these trajectories, and no one showed only a delayed response pattern. In Table 2, descriptive statistics of demographics and injury-related variables for the full sample and for the different trajectories are presented. Of the participants, 77% had a traumatic case of injury, and transport accidents were the most common injury mechanism (44%). All of the participants who were injured in a sport accident were in the resilience trajectory, and the two participants with an assault-related injury were in the distress trajectory. About one third (29%) of the participants had MT, and the rest (71%) had SCI. Twenty-eight percent of those with SCI also had MT. Among the participants with SCI, 56% had paraplegic injuries and 44% had tet-

Table 2  
*Sample Characteristics of the Resilience, Recovery, and Distress Trajectories*

Demographic variables	Full sample	Resilience trajectory	Recovery trajectory	Distress trajectory
<i>N</i> (%)	80 (100)	43 (54)	20 (25)	17 (21)
Age ( <i>M</i> [ <i>SD</i> ])	39.1 (15.6)	39.3 (15.5)	39.2 (16.5)	38.7 (15.6)
Gender ( <i>n</i> [%])				
Men	59 (73.8)	34 (79.1)	13 (65)	12 (70.6)
Women	21 (26.3)	9 (20.9)	7 (35)	5 (29.4)
Family status ( <i>n</i> [%])				
Married (or cohabitating)	43 (53.8)	24 (55.8)	11 (55)	8 (47.1)
Single	37 (46.3)	19 (44.2)	9 (45)	9 (52.9)
Education ( <i>n</i> [%])				
High school or less	60 (75)	29 (48.3)	16 (26.7)	15 (25)
College/university	20 (25)	14 (70)	4 (20)	2 (10)
Work status time of injury ( <i>n</i> [%])				
In school/occupation	58 (72.5)	35 (81.4)	13 (65)	10 (58.8)
No school/occupation	10 (12.5)	2 (4.7)	4 (20)	4 (23.5)
On sick leave	12 (15)	6 (14)	3 (15)	3 (17.6)
Injury/diagnoses ( <i>n</i> [%])				
Multiple trauma	23 (28.8)	13 (30.2)	7 (35)	3 (17.6)
Spinal cord injury	35 (43.8)	18 (41.9)	9 (45)	8 (47.1)
Multiple trauma and spinal cord injury	22 (27.5)	12 (27.9)	4 (20)	6 (35.3)
Cause of injury ( <i>n</i> [%])				
Sports accident	9 (11.3)	9 (20.9)	0 (0)	0 (0)
Assault	2 (2.5)	0 (0)	0 (0)	2 (11.8)
Transport accident <sup>a</sup>	34 (42.5)	21 (48.8)	8 (40)	5 (29.4)
Fall accident	14 (17.5)	5 (11.6)	3 (15)	6 (35.3)
Other traumatic cause	4 (5)	2 (4.7)	1 (5)	1 (5.9)
Nontraumatic cause	17 (21.3)	6 (14)	8 (40)	3 (17.6)
Severity of injury ( <i>n</i> [%])				
New Injury Severity Scale ( <i>M</i> [ <i>SD</i> ])	31.9 (13.5)	31.1 (12.8)	35.1 (14.8)	31.2 (14.7)
Pain ( <i>n</i> [%])				
Maximum pain admission ( <i>M</i> [ <i>SD</i> ])	4.72 (2.83)	4.1 (2.7)	4.5 (2.9)	6.6 (2.3)
Maximum pain discharge ( <i>M</i> [ <i>SD</i> ])	3.51 (2.51)	3.2 (2.5)	3.2 (2.6)	4.7 (2.1)

<sup>a</sup> Transport accident included all types of accidents that involved transport behavior, for example, car, motorbike, and biking accidents.

raplegic injuries; 67% had incomplete injuries, whereas 33% had complete injuries. The median days spent in the rehabilitation hospital was 91 (quartiles = 73–124).

### Bivariate Analyses

We conducted bivariate analyses for the continuous psychosocial variables and the categorical comorbid stressor variables (see Table 3). Significant differences between the resilience trajectory and the distress trajectory were most common in all the analyses, but we also found significant differences between the resilience and the recovery trajectories on trait positive affect and trait negative affect, comorbid psychiatric illness, serious illness or death in close family, and feelings of isolation and loneliness at admission and on comorbid feelings of isolation and loneliness and other comorbid stressors at discharge.

The only premorbid stressors that differed significantly between the resilience and the distress trajectories were substance abuse,  $\chi^2(1, N = 60) = 3.864, p = .049$ , and other premorbid stressors (such as relational problems, being refugees, difficulties in childhood),  $\chi^2(1, N = 60) = 9.9, p = .002$ . Other premorbid stressors also differed significantly between the resilience and the recovery trajectories,  $\chi^2(1, N = 63) = 10.268, p = .001$ . Among the event-related stressors, fear of dying,  $\chi^2(2, N = 79) = 8.86, p = .012$ ; whether they felt safe when they got help,  $\chi^2(2, N = 79) = 10.375, p = .005$ ; and whether they got enough support in the acute phase,  $\chi^2(2, N = 79) = 11.709, p =$

.003, showed significant differences between the resilience and the distress trajectories, but feelings of guilt associated with the event did not,  $\chi^2(2, N = 79) = .805, p = .734$ . The Pearson chi-square analyses for the participants' subjective experience of change in their mental health showed significant differences between the three trajectories,  $\chi^2(4, N = 80) = 18.319, p = .001$ . The participants in the resilience trajectory most frequently reported no change in their mental health, and the participants in the distress trajectory most frequently reported a worsening of their mental health. All the participants diagnosed with PTSD were in the distress trajectory both at admission and at discharge. The relationship between the resilience and the distress trajectories was significant at admission,  $\chi^2(1, N = 59) = 10.601, p = .005$ , but not at discharge,  $\chi^2(1, N = 60) = 5.233, p = .077$ .

According to the bivariate analyses, there were no significant differences between the demographics and the different trajectories (data not shown). One injury-related variable that showed a statistically significant effect was maximum pain experience at admission. Using the Bonferroni post hoc test, we found significant differences between the resilience and the distress trajectories ( $p = .005$ ). There was no significant difference between the resilience and the recovery trajectories ( $p = 1.0$ ) and the distress and the recovery trajectories ( $p = .142$ ) on maximum pain experience at admission. We found no significant difference between the three trajectories and maximum pain experience at discharge. There were significantly more traumatically injured participants in the resilience trajectory than in the recovery trajectory ( $p = .021$ ). Although not significant, it is

Table 3  
*Bivariate Analyses for Psychosocial Variables for the Resilience Trajectory Versus the Recovery and the Distress Trajectories*

Variables	Full sample	Resilience trajectory	Recovery trajectory		Distress trajectory	
Psychosocial						
<i>N</i> (%)	80	43 (54)	20 (25)		17 (21)	
Continuous	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>p</i> <sup>a</sup>	<i>M</i> ( <i>SD</i> )	<i>p</i> <sup>a</sup>
Social support						
Admission	8.5 (2)	9.14 (1.18)	8.16 (2.59)	0.2	7.19 (2.46)	0.002*
Discharge	8.4 (2.1)	8.98 (1.47)	8.58 (2.48)	1.0	6.59 (2.09)	<0.001*
Life Orientation Test—Revised: admission	16.6 (5.2)	18.36 (4.2)	16.28 (5.4)	0.41	13.06 (5.56)	<0.001*
Positive affect—Trait: admission	35.7 (8)	38.71 (6.79)	33.75 (8.48)	0.04*	30.13 (6.95)	<0.001*
Negative affect—Trait: admission	17.9 (6.8)	14.71 (4.31)	19.55 (7.31)	0.01*	24.13 (6.73)	<0.001*
Categorical variables	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	$\chi^2$	<i>n</i> (%)	$\chi^2$
Comorbid stressors at admission						
Serious illness	10 (12.7)	4 (5.1)	3 (3.8)	0.41	3 (3.8)	0.76
Psychiatric illness	12 (15.2)	2 (2.5)	5 (6.3)	5.54*	5 (6.3)	7.03*
Illness or death in family	11 (13.9)	3 (3.8)	6 (7.6)	5.70*	2 (2.5)	0.33
Marital problems	9 (11.4)	3 (3.8)	3 (3.8)	0.96	3 (3.8)	1.46
Substance abuse	9 (11.4)	4 (5.1)	0 (0)	2.04	5 (6.3)	3.70
feeling isolated or lonely	11 (13.9)	1 (1.3)	5 (6.3)	7.93*	5 (6.3)	9.68*
Other stressors	10 (12.7)	1 (1.3)	3 (3.8)	3.58	6 (7.6)	12.54*
Comorbid stressors at discharge						
Serious illness	4 (5)	1 (1.3)	1 (1.3)	0.32	2 (2.5)	2.29
Psychiatric illness	12 (15)	1 (1.3)	3 (3.8)	3.69	8 (10)	19.12*
Illness or death in family	11 (13.8)	6 (7.5)	3 (3.8)	0.01	2 (2.5)	0.05
Marital problems	8 (10)	2 (2.5)	3 (3.8)	2	3 (3.8)	2.69
Substance abuse	7 (8.8)	3 (3.8)	1 (1.3)	0.09	3 (3.8)	1.54
Feeling isolated or lonely	9 (11.4)	0 (0)	4 (5.1)	8.98*	5 (6.3)	13.5*
Other stressors	14 (17.5)	4 (5.1)	9 (11.3)	10.62*	1 (1.3)	0.19

<sup>a</sup> *p* values are adjusted according to the Bonferroni correction method.

\* *p* < .05.

interesting to note that the participants in the recovery group had the highest scores on NISS (see Table 2).

## Predictors

According to correlation analyses, there was no significant relationship between PA state and PA trait ( $r = .439$ ) and NA state and NA trait ( $r = .268$ ) at admission, indicating that PA and NA trait could be treated as possible predictors in regression analysis, even though PA and NA state, at admission, appear in the operationalization of the response variable. The variables PA trait, NA trait, LOT-R, and comorbid feelings of isolation or loneliness at admission were included in multinomial logistic regression analysis. However, we excluded LOT-R and comorbid feelings of isolation or loneliness because of lack of significance after adjustment for PA trait and NA trait. PA trait and NA trait were significant in the final model for both groups (see Table 4). The odds ratio for trait negative affect in both conditions, recovery versus resilience trajectory and distress versus resilience trajectory,

is greater than 1, which indicates that as the negative affect increases, so does the odds of the membership in the trajectory. More specifically, the odds ratios 1.16 and 1.26 indicate a 16% and 26% increase, respectively, for recovery versus resilience and distress versus resilience when negative affect is present. The odds ratio for trait positive affect in both conditions is less than 1, which indicates that as the positive affect increases, the odds of membership in the trajectory decreases. A comparison between the recovery and the distress trajectories was also done according to multinomial logistic regression, but the results were not significant. Results from parallel bivariate logistic regression and ordinal logistic regression were similar to the results from the multinomial logistic regression and thus supported the findings.

## Respondents Versus Nonrespondents

Because in addition to the exclusion criteria, we excluded the 21 participants who missed the follow-up at discharge, we compared those participants with data from the discharge to those without

Table 4  
*Final Model of Multinomial Logistic Regression Analyses*

Variable	Recovery vs. resilience trajectory			Distress vs. resilience trajectory			Recovery vs. distress trajectory		
	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>
Trait negative affect	1.16	[1.04, 1.31]	.01	1.26	[1.11, 1.43]	<.001	1.09	[0.98, 1.20]	.10
Trait positive affect	0.92	[0.84, 0.99]	.04	0.87	[0.79, 0.97]	.01	0.95	[0.87, 1.04]	.29

Note. OR = odds ratio; CI = confidence interval.

data from the discharge to look for potential bias. The two groups did not differ significantly in gender, age, family status, injury severity, length of stay in rehabilitation hospital, posttraumatic stress symptoms, anxiety, depression, and trait positive and negative affect. However, the nonrespondents had a significantly higher state positive affect ( $p = .003$ ) and a significantly lower state negative affect ( $p = .003$ ) at admission than did the respondents. This means that the nonresponse data may not be missing at random, but because the two groups did not differ significantly in any of the other variables, we conclude that it will not cause a problem in generalizing our results.

## Discussion

The purpose of this study was to identify trajectories of psychological adjustment to an acquired severe physical injury characterized by resilience, recovery, or distress; to explore differences between these trajectories; and to identify possible predictors. First, we found that resilience is the most common response to an acquired severe physical injury, with more than half of the participants displaying a trajectory characterized by resilience. This finding was consistent with those of other studies on similar populations, such as individuals who have experienced the loss of a loved one (Bonanno et al., 2002), a potentially traumatic event (Bonanno, Galea, Bucciarelli, & Vlahov, 2006), or breast cancer (Desields et al., 2006). However, comparing our results with Berry et al.'s (2007) study of personality prototypes in a sample with SCI, we found a higher prevalence of resilience than they did (54% compared with 28%, respectively). This discrepancy might be the result of the different operationalizations. In Berry et al.'s study, the resilient prototype was characterized by low neuroticism and above average extraversion, openness, agreeableness, and conscientiousness. Even though neuroticism has been associated with negative affect and extraversion with positive affect, our additional inclusion of the absence of psychopathology in our operationalization of resilience makes the operationalizations different. Because resilience is believed to be not a trait but rather a process of adjustment that involves behaviors, thoughts, and actions (Luthar, 2003), future studies should further investigate personality and resilience in populations with severe injuries.

The commonalities of adults displaying a resilient adaptation in our study might be because these individuals are exposed to an isolated stressor event. Individuals who are exposed to several stressful events over time (e.g., torture or violence) or endure challenging environments (e.g., child maltreatment or war) might not have the same possibilities for a resilient adaptation. Because our results show data from a rehabilitation process over approximately 3 months rather than cross-sectionally at one point in time, we assume that the individuals who fell into the resilient trajectory during rehabilitation will still be categorized as resilient several years after injury. Future studies should investigate resilience several years after injury to see whether they find the same incidence and investigate predictors of a long-term resilient outcome.

Second, according to bivariate analyses we found significant differences between both the resilience and the recovery trajectories and the resilience and the distress trajectories on trait positive affect, trait negative affect, comorbid psychiatric illness at admission, and feelings of isolation and loneliness both at admission and at discharge. Not surprisingly, significant differences between the

resilience and the distress trajectories for the psychosocial variables were most common. Participants in the distress trajectory were significantly less optimistic and less satisfied with social support both at admission and at discharge, had premorbid substance abuse, were more afraid of dying, felt less safe when they got help, and did not get enough support in the acute phase compared with participants in the resilience trajectory. It is interesting to emphasize that the individuals in the resilience trajectory were significantly more optimistic than the participants in the distress trajectory. This supports previous studies on the relationship between individuals characterized by optimism and adjustment. Studies have shown that optimistic individuals experience less distress after an adversity, such as a childbirth (Carver & Gaines, 1987), and retain higher quality of life after treatment of a medical condition (Allison, Guichard, & Gilain, 2000) and that optimism predicts lower likelihood for rehospitalization after bypass surgery (Scheier et al., 1999).

We also attempted to distinguish the participants in the recovery trajectory from those in the resilience trajectory, and we found that the participants in the recovery trajectory had serious illness or death in near family at admission and reported other comorbid stressors at discharge (such as relational problems and social problems). There was a trend in all the scores in the continuous data that the recovery trajectory lay between the two other trajectories. According to the analyses, it also seemed as though the comorbid stressors were more important than the premorbid stressors in predicting outcomes.

We found no differences between the trajectories on any of the demographic variables, meaning that age, gender, family status, and level of education did not predict the classification into the three trajectories. Our results did not support the findings of Bonanno and colleagues, who found that resilience was most prevalent among married, younger individuals, males, and individuals with a high education level in a population of individuals exposed to a potentially traumatic event, namely the September 11, 2001, terrorist attack in New York City (Bonanno et al., 2007). The discrepancy might be explained by the dissimilar populations and the different adversities. One example is that the New York City population had a higher education level (Galea et al., 2002). The nonsignificant findings from this study may also be the result of the low statistical power because of a relatively small sample ( $N = 80$ ). By comparison, in the study by Bonanno and his colleagues, there were 2,752 participants.

The only significant injury-related variables were maximum pain experience at admission, with the participants in the distress trajectory experiencing higher levels of pain than the participants in the resilience trajectory, and cause of injury, with the participants in the resilience trajectory more often having a traumatic cause of injury than the participants in the recovery trajectory. Although not significant, the participants in the recovery trajectory had the highest injury severity, which might indicate that these individuals need a longer time for psychological adjustment because of the extensive physical trauma. Previous research has stated that injury severity does not have an impact on posttraumatic stress symptoms (Quale, Schanke, Frosli, & Roise, 2009), but in this study we examined the adaptation process with more widespread variables such as affect, anxiety, and depression in addition to PTSD symptoms.

Third, trait positive and negative affect distinguished the resilience trajectory from the recovery trajectory and the resilience trajectory from the distress trajectory. This means that the individuals' reports of their affect or emotions preinjury predict the outcome course of the adjustment postinjury. The influence of positive affect and negative affect on outcome is supported by other studies that have found that individuals with high positive affect are more likely to participate in social activities (Ryff & Singer, 1998) and successfully cope with stressful situations (Folkman, 1997). Individuals with high negative affect are found to be more likely to be depressed or anxious or to report additional health complaints (Watson, Clark, & Carey, 1988a).

### Limitations and Strengths

Because of the limited literature on trajectories of resilience in adults and the limited knowledge of resilience in rehabilitation settings, we met some methodological challenges in the operationalization of the trajectories. Using both presence and absence of psychopathology such as anxiety and depression, together with state positive affect, complicated the operationalization. Rather than measuring the severity of psychopathology, we only measured the presence of each symptom. Our study would be strengthened if we additionally identified those with a few symptoms of psychological distress but who are functioning well, because this is also regarded as a sign of resilience (Hobfoll et al., 2009). Another point for further discussion is whether resilience can be defined as the absence of psychopathology. Is resilience the opposite of psychopathology, or the opposite of vulnerability? Bonanno (2004) claimed that resilience is more than the simple absence of psychopathology, and there are multiple routes to good mental health, of which resilience is just one (Bonanno, 2004). We complemented the operationalization by adding state positive and negative affect, which in turn resulted in the more complicated operationalization. At this point in time, a "gold standard" for how resilience is defined does not exist. This leads to nuances in how each researcher defines the concept in the field of psychological research and makes resilience a difficult construct to quantify. In future studies, we will use an instrument developed to directly measure the construct of resilience, the Resilience Scale for Adults (Friborg, Hjemdal, Rosenvinge, & Martinussen, 2003), to see whether this gives us an even better grasp of the construct in relation to individuals with a severe injury.

Additional work on at-risk populations' achievement of positive outcomes has been called for (Luthar et al., 2000), also within the field of rehabilitation psychology (White et al., 2008). Thus, this study has expanded our knowledge of resilience in rehabilitation settings with empirical data. As far as we know, this is the first longitudinal study of resilience in the field of rehabilitation, and no previous studies have examined trajectories of adaptation, with respect to resilience, during rehabilitation. Cross-sectional studies do not display the process of resilience and cannot distinguish a resilient adaptation from a recovery trajectory, which might be important in a rehabilitation setting because of the major physical challenges the individual must overcome. Because the focus in rehabilitation psychology research has mainly been to identify risk factors and vulnerabilities, this quantification of the reality that most individuals who acquire a severe physical injury adjust to

their circumstances reasonably well is an important contribution to the field.

### Resilience-Based Interventions

It is essential that rehabilitation psychologists identify, enhance, and encourage reliance on each severely injured individual's strengths, thereby maximizing psychological and physical recovery (Dunn & Dougherty, 2005). Individuals are able to learn and demonstrate resilience even during and after extremely traumatic events (Luthar et al., 2000), and both significant others and psychologists need to understand this. Resilience-based interventions prompt helping professionals to search for individual strengths in clients and to nurture them. Because the goal of the rehabilitation psychologist is to help individuals learn to cope and adjust after severe illness or injury, resilience-based interventions seem to have obvious applications for the field (White et al., 2008).

Resilience-based interventions emphasize that resilience is ordinary, not extraordinary; that being resilient does not mean that a person does not experience difficulties or distress; that resilience is not a trait that individuals either have or do not have; and that anyone can learn and develop resilient behaviors, thoughts, and actions (American Psychological Association Help Center, 2004). By developing resilience skills (e.g., social skills, self-competence) through therapy or education, individuals will have a greater repertoire of skills to help them adapt to adversity. One way for rehabilitation psychologists to develop resilience skills in individuals with severe injuries could be by using the framework of the conception of the good life after disability presented by Dunn and Brody (2008). They argued that a resilient adaptation is accessible if individuals living with a severe injury are willing to make certain choices and take certain actions, both behavioral and cognitive, that may enhance their daily living. Choices and actions are illustrated within three defining areas: making connections with others, developing positive traits, and enacting life regulation qualities. This framework could be a nice starting point for introducing resilience-based interventions in rehabilitation settings.

There seems to be a common tendency to interpret resilient adaptations to loss or potentially traumatic events as "denial" or a pathological refusal to experience pain (Mancini & Bonanno, 2006). If we turn to the insider–outsider distinction, this tendency is probably a result of the outsiders' difficulties with accepting that many individuals are able to cope well with even highly traumatic events or tragic losses, so they expect pathological reactions to arise later. However, the outsider's perspective is not supported in research. The now classic work by Wortman and Silver (1989) stated that many individuals do remain psychologically healthy after a traumatic event and that not all individuals have to experience grief and psychological disturbance to avoid a pathological or a delayed pathological reaction. According to research done by Shelley Taylor and her colleagues (Taylor, 1983; Taylor, Kemeny, Reed, Bower, & Gruenewald, 2000), realistic expectations about the specific challenge and the future are not associated with psychological health. However, positive illusions and unrealistic optimistic beliefs, which may be perceived as and labeled *denial* by outsiders, are health protective and associated with good adaptation to adversity. In our study population, no one showed only delayed reactions. Thus, we conclude, with support from the research mentioned earlier, that resilience might be considered as

a common and natural response to adjusting to a severe physical injury and that the absence of psychopathology and the continued ability to function adequately does not reflect denial but rather an inherent and adaptive resilient coping. This information is helpful news for individuals facing a severe physical injury, and it should be included in psychoeducative programs. These individuals should be reassured that resilience as a response is common despite the physical and emotional challenges and that delayed reactions are not to be expected.

### Positive Psychology and Rehabilitation

Our study has clear roots in the fast-growing field of positive psychology because enhancing resilience seems to be an underlying theme in clinical positive psychological work. Positive psychology is the science of understanding human strengths and the practice of promoting these strengths to help individuals cope psychologically and physically (Lopez & Snyder, 2009; Seligman & Csikszentmihalyi, 2000). Positive psychology focuses on identifying the strengths of an individual when faced with adversity rather than his or her weaknesses (e.g., depression, anxiety). A positive rehabilitation psychologist should do more than focus on treatment issues or adaptation to disability; he or she must capitalize on the individual's psychosocial strengths to maintain or enhance psychological and physical well-being and to prevent pathology (Dunn & Dougherty, 2005).

Future longitudinal studies should examine whether the adaptation trajectories change in prevalence when people leave inpatient rehabilitation and return to living in the community. The transition from the rehabilitation hospital to the home setting is one of the most challenging periods for the newly injured individual. Future studies with this study's population should aim to examine the relationship between resilience and quality of life and the operation between personality variables, coping style, and secondary complications after rehabilitation.

As rehabilitation researchers, we must aim at a more positive focus and learn more about positive adjustment, happiness, well-being, and positive growth after a person acquires a severe injury. We can help both injured and noninjured individuals to see that such life events do not need to be devastating and that the future can bring both hope and quality. We might then start to challenge the cultural assumptions and the prejudice toward individuals with disabilities to enhance hope and quality of life.

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