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Population-based Survey of Beliefs about Neck and Upper Extremity Injuries: Prelude to social marketing campaigns designed to reduce disability

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Principal Investigator/Applicant
Dr. Robert Ferrari



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RS2006-OG01

FINAL REPORT for WorkSafeBC project RS2006-OG01:

**"Population-based survey of beliefs about neck and upper extremity injuries:
Prelude to social marketing campaigns designed to reduce disability"**

Corresponding Author: Geoff Bostick

Principal Investigator: Dr. Robert Ferrari

Co-authors: Dr. Linda Carroll, Rachelle Buchbinder, Dr. Anthony Russell, Dr. Donald Krawciw,
and Dr. Douglas Gross

I. SUMMARY of MAIN RESEARCH FINDINGS and IMPLICATIONS

- Three hundred adult residents in Alberta and British Columbia were surveyed regarding their beliefs about three common musculoskeletal conditions (work-related neck and upper extremity pain, and whiplash associated disorders (WAD)) in terms of likelihood of recovery and return to work.
- Pessimistic beliefs were seen across all three conditions. Consistently, a minority of respondents agreed with the statement that “*the condition settles quickly and you get on with usual activities such as going back to work*”.
- Overall belief scores differed significantly among the conditions. Beliefs about WAD were more negative compared to beliefs about neck and upper extremity pain from work injury.
- Since recovery expectations and fear regarding return to activity are important influences on recovery, the general public may require re-education.
- Clinicians should be aware that the general public holds pessimistic beliefs about these conditions, as this pessimism may pose an important barrier to recovery and treatment success.

II. EXECUTIVE SUMMARY

Recovery from regional musculoskeletal disorders appears to be influenced by beliefs and attitudes such as expectations for recovery. Research on low back pain has shown that the general public has pessimistic beliefs that are not in agreement with current evidence about the condition. It is thought that pessimistic beliefs may negatively impact important outcomes such as disability. Little is known about public beliefs regarding work-related neck pain or upper extremity pain disorders, or whiplash-associated disorders (WAD). Therefore, the purpose of this study was to examine and compare Canadian population beliefs regarding three regional musculoskeletal conditions: neck pain and upper extremity pain from work injury, and WAD.

In the fall of 2006, a questionnaire evaluating the beliefs about the three conditions was mailed to a sample of adult residents in Alberta and British Columbia. Prior to this, an introductory postcard was sent to alert the individual about the mailed questionnaire. The sample was selected at random in an effort to achieve a sample that represents the entire population. In order to evaluate the beliefs about the three conditions, we modified an existing questionnaire (the Back Beliefs Questionnaire) that has been used to study beliefs about low back pain. The Back Beliefs Questionnaire has 14 items and asks respondents to rate their level of agreement with various statements about back pain on a 5-point scale ranging from completely agree to completely disagree. Adapting it for the three conditions yielded three questionnaires to be included in the overall questionnaire. Each questionnaire consisted of the same 10 items to allow for an appropriate comparison across the three conditions. Within each 10-item questionnaire, there were four sub-categories labeled: "recovery pessimism", "active coping", "passive coping", and "treatment pessimism". A higher score indicates more positive or optimistic beliefs about the condition, while a lower score indicates negative or pessimistic beliefs. In addition, a tailored question was added assessing beliefs about how quickly the condition settles. Information about whether or not the individual experienced the condition(s), their employment status, marital status, age group, gender, and place of residence was also collected. Appropriate statistical tests were performed to address the study purpose. Overall scores and sub-category scores for each questionnaire were compared to one another. The agreement on the tailored item associated with each category was also compared.

Two thousand surveys were distributed and 300 complete surveys were returned (15%). Forty-eight percent of the sample was female with the most common age group being 50-65. The overall scores on the beliefs about WAD questionnaire were more negative compared to beliefs about neck pain from work and beliefs about upper extremity pain from work. This was also true for the sub-categories of active coping and treatment pessimism. These findings indicate that beliefs about WAD are more pessimistic, specifically related to remaining active (active coping) and whether or not the condition can be successfully treated (treatment pessimism) compared to the other conditions. Agreement with the statement "most (*condition*) settles quickly and you get on with regular activities such as going back to work" was low in all three conditions with WAD being the lowest. This finding indicates that the population sampled believes that these musculoskeletal conditions do not settle quickly and do not permit an early return to work.

The population represented in this study appears to hold more pessimistic beliefs regarding WAD compared to other regional musculoskeletal conditions. Only a small minority believes these conditions settle quickly, and this pessimism may negatively influence recovery. The results provide impetus for further evaluation of population beliefs about neck and upper extremity musculoskeletal disorders. Since recovery expectations and fear regarding return to activity are important influences on recovery, public education campaigns may be indicated. Additionally, clinicians treating patients with these conditions may also need to be made aware of the beliefs their clientele hold regarding these disorders.

III. REPORT MAIN BODY

a. Research Problem

Whiplash associated disorders (WAD), and work-related neck and upper extremity injury are common problems. Little is known, however, about methods of improving outcomes following these injuries. In the analogous problem of low back pain, however, beliefs and attitudes about back pain, such as poor recovery expectations, pain-related fear or catastrophizing about the condition, have been found to be important predictors of outcome. Many back pain disability prevention strategies have thus aimed at changing patient beliefs, especially recent efforts at population-based educational interventions. It is hypothesized that beliefs about WAD, and work-related neck and upper extremity injury will mirror those of low back pain; however there is a dearth of literature that has evaluated the population beliefs about these conditions.

b. Methodology

Study design. A population-based, cross-sectional design mail-out survey was performed in fall 2006. Participants were asked to fill out three questionnaires relating to beliefs about three musculoskeletal conditions: neck pain from work injury, upper extremity pain from work injury, and WAD.

Setting and Participants. An experienced polling company was used to randomly sample adult residents of Alberta and British Columbia. The sample was identified through the most recent mail lists with the primary sources being phone books and Canada Post. The sample was randomly selected and stratified according to age group and gender in an effort to achieve a representative sample. Non-residents of Alberta (AB) and British Columbia (BC), individuals without a mailing address, and residents under the age of 18 were excluded.

Variables of interest. The primary dependent variables to be compared included overall and factor specific beliefs scores yielding continuous data, and a tailored question providing categorical data for each condition. The potential independent variables included a history of the condition (within four weeks, the past year, or ever), gender, age category, marital status, employment status, province (AB or BC), and residence (urban or rural). These variables were evaluated for confounding and for descriptive purposes.

Measurement. Beliefs for each condition were assessed via a modification of the Back Beliefs Questionnaire (BBQ) according to the condition of interest. The BBQ is a 14-item instrument where participants are asked to state their agreement on each item using a 5-point Likert scale ranging from completely disagree to completely agree. The BBQ has been shown to have adequate internal consistency and test-retest reliability in low back pain populations. In order to evaluate the validity of making comparisons across the modified instruments, exploratory factor analysis (EFA) was performed on each questionnaire. Four items from the questionnaire were eliminated due to their poor performance in the analysis, providing a 10-item questionnaire with four factors that were the same across all conditions (Table 1). All items are reversed with the exception of item "5" and "13" providing a

minimum total score of 10 and a maximum total score of 50. Higher scores are interpreted as more positive or optimistic beliefs about the condition.

Table 1. Questionnaire for comparison of beliefs across conditions.

Factor 1: recovery pessimism

1. *Condition* will eventually stop you from working
2. *Condition* makes everything in life worse
3. *Condition* means long periods of time off of work

Factor 2: beliefs about active coping

4. A bad *neck/upper extremity* should be exercised
5. If you have *condition* you should rest until it gets better
6. If you have *condition* you should try to stay active

Factor 3: beliefs about passive coping

7. Medication is the only way of relieving *condition*
8. Simple pain killers are usually enough to control most *condition*

Factor 4: treatment pessimism

9. There is no real treatment for *condition*
10. Doctors cannot do anything for *condition*

Tailored item: most (*condition*) settles quickly and you get on with usual activities such as getting back to work (not included in overall score)

Sample size. Post-hoc power analysis revealed that with 300 study participants, $\alpha = 0.05$ and $\beta = 0.20$, the study was powered to detect a small effect size for one-way ANOVA (where effect size, $f = 0.10$ for small effect, 0.25 for medium effect, and 0.40 for large).

Statistical Methods. Appropriate descriptive statistics were used to describe the population in regard to important variables. For the EFA, factors were extracted using principal components. Retention of factors was determined by the *eigenvalue > 1 rule and Catell's scree plot* and then rotated orthogonally (Varimax). Finally the factors were interpreted by including items within a factor that had loadings greater than 0.300 and were factorially simple (i.e. loaded on only one factor). A one-way ANOVA with Bonferroni post-hoc tests were used to compare overall and factor scores across conditions. The Kruskal-Wallis test was used to compare categorical data across conditions. The effects of gender, previous history of the condition, and other independent variables on belief scores were evaluated using stratified analysis. Significance was set at $\alpha = 0.05$ for all tests.

c. Research Findings

Participants. During the fall of 2006, 300 Alberta (52%) and British Columbia (48%) adult residents returned surveys (response rate = 15%). The characteristics of the sample can be found in Table 2. The low response rate is responsible for the middle-aged to older age groups being over-represented.

Table 2. Respondent characteristics.

Variable	Proportion (%)
Gender	Percent
Male	52.2
Female	47.8
Age Category	
18-24	1.4
25-34	7.8
35-49	21.6
50-65	38.2
65+	31.1
Residence	
Rural	19.7
Urban	80.3
Marital status	
Married	72.4
Single	14.2
Divorced	13.4
Employment status	
Employed	54.0
Not employed	2.5
Retired	42.4
Student	1.1
History of neck pain (work)	70.9
History of upper extremity pain (work)	78.4
History of whiplash injury	27.7

Main results. Overall beliefs scores were statistically different across conditions (Table 3). Post-hoc test (with Bonferroni correction) revealed beliefs scores about WAD were significantly lower when compared to the other conditions indicating more negative or pessimistic beliefs (Table 4). Neck and upper extremity injury from work were not found to be different from one another (Table 4). Factors two and four (beliefs about active coping and treatment pessimism) were found to be different across conditions with post-hoc tests revealing that beliefs scores about whiplash were lower compared to work-related upper extremity pain indicating more negative or pessimistic beliefs (Table 4). Factors one and three (recovery pessimism and beliefs about passive coping) were not different between conditions.

Table 3. Comparison of beliefs scores across conditions: results of one-way ANOVA.

	mean score (95% CI)	F-statistic	p-value
Overall scores			
*Beliefs about neck pain from injury questionnaire (Q1)	34.5 (33.9, 35.0)		
*Beliefs about upper extremity pain from work injury questionnaire (Q2)	35.3 (34.7, 35.9)	22.66	p<0.001
*Beliefs about whiplash injury questionnaire (Q3)	32.8 (32.3, 33.3)		
Factor specific sub-scores			
*Factor 1: recovery pessimism			
Q1	9.1 (8.8, 9.4)		
Q2	9.5 (9.2, 9.8)	1.66	p=0.19
Q3	9.2 (9.0, 9.5)		
*Factor 2: beliefs about active coping			
Q1	10.7 (10.5, 10.9)		
Q2	10.8 (10.6, 11.0)	6.18	p=0.002
Q3	10.3 (10.1, 10.5)		
*Factor 3: beliefs about passive coping			
Q1	7.2 (7.0, 7.4)		
Q2	7.1 (7.0, 7.3)	0.17	p=0.843
Q3	7.2 (7.0, 7.3)		
*Factor 4: treatment pessimism			
Q1	7.6 (7.4, 7.8)		
Q2	7.8 (7.7, 8.0)	8.32	P<0.001
Q3	7.3 (7.1, 7.5)		

*Overall scores range from 10-50, factors 1 and 2 scores range from 3-15, and factors 3 and 4 scores range from 2-10.

Table 4. Post-hoc comparisons of beliefs.

	Mean difference (95% confidence interval)	p-value
Overall scores		
Q1 compared to Q2	-0.83 (-1.74, 0.07)	p=0.08
Q1 compared to Q3	1.68 (0.78, 2.58)	p<0.001
Q2 compared to Q3	2.51 (1.62, 3.40)	p<0.001
Factor specific sub-scores		
Factor 1: recovery pessimism		
Q1 compared to Q2	-0.36 (-0.83, 0.11)	p=0.18
Q1 compared to Q3	-0.12 (-0.59, 0.36)	p=0.83
Q2 compared to Q3	0.24 (-0.23, 0.71)	p=0.44
Factor 2: beliefs about active coping		
Q1 compared to Q2	-0.13 (-0.50, 0.24)	p=0.69
Q1 compared to Q3	0.41 (0.03, 0.78)	p=0.03
Q2 compared to Q3	0.54 (0.16, 0.91)	p=0.002
Factor 3: beliefs about passive coping		
Q1 compared to Q2	0.07 (-0.20, 0.34)	p=0.83
Q1 compared to Q3	0.02 (-0.25, 0.29)	p=0.98
Q2 compared to Q3	-0.04 (-0.27, 0.18)	p=0.92
Factor 4: treatment pessimism		
Q1 compared to Q2	-0.21 (-0.51, 0.10)	p=0.25
Q1 compared to Q3	0.32 (0.01, 0.63)	p=0.04
Q2 compared to Q3	0.53 (0.22, 0.84)	p<0.001

Q1 = beliefs about neck pain from work injury questionnaire, Q2 = beliefs about upper extremity pain from work-injury, Q3 = beliefs about whiplash injury

Comparison of the tailored item: “most neck pain/shoulder or arm muscle pain/whiplash injury settles quickly, and you get on with normal activities such as going to work” revealed differing responses across conditions. Only 32, 33, and 18 of participants agreed with this statement in the neck pain from work injury, upper extremity pain from work injury, and whiplash injury scenarios. Comparing the responses to this item across condition revealed a statistically lower mean ranks in the whiplash injury condition (Table 5).

Table 5. Comparison across conditions for the tailored item* using the Kruskal-Wallis test.

Tailored item	Mean rank	p-value
Q1	452.2	P = 0.03
Q2	451.8	
Q3	406.8	

*most (condition) settles quickly, and you get on with normal activities such as going to work”

Other analyses. After stratifying for history of the condition no confounding was present with the following exception: it was found that age history of the condition slightly confounded the Factor 2 beliefs scores. Controlling for this variable brought the significance value between conditions slightly above the critical value of 0.05. This stratification revealed that individuals with no history of the condition had more negative or pessimistic beliefs about active coping compared to individuals with a history of the condition.

Discussion and Conclusions. The population sampled in this study appears to hold more pessimistic beliefs regarding WAD compared to other regional musculoskeletal conditions. Only a small minority believes these conditions settle quickly, and this pessimism is likely to negatively influence recovery. The primary limitation of this study was the low response rate. This occurred despite a relatively short and salient survey and the use of introductory postcards. Unfortunately data was not available to compare survey respondents with non-respondents. As a consequence of the low response rate, older adults were over-represented. However, some data suggests older age as a prognostic indicator for delayed recovery after WAD. If this is indeed true, the sample from this study provides important information about the beliefs of this potentially at-risk population. This study provides impetus for further evaluation of population beliefs about neck and upper extremity musculoskeletal disorders. Public educational campaigns may be indicated.

d. Implications for Future Research on Occupational Health

This investigation revealed that respondents were pessimistic about the likelihood of recovery and return-to-work in three common musculoskeletal conditions. These findings are important, as negative expectations and fear have been found to be influential on recovery. Beliefs about WAD were more negative compared to the other conditions, however the effect size of this difference were small to medium and there may be many similarities in the beliefs about these conditions. Literature points toward individual beliefs as well as social influences as important considerations in determining outcome. For example, a public education campaign related to low back pain in Australia aimed at changing population beliefs, resulted in numerous positive outcomes related to beliefs and workers compensation outcomes. (1) With this in mind, similar strategies may warrant consideration for neck and upper extremity conditions in the hopes of achieving less pessimistic population beliefs; which may ultimately result in less disability.

e. Policy and Prevention

This study highlights the potential role of primary secondary prevention strategies for persistent pain and disability in three common musculoskeletal conditions. Similar strategies have been shown to be effective in changing beliefs in Australia (1) and Scotland (2) related to low back pain, with the Australia study also demonstrating improved worker compensation outcomes. A low proportion of participants in this study believed that these conditions settle quickly and permit a prompt return to

usual activity such as work. In reference to the fear-avoidance model, pre-existing pessimistic beliefs may lead an individual who has injured their neck or upper extremity at work or in a motor vehicle collision toward a fearful or catastrophic mindset that precipitates prolonged disability. Further investigation is required to determine if negative beliefs do in fact negatively impact pain and disability, and if so, what is the clinically important threshold score on the instrument indicating this. However, it is known that these conditions respond to active interventions (3-7), therefore alleviating the belief that activity is harmful to painful conditions is important.

Clinicians involved in the management of individuals with these conditions are also relevant consumers of this information. They may need to be aware that many of their patients presenting with these conditions hold pessimistic beliefs and expectations. These beliefs may pose barriers to recovery throughout the management of the condition, especially as it relates to return to activity and/or work. Third-party payers involved in the management of these individuals may also view this information as pertinent and are likely best situated to be involved in public education campaigns aimed at secondary prevention of disability.

f. Dissemination/Knowledge Transfer

The abstract for this paper has been presented and accepted for presentation in a variety of settings (see below). The audiences at these forums consist of a variety of clinicians, researchers, and members of the automobile safety community. The authors of this project will also pursue publication in a peer-reviewed journal article.

Juried Presentations:

Bostick GP, Ferrari R, Carroll L, Buchbinder R, Russell AS, Krawciw D, Gross DP. **A comparison of population beliefs across whiplash work related neck and upper extremity injury in Canada.** Neck Pain World Congress. Los Angeles CA USA, January 2008.

Bostick GP, Ferrari R, Carroll L, Buchbinder R, Russell AS, Krawciw D, Gross DP. **A comparison of population beliefs across whiplash work related neck and upper extremity injury in Canada.** Alberta Physical Therapy Conference. Edmonton AB CAN, October 2007.

Other Presentations:

Bostick GP, Ferrari R, Carroll L, Buchbinder R, Russell AS, Krawciw D, Gross DP. **A comparison of population beliefs across whiplash work related neck and upper extremity injury in Canada.** Alberta Provincial CIHR Training Program in Bone and Joint Health Meeting. Banff AB CAN, October 2007.

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Research Secretariat
6951 Westminster Highway
Richmond, B.C. V7C 1C6
Phone (604) 244-6300 / Fax (604) 244-6299
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