Disability After Injury: The Cumulative Burden of Physical and Mental Health

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ABSTRACT

Context: Injury is one of the leading contributors to the global burden of disease. The factors that drive long-term disability after injury are poorly understood.

Objective: The main aim of the study was to model the direct and indirect pathways to long-term disability after injury. Specifically, the relationships between 3 groups of variables and long-term disability were examined over time. These included physical factors (including injury characteristics and premorbid disability), pain severity (including pain at 1 week and 12 months), and psychiatric symptoms (including psychiatric history and posttraumatic stress, depression, and anxiety symptoms at 1 week and 12 months).

Design, Setting, and Participants: A multisite, longitudinal cohort study of 715 randomly selected injury patients (from April 2004 to February 2006). Participants were assessed just prior to discharge (mean = 7.0 days, SD = 7.8 days) and reassessed at 12 months postinjury. Injury patients who experienced moderate/severe traumatic brain injury and spinal cord injury were excluded from the study.

Main Outcome Measure: The World Health Organization Disability Assessment Schedule 2.0 was used to assess disability at 12 months after injury.

Results: Disability at 12 months was up to 4 times greater than community norms, across all age groups. The development and maintenance of long-term disability occurred through a complex interaction of physical factors, pain severity across time, and psychiatric symptoms across time. While both physical factors and pain severity contributed significantly to 12-month disability (pain at 1 week: total effect [TE] = 0.2, standard error [SE] < 0.1; pain at 12 months: TE = 0.3, SE < 0.1; injury characteristics: TE = 0.3, SE < 0.1), the total effects of psychiatric symptoms were substantial (psychiatric symptoms 1 week: TE = 0.30, SE < 0.1; psychiatric symptoms 12 months: TE = 0.71, SE < 0.1). Taken together, psychiatric symptoms accounted for the largest proportion of the variance in disability at 12 months.

Conclusions: While the physical and pain consequences of injury contribute significantly to enduring disability after injury, psychiatric symptoms play a greater role. Early interventions targeting psychiatric symptoms may play an important role in improving functional outcomes after injury.

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Injury contributes to approximately 12% of the world's burden of disease as measured by disability-adjusted life-years.[1] It is estimated that injuries will account for 1 in 5 healthy life-years lost worldwide by 2020.[1] Disability is commonly defined as the inability to conduct activities at a level considered normal and may occur in a range of domains such as self care, employment, and participation in society.[2] There is also ample evidence that injury results in the new onset of a range of psychiatric disorders.[3,4] For example, a national study of 29,371 injury patients recruited from 69 trauma services found that 23% had developed posttraumatic stress disorder (PTSD) by 12 months postinjury.[5] It is important therefore to identify more clearly the relative contributions made by psychological and physical factors in determining disability after injury so that preventive strategies and interventions can be more accurately targeted to the specific needs of survivors.

The nature and severity of the physical injury have been the singular focus of most literature examining levels of consequent disability.[6] As an indication of this tendency, the Global Burden of Disease Study estimates disability solely on the basis of various types of physical injury (eg, severe chest injury).[7] Furthermore, much of the disability literature has focused on specific injuries such as spinal cord[8] or traumatic brain injuries.[9] At the same time, there is evidence that factors other than the injury itself contribute to long-term disability, including premorbid physical functioning and the level of acute pain postinjury.[10,11] Furthermore, there is a growing literature examining the impact of psychological factors on disability after injury. For example, in a national cross sectional US injury study, Zatzick and colleagues[12] found that PTSD and depression were both independently associated with lower functional outcomes including return to work. Furthermore, the level of psychological distress postinjury has been shown to predict overall recovery and later disability.[10,13–15]

It is well recognized that the physical and psychiatric sequelae of injury are not independent. Complex interactions occur between the injury itself, pain, and mental health in the many pathways leading to disability.[16–18] Although past research has investigated some of these contributors to disability it has mostly focused on direct effects, and there is scant quantitative assessment of the relative contributions made by both direct and indirect pathways. Understanding how these risk factors interact to drive long-term disability is essential in developing comprehensive injury management systems for injury survivors.

The first aim of this longitudinal study was to document the level of disability experienced by a large cohort of trauma service patients 12 months postinjury. The second aim of the study was to apply structural equation modeling to examine how

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Clinical Points

- Because injury is a leading contributor to the global burden of disease, understanding the factors that drive long-term disability is important.
- In a multisite longitudinal cohort study of injury patients, disability at 12 months was up to 4 times greater than community norms across all age groups. Although both physical factors and pain severity contributed significantly to 12-month disability, psychiatric symptoms played a greater role.
- Early interventions targeting psychiatric symptoms may contribute to improving functional outcomes after injury.

indices of acute (measured at 1 week) and 12-month physical injury, pain, and psychiatric symptoms interacted to drive 12-month disability. We hypothesized that premorbid disability,[10] injury characteristics,[6] psychiatric symptoms,[14] and pain[11] would have direct relationships with 12-month disability. We also wanted to examine the indirect effects that these variables had on later disability to see the relative contribution that physical, pain, and psychiatric indices made to later disability (see Figure 1 for model tested).

METHOD

Participants

Patients admitted on a weekday to 4 level 1 trauma services in Australia were recruited to the study if they were between the ages of 16 and 70 years, were proficient in English, and had an injury serious enough to require hospital admission of more than 24 hours. Patients with mild traumatic brain injury[19] were eligible to participate in the study, but those with moderate or severe traumatic brain injury were excluded. Thus, those with a loss of consciousness of more than 30 minutes, a Glasgow Coma Scale[20] score of less than 13 after 30 minutes, or posttraumatic amnesia greater than 24 hours were excluded from the study. Patients were also excluded if they were psychotic or suicidal, were non-Australian visitors, or had cognitive impairments. Those with spinal cord injuries were not admitted to study hospitals. Over a 2-year period (April 2004 to February 2006), 3,771 patients met inclusion criteria. Patients were randomly selected using an automated, random assignment procedure, stratified by length of stay. A total of 1,590 were randomly selected, and 1,166 (73%) consented to participate in the study. We had complete intake data on 1,010 participants (87%), and 715 participants (71%) completed the 12-month follow-up assessment.

The mean age of participants on admission was 39.7 years (SD = 13.7). The sample was predominantly composed of male subjects (n = 512, 71.7%). Baseline assessments were conducted just prior to discharge, which was a mean of 7.0 days (SD = 7.8) after the injury. Other descriptive data concerning the sample are found in Table 1.

Individuals who refused to participate in the current study did not differ from participators in gender, length of hospital admission, injury severity, or age. Patients who failed to complete the 12-month assessment did not differ from those who did with respect to gender, length of hospital admission, or injury severity. Noncompleters were, however, more likely to be younger (35.1 ± 12.9 vs 39.7 ± 13.7, $t_{1,162} = -5.7$, $P > .001$).

Measures

Disability. Preinjury and 12-month disability were measured using the 12-item World Health Organization Disability Assessment Schedule II (WHODAS II).[21] The WHODAS II measures activity limitations across 6 domains: (1) understanding and communication, (2) getting around, (3) self-care, (4) getting along with others, (5) household and work activities, and (6) participation in society. Items are rated on a 5-point scale. The WHODAS II has been shown to be a reliable and valid measure of disability across various patient groups.[22]

Psychiatric history. Lifetime history of major depression, dysthymia, panic disorder, social phobia, obsessive compulsive disorder, posttraumatic stress disorder, generalized anxiety disorder, alcohol abuse, and alcohol dependence was determined using the Mini-International Neuropsychiatric Interview (MINI, version 5.5).[23] The MINI is a short, structured diagnostic interview based on the *DSM-IV* and the *ICD-10* classification of mental illness. The MINI has good reliability for all diagnoses.[23]

Injury characteristics. Injury characteristics included Injury Severity Score,[24] as well as length of stay in hospital, admission to an intensive care unit (ICU), and discharge to a rehabilitation.

Posttraumatic stress symptoms. The presence and severity of posttraumatic stress symptoms were measured using the Clinician Administered PTSD Scale (CAPS)[25] in the acute setting and at 12 months postinjury. The CAPS has been shown to have excellent reliability and validity.[26] All interviews were recorded, and 5% of interviews were reassessed by blinded, independent assessors. Diagnostic consistency between assessors was 0.97 at 1 week and 1.00 at 12 months postinjury.

Anxiety and depressive symptoms. The presence and severity of anxiety and depressive symptoms were assessed using the Hospital Anxiety and Depression Scale (HADS).[27] This self-report questionnaire is suitable for use in injury populations as it does not measure the somatic symptoms of affective disturbance. In this study, we used a threshold for caseness of greater than 8 on either scale.[28] The HADS has demonstrated excellent discriminant validity and internal consistency, as well as good factor structure.[28]

Pain severity. Pain intensity was measured using a 100-mm long Visual Analog Scale (VAS).[29] The VAS is a reliable and change-sensitive measurement of subjective experience of pain.[30] A pain score of 50 mm or more was used as a cutoff for chronic pain at 12 months.[31]

Procedure

The study was approved by the human research ethics committee at all hospitals and at the University of

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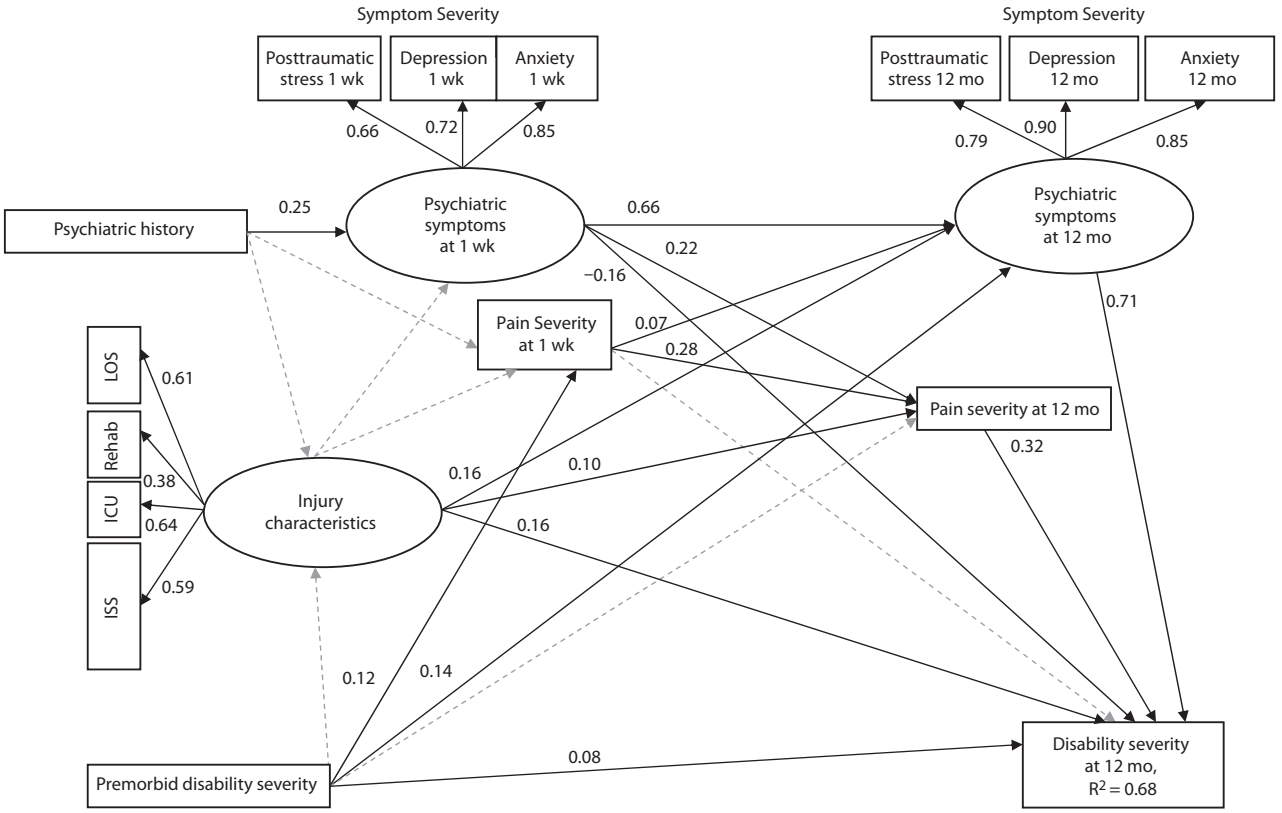
Figure 1. Direct and Indirect Effects of Preinjury Disability, Injury Characteristics, Psychiatric Symptoms, and Pain Severity on 12-Month Disability Severity[a,b]



[a]The study model consisted of 3 latent variables (ovals) and 15 observed variables (rectangles). Significant pathways are represented by black arrows.
[b]Significant direct effects are depicted by a solid black line, and nonsignificant effects are depicted by gray broken lines. The possible values of these standardized regression weights vary between 0 (no relationship) and 1 (strongest possible relationship).
Abbreviations: ICU = intensive care unit, ISS = Injury Severity Score, LOS = length of hospital admission, Rehab = discharge to rehabilitation facility.

Melbourne, Australia. After providing written informed consent, patients were assessed just prior to discharge from the acute hospital. The assessment included an interview during which the CAPS was administered and a self-report questionnaire that contained the WHODAS, VAS, and HADS. Injury data (ie, injury severity score, length of stay, ICU admission, discharge destination) were obtained from patients' medical records.

Patients were reassessed at 12 months. Participants were sent self-report questionnaires that contained the WHODAS, VAS, and HADS, which they returned in a replied paid envelope. The CAPS was administered by telephone interview, a reliable way of conducting the assessment.[32]

Statistical Analysis

Means, standard deviations, and frequencies were calculated using PASW 18.0 for Windows (SPSS Inc, Chicago, Illinois) to identify the characteristics of the population and explore the prevalence rates of anxiety, depression, PTSD, and disability. Preinjury and 12-month disability scores were compared to Australian norms using *t* tests.

Structural equation modeling was used to construct a model that could examine the strength of pathways between variables of interest and disability at 12 months. Modeling was conducted using MPlus Version 6.1 (Muthén & Muthén, Los Angeles, California), which is able to use all available data because it has sophisticated routines for taking account of missing data. Structural equation modeling is a multivariate technique that combines aspects of multiple regression and factor analysis to simultaneously estimate the strengths of the relationship between variables.[33] The specific advantage of this approach is that MPlus is able to produce standardized estimates for both direct and indirect relationship between variables and, therefore, the total effects a variable has on the outcome variable.

The model tested in this study is illustrated in Figure 1. The model consisted of 3 latent variables and 15 observed variables. Latent variables are used when a variable is composed of multiple components, while the observed variables are based on the single measure of these indices. In the current study, the latent variable, "injury characteristics," was derived from the Injury Severity Score, ICU admission (yes/no), discharge to a rehabilitation facility (yes/no), and length of stay in hospital (note: injury type [including mild traumatic brain injury] and mechanism of injury were included in the original model but were removed because they did not contribute significantly to the final model). The latent variables, "psychiatric symptoms at 1

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Table 1. Characteristics of a Sample of Injury Patients Including Preinjury Disability, Psychiatric History, Injury Characteristics, Psychiatric Symptoms at 1 Week and 12 Months, and 12-Month Disability (N = 715)

Variable	Value
Preinjury disability	
WHO DAS II score, mean (SD)	7.1 (11.3)
Psychiatric history	
MINI score, %	60.9
Injury characteristics	
ISS, mean (SD)	11.2 (8.2)
ICU admission, %	16.1
Length of stay, mean (SD), d	12.4 (12.2)
Discharge to rehabilitation facility, %	21.0
Mechanism of injury, %	
Motor vehicle accident	66.1
Fall	16.5
Assault	6.0
Work related injury (not described above)	4.8
Other	6.6
Type of injury, %	
Multiple	81.0
Orthopedic	84.9
Upper extremity	36.4
Lower extremity	57.1
Thoracic	26.6
Abdominal	13.3
Psychiatric symptoms at 1 wk, mean (SD)	
Clinician Administered PTSD Scale score (PTSD)	13.9 (14.0)
HADS score (depression)	4.7 (3.9)
HADS score (anxiety)	4.9 (3.8)
VAS score (pain)	3.4 (2.6)
Psychiatric symptoms at 12 mo, mean (SD)	
Clinician Administered PTSD Scale score (PTSD)	16.0 (19.7)
HADS score (depression)	4.4 (4.1)
HADS score (anxiety)	6.0 (4.4)
VAS score (pain)	2.4 (2.4)
Disability at 12 mo	
WHO DAS II score, mean (SD)	21.6 (19.7)

Abbreviations: HADS = Hospital Anxiety and Depression Scale, ICU = intensive care unit, ISS = Injury Severity Score, MINI = Mini International Neuropsychiatric Interview, PTSD = posttraumatic stress disorder, VAS = Visual Analog Scale, WHO DAS II = 12-item World Health Organization Disability Assessment Schedule II.

week/12 months," were created from the same variables, namely posttraumatic stress severity, depression severity, and anxiety severity at the respective time points. The observed variables of particular interest in the model were "premorbid disability severity," "psychiatric history," "pain severity at 1 week," "pain severity at 12 months," and "disability severity at 12 months." In the model, the relationship between variables is represented by an arrow. The strength of the relationship is given by the standardized regression weight (β weight). In Figure 1, significant direct effects are depicted by solid black lines, and nonsignificant effects are depicted by gray broken lines. The possible values of these standardized regression weights vary between 0 (no relationship) and 1 (strongest possible relationship).

RESULTS

Psychiatric Disorder

Descriptive data for the sample are found in Table 1. In the first week postinjury, 17.9% (n = 128) crossed the HADS depression threshold, and 17.2% (n = 123) crossed the anxiety threshold. The rate of acute PTSD (not taking into account the time criterion of 1 month for a full diagnosis) was 2.5% (n = 18). At 12 months, 17.8% (n = 127) were above threshold for HADS depression, and 28.7% (n = 205) were above threshold for HADS anxiety. A total of 7.7% (n = 55) of participants had a current diagnosis of PTSD at 12 months.

Table 2. Preinjury Disability and 12-Month Disability After Injury for a Sample of Injury Patients (N = 715) and Australian Disability Norms as Measured by WHO DAS II[a,b]

Age Group, y	Preinjury Patients, n	Preinjury Disability, Mean (SD)	12-Month Disability, Mean (SD)	Australian Norms, Mean (SD)
16–24	127	2.5 (4.3)	5.2 (6.2)*	2.3 (4.2)
25–34	129	1.8 (3.2)	7.4 (7.7)*	2.5 (5.1)
35–44	154	2.7 (4.2)	9.3 (7.7)*	2.8 (4.9)
45–54	140	2.6 (4.2)	8.8 (7.1)*	3.2 (5.5)
55–64	90	3.1 (4.2)	8.0 (7.1)*	3.4 (5.7)
65–74	22	3.9 (4.8)	6.5 (6.4)*	3.7 (7.1)

[a]There were no significant differences between preinjury disability scores and Australian norms.
[b]To enable comparisons with published Australian norms, we used the sum scoring method[34] (range, 0 [no disability] to 48 [complete disability]) rather than the weighted percentage scoring method[20] used throughout the rest of the article.
*Significant at $P < .001$.
Abbreviation: WHO DAS II = 12-item World Health Organization Disability Assessment Schedule II.

Disability

Table 2 displays the levels of preinjury and 12-month disability after injury, stratified into age bands. There were no significant differences between the levels of disability preinjury relative to community norms. At 12 months after injury, however, each age group in our sample reported significantly higher levels of disability relative to community norms (all P values < .001).

Pain Intensity

Just prior to discharge, 27.6% (n = 197) of participants scored above threshold (50 mm or more on the VAS scale) on pain intensity. At 12 months postinjury, 19.2% (n = 137) scored over this threshold and would therefore meet criteria for chronic pain.

Determinants of Outcome After Injury

Figure 1 shows the relationship between predictor variables and 12-month disability. The model accounted for 68% of the variance in 12-month disability ($R^2 = 0.68$). Depression, posttraumatic stress, and anxiety severity at 1 week all contributed strongly to the latent variable "psychiatric symptoms 1 week." The relationship of these symptoms at 12 months with the 12-month latent variable "psychiatric symptoms 12 months" was even stronger. This suggests that the latent variable at both time points was a strong mix of these PTSD, anxiety, and depression symptoms, with no particular set of symptoms standing out as contributing most to the latent construct. Interestingly, the variables contributing to "injury characteristics" ranged in their contribution, with "discharge to a rehabilitation facility" contributing least to this latent variable. However,

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Table 3. Standardized Total Effects[a] for Psychiatric Factors, Physical Factors, and Pain Severity in Predicting 12-Month Disability (N = 715)[b]

Factor	Total Effect (β weight)	SE
Psychiatric		
Psychiatric history	0.08*	0.02
Psychiatric symptoms 1 wk	0.30*	0.04
Psychiatric symptoms 12 mo	0.71*	0.04
Total variance in 12-mo disability accounted for: $R^2 = 0.67$, SE = 0.02, $Z = 28.56$, $P < .001$		
Pain severity		
Pain severity 1 wk	0.16*	0.03
Pain severity 12 mo	0.32*	0.03
Total variance in 12-mo disability accounted for: $R^2 = 0.39$, SE = 0.03, $Z = 14.11$, $P < .001$		
Physical		
Premorbid disability	0.22*	0.04
Injury characteristics	0.32*	0.05
Total variance in 12-mo disability accounted for: $R^2 = 0.14$, SE = 0.03, $Z = 4.96$, $P < .001$		

[a]Total effects are the summation of direct effects and indirect effects.
[b]All coefficients are standardized.
*$P < .001$.

its contribution was significant, so it was kept in the equation.

The latent variable "injury characteristics" contributed to the development of 12-month disability via significant direct (β = 0.16, $P < .001$) and indirect pathways (the latter via "pain at 12 months" [β = 0.03, $P = .03$] and "psychiatric symptoms at 12 months" [β = 0.11, $P < .001$]). "Pain at 1 week" also contributed to the development of disability at 12 months via an indirect pathway through "pain at 12 months" (β = 0.09, $P < .001$) and "psychiatric symptoms at 12 months" (β = 0.05, $P = .04$). "Psychiatric symptoms at 1 week" had a direct relationship with 12-month disability (β = –0.16, $P < .001$) and significant indirect relationships through "pain at 12 months" (β = 0.07, $P < .001$) and "psychiatric symptoms at 12 months" (β = 0.39, $P < .001$).

Table 3 presents the total effects of physical and psychiatric factors as well as pain severity in relation to 12-month disability. The amount of variance in 12-month disability accounted for by psychiatric factors ($R^2 = 0.67$) was far greater than that accounted for by physical factors ($R^2 = 0.14$) or pain severity ($R^2 = 0.39$)

Health Service Use

It is interesting to note that the level of disability at 12 months associated with psychiatric factors was despite a large proportion of participants receiving mental health related services. At 12 months, 16.2% of participants (n = 116) were receiving medication for "stress, depression, or sleep problems." Thirty percent of the whole sample (n = 213) were taking pain medication. In terms of health care services over the course of 12 months postinjury, 13% (n = 93) had seen a psychiatrist, 21% (n = 150) had seen a psychologist, and 14% (n = 100) had seen other mental health workers.

DISCUSSION

This study is the largest cohort study to investigate the pathways (both direct and indirect) to long-term disability after injury. The study focused not only on the physical contributors to later disability but also on the contribution made by pain severity and psychiatric symptoms over time. Furthermore, the use of sophisticated modeling allowed for exploration of multiple pathways to disability, and how various factors independently or via interactions drove disability over time. This study highlights that the development and maintenance of long-term disability after injury results from a complex array of factors.

Our findings demonstrated a high level of disability at 12 months postinjury even after the exclusion of patients with moderate-severe head injury and spinal cord injury. Disability levels were between 3 and 4 times greater than expected according to community norms across all age bands. This is particularly important, as nearly 40% of our sample was under 35 years old. Given that these young adults are early on their occupational paths, the implications of high levels of disability among this group are considerable. Disability among young people has been associated with difficulties with employment[35] and ongoing mental health problems.[36] This pattern points to a potentially broad range of adverse consequences for injury patients including economic and social disadvantages.

The total contribution to later disability made by physical factors and pain severity was substantial, each contributing to the variance in 12-month disability. It was, however, psychiatric factors that were the major contributor to 12-month disability, accounting for nearly double that accounted for by physical factors or pain severity. This relationship, between psychiatric symptoms and later disability, was complex. Early psychiatric symptoms appeared to drive later disability primarily via their effects on 12-month pain severity and 12-month psychiatric symptoms. This finding is contrary to previous research, which has shown a direct relationship between early psychiatric symptoms and later disability.[37] The discrepancy may be because our study considered the impact of chronic mental health problems rather than just the acute symptoms. Interestingly, our study showed a negative, direct relationship between acute psychiatric symptoms and later disability, in contrast to the positive, indirect relationship through psychiatric symptoms at 12 months. This could be understood in that the majority of those with high psychiatric symptoms at 1 week went on to have high symptoms at 12 months, which in turn increased their level of long-term disability. A smaller group of those with high psychiatric symptoms at 1 week went on to have lower levels of disability at 12 months. It is possible that this group represents the patients who sought treatment for their psychiatric symptoms and improved, which then had consequences for their later disability levels.

Our finding that psychiatric symptoms are an important driver of long-term disability in injury patients is consistent with the literature showing that PTSD symptoms have a detrimental effect on physical health and functioning.[38–40] Building on this work, Ramchand and collegues[41]

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conducted a longitudinal study with injury patients and showed that the relationship between posttraumatic stress symptoms and physical functioning is a reciprocal one, with acute posttraumatic stress symptoms playing a particularly important role in driving poor physical functioning. Our study extends these findings by showing that in addition to posttraumatic stress symptoms, depression and anxiety symptoms also play an important role in determining physical functioning after injury. One theoretical explanation for the relationship between acute psychiatric symptoms and later chronic psychiatric symptoms/pain is that of sensitization.[42] Sensitization refers to the increasing biological and psychological responsivity over time due to repeated exposure to stressful stimuli that potentiate the amplitude of reactivity.[43,44] For example, individuals who develop PTSD develop a generalized overreactivity to a range of triggers in their environment that remind them of the traumatic event. This cycle of reactivity to an increasing range of cues serves to further reinforce their distress response.[42] Our results may suggest that acute symptoms sensitize vulnerable individuals in a way that sees a progression of symptoms over time, including pain, that in turn drive higher levels of disability.

In our study, pain severity demonstrated complex associations with psychological distress and disability. Although acute pain did not have a direct relationship with later disability, it had a significant effect on 12-month psychiatric symptoms, which in turn drove disability. There is an extensive body of literature linking pain to mental health symptoms. One pathway may be through PTSD symptoms,[18] in which early pain symptoms provoke memories of the traumatic event, increasing arousal and driving avoidance behaviors. Avoidance of pain may have significant implications for activity and physical therapy treatment compliance, resulting in increased disability. Acute pain severity played an important role in driving chronic pain severity, which in turn impacted significantly on disability. This, again, might represent a sensitization process.[45]

The model suggests that the persistence of psychiatric symptoms from the acute period through to 12 months is a major driver of disability at 12 months. These findings point to the imperative to ensure that persons with high levels of psychiatric symptoms and/or pain in the acute phase need identification and intervention where necessary. Studies suggest that stepped and collaborative care models are effective in preventing/treating early psychiatric symptoms after injury,[46,47] although further large scale investigations are required to inform policy mandates.

The limitations of the study require consideration. Many of our measures were self-report based, including the disability outcome measure. Future studies would benefit from using clinician-administered assessments, including the measure of disability or other objective evidence such as return to work. Second, the majority of participants in the study were survivors of a motor vehicle accident, and it is not clear how well the findings generalize to other injury groups. Furthermore, there may have been other unmeasured variables (such as repeat injury) that contributed to disability beyond those included in the model. Finally, this study utilized a continuous measure of disability. A continuous measure best suited the aims of the study; however, we recognize that there may have been relative policy advantages if we had used a dichotomous variable.[12]

The Global Burden of Disease Study showed that neuropsychiatric disorders and injuries are the major cause of lost years of health life.[7] This study brings together these 2 domains by exploring their interaction over the course of 12 months. The findings confirm that psychiatric disorder attributable to injury is a major contributor to disability over time, with pain interacting with the former in driving this outcome. Future studies that aim to refine screening and early interventions that target mental health care have the potential to improve the quality of care for injury patients. These studies will help inform future policy efforts to substantially diminish functional impairments following injury.

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