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ORIGINAL REPORT

FACTORS ASSOCIATED WITH RECOVERY EXPECTATIONS FOLLOWING VEHICLE COLLISION: A POPULATION-BASED STUDY

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Objective: **Positive expectations predict better outcomes for a variety of health conditions including recovery from whiplash-associated disorders, but we know little about which individuals have negative expectations, and therefore may be at risk for poor whiplash-associated disorders recovery.**

Methods: **We assessed expectations for global recovery in a population-based cohort of 6015 individuals with traffic-related whiplash-associated disorders. We used multinomial logistic regression analysis to model factors associated with expecting to recover slowly, or not recover at all, as opposed to expecting to recover quickly.**

Results: **Depressive symptomatology, lower education, lower income, male gender, younger age, being a passenger in the vehicle, history of neck pain, and greater initial pain (greater percentage of body in pain, greater intensity of neck pain and presence of low back and/or headache pain) were associated with poor expectations for recovery.**

Conclusion: **A number of demographic, socioeconomic and injury-related factors were associated with expectations for recovery in whiplash-associated disorders. Two of the strongest associated factors were depressive symptomatology and initial neck pain intensity. These results support using a biopsychosocial approach to evaluate expectancies and their influence on important health outcomes.**

Key words: expectations, recovery, whiplash-associated disorders.

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INTRODUCTION

Whiplash-associated disorders (WAD) are a common problem, estimated at 300–600 cases per 100,000 population per year in North America and western Europe (1). They are costly to insurance/medical systems, and may result in long-term disability in the injured person, including increased risk of future neck pain and other health complaints (2). Clinically, there is uncertainty about how to manage these injuries, and the scale and complexity of the whiplash dilemma makes whiplash injuries an important public health concern. Although many different treatment modalities have been studied, these treatment effects in WAD are modest at best, and frequently short-lived (3). This suggests that other types of interventions may be required to reduce disability and improve outcomes. As such, researchers and clinicians should focus attention on factors that have demonstrated independent associations with patient recovery.

One already demonstrated and clinically meaningful approach is to focus on patients' expectations about their own recovery. Studies have consistently shown that, for a wide variety of medical conditions, positive expectations for recovery are positively associated with better clinical outcomes, from increased success of rehabilitation and to reduced levels of post-operative pain (4). In addition, 2 recent studies have identified recovery expectations as important in WAD recovery (5, 6). In fact, in a Canadian study, those with WAD having positive expectations recovered more than 3 times faster than those who expected never to get better (5). A Swedish study found a dose-response relationship between recovery expectations and disability 6 months after the crash (6). After controlling for severity of physical and mental symptoms, individuals who expected they would not make a full recovery were over 4 times more likely to have a high disability; those who self-rated as having "intermediate" recovery expectations were over two times more likely to have high disability. Both groups were compared to those stating they were very likely to make a full recovery (6). Given the substantial effect size and independent relationship demonstrated by recovery expectation on recovery in both WAD population studies, assessing patients' expectations early in the injury experience appears useful, particularly in identifying those who have the greatest concerns regarding their recovery (7), thus helping reduce the burden of WAD in this vulnerable group. Moreover, such findings lead to the prospect that modifying a persons' expectation for WAD recovery will speed their actual recovery and thus decrease the burden of impairment and disability.

However, very little is known about how individuals formulate health expectations. Understanding how they are formed is a crucial step in understanding how they can be modified. Janzen et al. (8) have recently offered a conceptual model describing how health expectations are formulated, and have

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performed some validation work with expectations in Alzheimer's disease. This model suggests that expectations are formulated through a number of interacting processes, including prior knowledge, cognitive processing, and outcome evaluation. The model acknowledges that expectations are socially and culturally contingent, governed by one's understanding of the world, and are contextually specific; principles that are in keeping with the biopsychosocial model of health. While the model appears to provide a basis for study of expectation for soft tissue injuries, there has not been any validation of it with a WAD population. Knowledge of how expectations are formulated in a WAD population would prove useful for interventional studies aimed at modifying expectations and further facilitate refinement of Janzen's conceptual model specifically for soft tissue injuries.

As an initial step in assessing the adequacy of the model in explaining how expectations are formed for recovery of such injuries, we aimed to explore what personal and injury-related factors are associated with having positive or negative expectations for WAD recovery. Our hypothesis was that expectations would be associated with a variety of demographic factors, factors related to the crash itself (such as post-crash pain and symptoms) and psychological factors, such as depressive symptomatology.

METHODS

The study included all eligible traffic-injury claimants in Saskatchewan, Canada. Complete ascertainment of claimants was possible because Saskatchewan has a single traffic-injury insurer, Saskatchewan Government Insurance (SGI); and persons seeking healthcare for traffic injuries are required to make a claim with SGI. At the time of this study, the insurance system was a "no fault" system, meaning that insurance benefits (e.g. payment for treatment, income replacement benefits, etc.) are available to the injured individual regardless of fault for the collision. Thus, the study was able to capture all individuals involved in a collision requiring treatment, income replacement, or other benefits.

We included all eligible injury insurance claimants who completed the Application for Benefits form, forming the baseline questionnaire, within 42 days of the collision. This questionnaire provided information on demographic and socioeconomic characteristics, data on the crash, injury-related symptoms, work status, depressive symptomatology, and expectations for recovery. All data used in this cross-sectional study are self-reports from this baseline questionnaire.

Inclusion and exclusion criteria

Inclusion criteria to the study were as follows: Saskatchewan residents aged 18 years and over, whose traffic injury was sustained between 1 December 1997 and 30 November 1999 and who had made a claim for WAD within 42 days of the collision. Our operational definition of WAD was being injured in a motor vehicle (rather than as a pedestrian or a bicyclist) and reporting neck pain after the collision. We excluded those who were hospitalized for more than 2 days because this suggests injuries of a more serious nature. This cohort did not include persons who sustained a traffic injury at work because these individuals claim under a different insurance system. The cohort is described in more detail in previous publications (9, 10).

Source of data

All data were self-reported, and information from the insurance application formed our baseline data. This claim application was a paper-and-pencil questionnaire, which included items on pre-injury health, demographic and socio-economic characteristics, post-collision pain intensity and location, post-injury symptoms and depressive symptomatology.

Expectations for recovery

The dependent variable of interest is self-reported expectations for global recovery from WAD. This was assessed in the baseline questionnaire by asking, "Do you think your injury will…": the response options were "get better soon", "get better slowly", "never get better", and "don't know". The use of a single question to assess expectation for global recovery have been reported in previous studies of expectation, and self-rated global recovery, recovery of neck pain intensity, and improvements in self-rated disability following whiplash (1, 5, 7, 11–13). Such a strategy also adheres to concepts arising out of qualitative work (14).

Potential explanatory factors

Factors potentially associated with early expectations for recovery included the following, which were all measured at baseline: demographic and socioeconomic factors (age, sex, family income, education), crash-related factors (position within vehicle at time of impact, direction of collision, time from collision to completing claim form), pain-related factors (percentage of body pain area, current neck pain intensity, back pain intensity and headache intensity at the time of completing the questionnaire), previous history of neck claim with SGI or elsewhere, prior history of musculoskeletal problems, and depressive symptomatology.

Current pain intensity was measured using an 11-point numerical analog scale (responses ranging from 0 or no pain to 10 or pain as bad as could be). Pain location and extent were assessed using a pain drawing (an anatomical diagram of anterior and posterior views of the body), on which the individual shaded-in painful areas. Percentage of body in pain was then calculated from this. Both methods have been validated and accepted as useful tools for pain measurement (15, 16).

Depressive symptomatology was assessed using the Center for Epidemiologic Studies Depression Scale (CES-D) (17). This questionnaire is a valid and frequently used measure of depressive symptomatology (9, 18, 19). Pre-collision health was measured using one item from the Short Form 36 (SF-36): "How was your health the month before the accident?" with the response options being: "excellent; very good; good; fair; poor" (20). Prior history of musculoskeletal pain was ascertained by asking if claimants had muscle, bone or joint problems in the 6 months before the collision. Answering "yes" prompted further questioning whether these problems affected health "not at all; mild; moderate; severe."

Socioeconomic and demographic variables were assessed by self-report of the applicant. Questions regarding variables such as work and crash-related factors were deemed to have appropriate face validity to capture the particular domain of interest. The use of a single question to assess these constructs has been reported in previous studies (5, 10, 21).

Statistical analysis

Polytomous logistic regression was used to assess the associations between the potential explanatory factors and expectations for global recovery. There were 4 response categories (expect to get better soon, expect to get better slowly, never get better, don't know), and expecting to get better soon was our reference category. Findings were reported as odds ratios with their 95% confidence intervals.

Variables assessed for their crude relationship with global recovery expectations included: age group; marital status (married/common-law or not married/common-law); highest level of education (high school, less than high school and greater than high school); income (3 income categories); gender; health month prior to collision (good to excellent or fair to poor); presence of depressive symptomatology;

presence of collision-related low back or headache pain (no or mild lower back or headache pain, as determined by a pain intensity rating of <3, vs moderate to severe pain, as indicated by either low back or headache pain rated as 3 or more on the 11-point numeric rating scale (NRS)) (22); prior history of claim for neck injury with SGI or Workers' Compensation Board (WCB); self-assessed presence and severity musculoskeletal problems in the 6 months preceding the traffic injury; position in vehicle (driver or passenger); direction of impact; percentage of body in pain; neck pain intensity; and number of days from collision to completion of claim form. The latter factor was in-

Table I. *Characteristics of cohort stratified by recovery expectation at baseline (post-injury) (n = 6015)**

Factor	Get better soon (*n* = 1470)	Get better slowly (*n* = 2519)	Never get better (*n* = 112)	Do not know (*n* = 1914)
Age, years, *n* (%)				
<24	258 (17.6)	572 (22.7)	30 (26.8)	375 (19.6)
24–<30	181 (12.3)	373 (14.8)	16 (14.3)	284 (14.8)
30–<40	390 (26.5)	554 (22.0)	29 (25.9)	417 (21.8)
40–<50	351 (23.9)	465 (18.5)	12 (10.7)	377 (19.7)
≥50	290 (19.7)	555 (22.0)	25 (22.3)	461 (24.1)
Marital status, *n* (%)				
Not married/common-law	617 (42.0)	1171 (46.5)	77 (68.8)	913 (47.7)
Married/common-law	853 (58.0)	1347 (53.5)	35 (31.2)	1000 (52.3)
Dependents, *n* (%)				
0	851 (57.9)	1466 (58.2)	73 (65.2)	1122 (58.7)
1–2	451 (30.7)	764 (30.3)	28 (25.0)	572 (29.9)
≥3	168 (11.4)	289 (11.5)	11 (9.8)	219 (11.4)
Education, *n* (%)				
Less than high school	224 (15.3)	557 (22.1)	35 (31.2)	534 (28.0)
High school graduate	345 (23.5)	596 (23.7)	18 (16.1)	503 (26.4)
More than high school	899 (61.2)	1363 (54.2)	59 (57.2)	870 (45.6)
Income, $ Cdn, *n* (%)				
0–20,000	352 (24.5)	792 (32.2)	49 (45.4)	648 (35.1)
20,001–40,000	406 (28.3)	770 (31.3)	36 (33.3)	615 (33.3)
>40,000	677 (47.2)	895 (36.4)	23 (21.3)	582 (31.5)
Gender, *n* (%)				
Male	486 (33.1)	818 (32.5)	42 (37.5)	695 (36.3)
Female	984 (66.9)	1701 (67.5)	70 (62.5)	1219 (63.7)
Position in vehicle, *n* (%)				
Driver	1197 (81.4)	1888 (75.0)	77 (68.8)	1412 (73.8)
Passenger	273 (18.6)	631 (25.0)	35 (31.2)	502 (26.2)
Direction of impact, *n* (%)				
Front	381 (26.1)	728 (29.1)	36 (32.5)	534 (28.1)
Driver side	207 (14.2)	389 (15.6)	14 (12.5)	274 (14.4)
Passenger side	162 (11.1)	333 (13.3)	14 (12.5)	211 (11.1)
Other	62 (4.2)	141 (5.6)	5 (4.5)	87 (4.6)
Rear	650 (44.5)	910 (36.4)	43 (38.4)	795 (41.8)
Health one month prior, *n* (%)				
Good to excellent health	1398 (95.1)	2385 (94.7)	91 (82.0)	1741 (91.0)
Fair or poor health	72 (4.90)	134 (5.30)	20 (18.0)	173 (9.00)
Baseline depressive symptoms, *n* (%)†				
Yes	384 (26.7)	1136 (46.6)	78 (72.2)	1025 (55.8)
No	1055 (73.3)	1303 (53.4)	30 (27.8)	813 (44.2)
Headache or back pain, *n* (%)				
Moderate or greater pain	1026 (70.4)	2112 (84.4)	101 (91.8)	1647 (87.1)
No or mild pain	432 (29.6)	391 (15.6)	9 (8.2)	243 (12.9)
Previous neck injury, *n* (%)				
Yes	340 (23.3)	715 (28.5)	48 (43.2)	508 (26.7)
No	1126 (76.8)	1792 (71.5)	63 (56.8)	1398 (73.3)
Previous musculoskeletal problems, *n* (%)				
No to mild effect	427 (29.1)	645 (25.6)	25 (22.5)	434 (22.7)
Moderate to severe	162 (11.0)	321 (12.8)	37 (33.3)	293 (15.4)
Absent	879 (59.9)	1550 (61.6)	49 (44.1)	1181 (61.9)
Neck/shoulder pain, mean (SD)§	5.52 (2.06)	6.53 (1.94)	7.59 (1.97)	6.97 (2.04)
Percent body pain, mean (SD)‡	18.6 (13.5)	24.2 (15.6)	26.2 (14.9)	25.6 (16.8)

*There was some missing data for several factors. 193 persons did not complete the CES-D questionnaire, 171 did not answer the question about income, 83 did not report neck pain intensity, and 54 did not report on low back or headache pain.

†Yes refers to a CES-D score ≥16; no refers to a CES-D score <16.

§Neck/shoulder pain was measured on an 11-point numeric rating scale.

‡Percentage of body in pain was assessed with a pain drawing.

SD: standard deviation; CES-D: Center for Epidemiologic Studies Depression Scale.

cluded since expectations for recovery might be affected by how long after the collision the individual had completed the questionnaire.

To identify factors associated with global expectations for recovery, we first built crude (univariate) models for each of the above explanatory variables. All factors whose crude association was statistically significant at $p < 0.20$ were entered simultaneously in our final multivariable model and are reported in Tables II and III. All analyses were completed using SPSS for Windows, version 16.0 (23).

RESULTS

Of the 8634 claimants during the 2-year inception period, 6749 met the criteria for WAD and 6021 made their claim within 42 days of the injury. Of these, 6 individuals did not answer the recovery expectations question, leaving 6015 to form the study group. Median time between injury and completion of claim

Table II. *Crude odds ratios (OR) and 95% confidence intervals (95% CI) for factors associated with positive global recovery expectation*

Factor	Get better slowly¶ OR (95% CI)	Never get better¶ OR (95% CI)	Do not know¶ OR (95% CI)
Age group, years			
<24	1.16 (0.94–1.42)	1.35 (0.77–2.35)	0.91 (0.74–1.14)
24–29	1.08 (0.86–1.35)	1.03 (0.53–1.97)	0.99 (0.78–1.25)
30–39	0.74 (0.61–0.90)*	0.86 (0.50–1.50)	0.67 (0.55–0.82)*
40–49	0.69 (0.57–0.84)*	0.40 (0.20–0.80)*	0.68 (0.55–0.83)*
≥50	1.00	1.00	1.00
Marital status			
Not married/common-law	1.20 (1.06–1.37)*	3.04 (2.01–4.60)*	1.26 (1.10–1.45)*
Married/common-law	1.00	1.00	1.00
Education			
Less than high school	1.64 (1.38–1.96)*	2.38 (1.53–3.71)*	2.46 (2.05–2.95)*
High school graduate	1.14 (0.97–1.33)	0.80 (0.46–1.37)	1.50 (1.28–1.78)*
More than high school	1.00	1.00	1.00
Income, $ Cdn			
0–20,000	1.70 (1.45–2.00)*	4.10 (2.46–6.84)*	2.14 (1.81–2.54)*
20,001–40,000	1.44 (1.22–1.68)*	2.61 (1.53–4.47)*	1.76 (1.49–2.08)*
>40,000	1.00	1.00	1.00
Gender			
Male	0.97 (0.85–1.12)	1.22 (0.82–1.81)	1.15 (1.00–1.33)*
Female	1.00	1.00	1.00
Position in vehicle			
Passenger	1.47 (1.25–1.72)*	1.99 (1.31–3.04)*	1.56 (1.32–1.84)*
Driver	1.00	1.00	1.00
Direction of impact			
Front	1.37 (1.16–1.60)*	1.44 (0.90–2.26)	1.15 (0.97–1.36)
Driver side	1.34 (1.10–1.63)*	1.02 (0.55–1.91)	1.08 (0.88–1.33)
Passenger side	1.47 (1.19–1.82)*	1.31 (0.70–2.45)	1.07 (0.85–1.34)
Other	1.62 (1.19–2.23)*	1.22 (0.47–3.19)	1.15 (0.82–1.62)
Rear	1.00	1.00	1.00
Health one month prior			
Good to excellent health	0.92 (0.68–1.23)	0.23 (0.14–0.40)*	0.52 (0.39–0.69)*
Fair or poor health	1.00	1.00	1.00
Baseline depressive symptoms†			
Yes	2.40 (2.08–2.76)*	7.14 (4.61–11.1)*	3.46 (2.99–4.02)*
No	1.00	1.00	1.00
Headache or back pain			
Moderate or greater pain	2.27 (1.95–2.66)*	4.73 (2.37–9.43)*	2.85 (2.40–3.40)*
No or mild pain	1.00	1.00	1.00
Previous neck injury			
Yes	1.32 (1.14–1.53)*	2.52 (1.70–3.74)*	1.20 (1.03–1.41)*
No	1.00	1.00	1.00
Previous musculoskeletal problems			
No to mild effect	0.86 (0.74–0.99)*	1.05 (0.64–1.72)	0.76 (0.65–0.89)*
Moderate to severe	1.12 (0.91–1.38)	4.10 (2.59–6.48)*	1.35 (1.09–1.66)*
Absent	1.00	1.00	1.00
Neck pain§	1.27 (1.23–1.31)*	1.70 (1.52–1.90)*	1.42 (1.37–1.47)*
Percent body pain‡	1.03 (1.02–1.03)*	1.04 (1.03–1.05)*	1.03 (1.03–1.04)*

¶Comparison group is "get better soon".
*Denotes significant at $p < 0.05$.
†Yes refers to a CES-D score ≥16; No refers to a CES-D score <16.
§Neck/shoulder pain was measured on an 11-point numeric rating scale.
‡Percentage of body in pain was assessed with a pain drawing.
CES-D: Center for Epidemiologic Studies Depression Scale.

form was 11 days. All claimants reported neck pain (as per our inclusion criteria), and 84% and 70% reported painful neck movements and reduced neck movement, respectively.(10) In addition, the majority reported headache and/or back pain. Overall, the average headache and back pain intensity were 5.1 (standard deviation (SD) 3.3) and 3.8 (SD 3.5), respectively. Other post-crash symptoms reported by this cohort included numbness of the arms and legs (38% and 22%, respectively), dizziness (42%) and jaw pain (18%) (10). Table I describes the characteristics of the recovery expectation study sample, stratified by outcome. Most (66.3%) of the cohort felt that their symptoms would either get better soon or slowly, while 31.8% were unsure of their course of recovery and 1.9% felt that they would never get better. Both those who felt they

Table III. *Adjusted odds ratios (OR) and 95% confidence intervals (95% CI) for factors associated with positive global recovery expectation*

Factor	Get better slowly¶ OR (95% CI)	Never get better¶ OR (95% CI)	Do not know¶ OR (95% CI)
Age group, years			
<24	1.15 (0.89–1.48)	1.32 (0.66–2.64)	0.90 (0.68–1.18)
24–<30	1.04 (0.81–1.35)	1.14 (0.53–2.44)	1.07 (0.81–1.42)
30–<40	0.74 (0.59–0.92)*	1.10 (0.58–2.10)	0.74 (0.58–0.93)*
40–<50	0.73 (0.59–0.92)*	0.43 (0.19–0.95)*	0.77 (0.61–0.98)*
≥50	1.00	1.00	1.00
Marital status			
Not married/common-law	0.98 (0.82–1.17)	2.71 (1.58–4.63)*	1.10 (0.91–1.34)
Married/common-law	1.00	1.00	1.00
Education			
Less than high school	1.38 (1.12–1.70)*	1.79 (1.05–3.07)*	2.10 (1.69–2.61)*
High school graduate	1.06 (0.89–1.26)	0.82 (0.46–1.46)	1.44 (1.19–1.73)*
More than high school	1.00	1.00	1.00
Income, $ Cdn			
0–20,000	1.15 (0.93–1.41)	1.12 (0.60–2.08)	1.26 (1.00–1.57)*
20,001–40,000	1.20 (1.00–1.43)*	1.37 (0.76–2.46)	1.34 (1.10–1.62)*
>40,000	1.00	1.00	1.00
Gender			
Male	1.18 (1.01–1.38)*	1.80 (1.14–2.85)*	1.38 (1.17–1.63)*
Female	1.00	1.00	1.00
Position in vehicle			
Passenger	1.44 (1.20–1.72)*	2.14 (1.31–3.48)*	1.43 (1.18–1.73)*
Driver	1.00	1.00	1.00
Direction of impact			
Front	1.24 (1.04–1.48)*	1.15 (0.69–1.90)	0.93 (0.76–1.12)
Driver side	1.22 (0.98–1.51)	0.69 (0.34–1.41)	0.87 (0.69–1.11)
Passenger side	1.23 (0.97–1.55)	0.77 (0.37–1.57)	0.78 (0.60–1.00)
Other	1.34 (0.94–1.89)	0.86 (0.31–2.40)	0.71 (0.48–1.05)
Rear	1.00	1.00	1.00
Health one month prior			
Good to excellent health	1.18 (0.85–1.65)	0.61 (0.32–1.18)	0.75 (0.54–1.05)
Fair or poor health	1.00	1.00	1.00
Baseline depressive symptoms†			
Yes	1.75 (1.49–2.04)*	4.21 (2.60–6.82)*	2.31 (1.96–2.73)*
No	1.00	1.00	1.00
Headache or back pain			
Moderate or greater pain	1.31 (1.09–1.57)*	1.50 (0.69–3.27)	1.31 (1.07–1.62)*
No or mild pain	1.00	1.00	1.00
Previous neck injury			
Yes	1.30 (1.10–1.54)*	1.87 (1.17–2.98)*	1.06 (0.88–1.28)
No	1.00	1.00	1.00
Previous musculoskeletal problems			
No to mild effect	0.89 (0.75–1.04)	1.21 (0.70–2.11)	0.81 (0.67–0.97)*
Moderate to severe	1.02 (0.81–1.30)	3.16 (1.80–5.53)*	1.05 (0.82–1.35)
Absent	1.00	1.00	1.00
Neck pain§	1.18 (1.14–1.23)*	1.48 (1.31–1.68)*	1.30 (1.24–1.35)*
Percent body pain‡	1.02 (1.01–1.02)*	1.01 (1.00–1.03)	1.02 (1.01–1.02)*

¶Comparison group is "get better soon".
*Denotes significant at $p<0.05$.
†Yes refers to a CES-D score ≥16; No refers to a CES-D score <16.
§Neck/shoulder pain was measured on an 11-point numeric rating scale.
‡Percentage of body in pain was assessed with a pain drawing.
CES-D: Center for Epidemiologic Studies Depression Scale.

would never get better and those who didn't know were less educated and had more depressive symptomatology than the groups anticipating that they would get better.

Table II reports the crude associations for each factor included in the multivariable model. Findings from the multivariable model are reported in Table III. In polytomous logistic regression, each level of the dependent variable (in this case, expecting to get better slowly, expecting to never get better, and "don't know") are compared with the reference category, which consists of those expecting to get better quickly.

Factors associated with claimants predicting they would "get better slowly"

In the multivariable analysis, the following factors were associated with the response "get better slowly" (as opposed to quick recovery): age 30–49 years, lower education level, being male, being single, separated or divorced, low income, being a passenger rather than a driver, presence of depressive symptoms at baseline, having a prior history of compensated neck injury, presence of post-collision low back or headache pain, greater neck pain intensity, and greater extent of bodily pain. Percentage of body in pain and neck pain intensity were measured on continuous scales, and therefore, for each 1 point increase in percentage of body pain, and each 1 point increase in neck pain intensity (on the 11-point NRS), the odds of anticipating "getting better slowly" rather than "getting better quickly" increased by 1% and 18%, respectively.

Factors associated with claimants predicting they would "never get better"

In the multivariable analysis, the following factors were associated with the response "never get better" (compared with a quick recovery): age 40–49 years, lower education level, being male, being a vehicle passenger rather than a driver, presence of depressive symptoms at baseline, having a previous history of compensated neck injury, and experiencing moderate to severe impact on daily functioning from previous musculoskeletal pain. This group had more intense neck pain at baseline. For each 1 point increase in percentage of body pain, and each 1 point increase in neck pain intensity (on the 11-point NRS), the odds of anticipating "never get better" rather than "getting better quickly" increased by 1% and 48%, respectively.

Factors associated with claimants predicting they would "get better slowly"

In the multivariable analysis, the following factors were associated with the response "don't know" (compared with a quick recovery): age 30–49 years, lower education level, lower household income, being male, being a vehicle passenger rather than a driver, presence of depressive symptoms at baseline, have more headache or low back pain as a result of the collision, and those with no to mild health effects from previous musculoskeletal problems. Also, for each 1 point increase in percentage of body pain, and numerical rating for neck/shoulder pain, the odds of reporting "don't know" increased by 2% and 30%, respectively, compared with reporting "getting better soon".

DISCUSSION

To the best of our knowledge, this is the first study looking at factors associated with positive recovery expectations within a WAD population. A variety of both modifiable and non-modifiable variables were explored, and both variable types were found to be associated with global recovery expectation, with pain and depressive symptomatology having the greatest effect on odds ratios. The results from this analysis appear to support the notion of using a biopsychosocial approach to evaluate expectancies.

Presence of post-crash depressive symptoms and neck pain intensity (both measured simultaneously with expectations) appear to be especially important for expectations. Those with depressive symptoms are almost twice as likely to expect to get better slowly, more than twice as likely to state they do not know, and more than 4 times as likely to expect to never get better than to expect to get better quickly (the comparison group). Depressive symptomatology has previously been shown to be common following whiplash injury in those initially reporting no pre-injury mental health issues. Carroll et al. (21) reported that 42.3% of subjects developed depressive symptoms within 6 weeks of their injury, and an additional 17.8% developed symptoms over a 1-year follow-up. In that study, those with pre-injury mental health problems were at higher risk of having a recurrent or persistent course of early onset depressive symptoms. Our findings suggest that depressive symptoms are associated with recovery expectations when assessed early in the recovery process and add to the existing literature that feelings and perceptions may profoundly affect biological disease processes through behavioral and non-behavioral mechanisms (24).

Self reported pain intensity also shows an impact on positive recovery expectation. With respect to the 11-point NRS for neck pain intensity, every 1-unit increase in scores means individuals are at approximately 18% higher odds of expecting a slow recovery and 48% greater odds of expecting never to recover. The impact of pain on recovery is likely multi-factorial, informing behaviors required for recovery, and also mediating the resulting consequences of these behaviors (8, 25). As previously mentioned, definitions of recovery differ among individuals with some reporting that pain recovery is a central tenet of recovery (26), and one study showing that abolition of pain appears to be paramount for reporting self-perceived recovery for a WAD population (27). Our findings suggest that individual pain reports are necessary and informative as associated factors of expectations for global recovery.

Collision-related factors have generally not been associated with prognosis of WAD following motor vehicle collision (28). However, our findings show that drivers are more likely to report positive global recovery expectation compared with passengers. A modest sized association was noted for the position in vehicle variable (driver vs passenger). Although it is possible that this is a spurious finding, there may be differences between drivers and passengers that systematically influence global recovery expectations. For example, a driver is more likely to feel (or be) responsible for the collision than

a passenger. Prior studies have suggested that being "at fault" for the collision is associated with somewhat faster recovery (29), and may also influence expectations for recovery. It is also possible that drivers and passengers differ systematically in other ways that could impact on expectations for recovery, such as unmeasured differences in health.

Strengths and limitations

One of the important strengths of our data is the complete ascertainment of information. All claimants completed the baseline questionnaire (since that was the claim application form), so there is no selection bias, although these findings may not be generalizable to those who do not make a claim for traffic injuries. However, given the "no fault" insurance system in place at the time of the study, and the inclusion in the claims process of those seeking treatment for traffic injuries, this is unlikely to be a serious limitation.

This is an early exploratory study to assess factors associated with expectations for recovery, although clearly not all important potential factors were measured. We have little information about claimants' personality styles, for example, nor do we have information on very early coping styles. Future studies might include such factors to assess their potential contribution to expectations for recovery. However, we did include a broad range of demographic, social, work, psychological and crash-related factors that were thought to be important for their associations to expectations. Measurement of these important variables, such as depressive symptoms, was done using valid, reliable instruments, such as the CES-D, thus minimizing the likelihood of information bias.

We considered the possibility that the assessment of expectations might have been affected by how long after the injury the claim was made. That is, since injured individuals had 6 weeks to respond to the baseline questionnaire, those who responded early following the event might have been more likely to be unsure of how they would recover resulting in underestimation of outcome, or more (or less) positive about how well they anticipated that they would recover. However, we found no association between time to complete the claim form and expectations.

There are practical implications of our analyses. Identifying important demographic, socioeconomic, crash, pain, and depression-related information at baseline following a vehicle collision and resulting WAD are associated with good vs poor expectations. Appropriate interventions (for example, education about the usual course of recovery in WAD) could potentially impact on expectations. This is also a first step to a more in-depth study of how WAD recovery expectations are formulated. Understanding the basis for expectations will enable the development of a more effective strategy for addressing these expectations.

Also, the substantial impact of neck/shoulder pain on negative global recovery expectation can alert clinicians to provide appropriate interventions to alter this state, thereby reducing the potential of prolonged recovery. Despite the fact that the course of recovery from WAD and neck pain in the general population/workers is remarkably similar (28), whiplash injuries carry the reputation of leading to a poor prognosis and leading to chronic symptoms (30), and attributing initial neck complaints to whiplash predicts persistent disability (31). Provision of early education and reassurance by health professionals regarding clinical course may help, with one study showing that these types of interventions are beneficial for WAD patients, probably by modifying patient expectations (32).

Our identification of associated factors adds to the model proposed by Janzen et al. (8) for how health expectations are formulated, affirming that factors arising from the precipitating phenomenon (such as pain), and influences on cognitive processing (such as depressive symptoms) affect the outcome (such as global recovery expectation). Further research is needed to: assess the impact of an individuals' prior understanding of an event on expectations; the potential of time varying components of expectation over the recovery process; as well as whether there are several "phases" to recovery expectations for WAD. Testing this preliminary expectancy formulation model with such research questions may increase our understanding of expectancies, given that they are such an influential factor for health outcomes.

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