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Chronic pain, activity restriction and flourishing mental health

by Heather Gilmour

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.   not available for any reference period
..   not available for a specific reference period
...   not applicable
0   true zero or a value rounded to zero
0^s value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
^{p} preliminary
^{r} revised
x   suppressed to meet the confidentiality requirements of the *Statistics Act*
^{E} use with caution
F   too unreliable to be published
*   significantly different from reference category (p < 0.05)

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Abstract

Background

According to the activity restriction (AR) model, a potential explanation for the impact of chronic pain on mental illness is that pain contributes to depression by limiting usual activities. This study uses a measure of mental health (flourishing), rather than mental illness to examine associations between pain and activity restrictions.

Data and methods

Data from the 2011/2012 Canadian Community Health Survey were used to study the relationship between pain intensity, pain-related activity prevention, and flourishing mental health in people aged 18 or older. Multivariate logistic regression was used in a sample of 26,429 people with chronic pain to identify significant relationships, while adjusting for potential confounders.

Results

In 2011/2012, an estimated 6 million Canadians aged 18 or older (22%) reported chronic pain. They were less likely to be in flourishing mental health than were people without chronic pain (69% versus 79%). The prevalence of flourishing mental health declined as pain intensity and the number of activities prevented because of pain increased. Pain intensity and pain-related activity prevention were each independently associated with flourishing mental health, even when socio-demographic and health factors were taken into account. Pain-related activity prevention partially mediated the association between pain intensity and flourishing mental health.

Interpretation

The results of this study support the AR model and highlight the importance of both pain intensity and activity restriction in relation to flourishing mental health.

Keywords

Positive Mental Health Continuum – Short Form (MHC-SF), cross-sectional study, health survey

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The association between chronic pain and poor psychological health is well established.[1-12] A potential explanation for this relationship is that pain affects mental well-being by limiting usual activities such as personal care, work and family roles and leisure and social pursuits. The Activity Restriction (AR) model of depressed affect[12,13] posits that psychological adjustment to a stressor is related largely, and sometimes only, to the day-to-day activity restrictions that result. Thus, while pain can contribute directly to mental illness, it can also contribute indirectly by limiting activities and thereby increasing psychological distress. In the AR model, activity restriction mediates the relationship between pain and depression.

The AR model has been examined in relation to chronic pain,[6,12] and conditions such as cancer,[13,14] multiple sclerosis,[15] arthritis,[2,5,8,11,16] and vision problems,[17] and in relation to caregiving.[4,18] Many of these studies pertained to comparatively small clinical or institutional populations, or older adults, and most often examined depressive symptoms as the outcome. Consequently, the generalizability of findings is limited.

As well, previous studies have applied the AR model in relation to mental *illness*, but not in relation to mental *health*. Keyes' two continua model[19] identifies mental health and mental illness as separate but correlated axes—one representing the presence or absence of mental health; the other, the presence or absence of mental illness. Therefore, instead of depression or other indicators of mental illness as the outcome, the current analysis employs a multi-dimensional measure—flourishing mental health as defined by the Mental Health Continuum Short Form (MHC-SF).[19-21] Emotional well-being and psychological and social functioning are considered in order to classify respondents' mental health as flourishing, moderate, or languishing. "Flourishing" is an important concept, which a longitudinal analysis found to be protective for all-cause mortality.[22]

Using the AR model as the theoretical framework, the present study examined mental health among chronic pain sufferers aged 18 or older in the general population. The relationship between flourishing mental health, pain intensity and pain-related activity prevention was

investigated. It was hypothesized that pain intensity and pain-related activity prevention were independently associated with flourishing, and that activity prevention would partially or wholly mediate the association between pain intensity and flourishing mental health. Age and sex differences in this relationship were also examined.

Methods

Data source

This study was based on data from the 2011/2012 Canadian Community Health Survey (CCHS), a cross-sectional survey that collects information about health status, health care use and health determinants for about 98% of the population aged 12 or older. It covers household residents in the provinces and territories; members of the Canadian Forces and residents of institutions, Indian reserves, other Aboriginal settlements, and some remote areas are excluded. Data collection, using computer-assisted interviewing, began in January 2011 and continued over 24 months. The sample size was 125,645, with a response rate of 68.4%. Details about the CCHS are available on the Statistics Canada website (www.statcan.gc.ca).

Study sample

Calculations of pain prevalence were based on a sample of 114,897 respondents aged 18 or older, representing 26.9 million people. Analysis of mental health used a sample of 108,063 respondents aged 18 or older (47,530 men and 60,533 women) who provided answers to the MHC-SF, representing 25.6 million people; their average age was 51.6. Further analysis focused on the subpopulation who reported chronic pain—26,429 respondents (10,165 men and 16,264 women), representing 5.6 million people (Appendix Table A). The average age of this group was 56.7 years; the majority (73.4%) were postsecondary graduates; 62.9% were married or in a common-law relationship; 24.7% were in the lowest household income quintile, and 16.4% were in the highest; 84.6% described their race/cultural background as White.

Definitions

Mental health

The MHC-SF[19-21] consists of 14 questions asking respondents how they felt in the past month with response categories of "every day," "almost every day," "about 2 or 3 times a week," "about once a week," "once or twice," or "never."

Three questions measure emotional well-being:

- how often did you feel happy?
- how often did you feel interested in life?
- how often did you feel satisfied with your life?

Five questions measure social well-being:

- how often did you feel that you had something important to contribute to society?
- how often did you feel that you belonged to a community (like a social group, your neighborhood, your city, your school)?
- how often did you feel that our society is becoming a better place for people like you?
- how often did you feel that people are basically good?
- how often did you feel that the way our society works makes sense to you?

Six questions measure psychological well-being:

- how often did you feel that you liked most parts of your personality?
- how often did you feel good at managing the responsibilities of your daily life?
- how often did you feel that you had warm and trusting relationships with others?
- how often did you feel that you had experiences that challenge you to grow and become a better person?
- how often did you feel confident to think or express your own ideas and opinions?
- how often did you feel that your life has a sense of direction or meaning to it?

The three-factor structure of mental well-being found in other populations[20,21,23] was replicated in this Canadian population sample. The internal consistency (Cronbach's alpha) for the three scales was 0.80, 0.75, and 0.80 for emotional, social, and psychological well-being, respectively. Reliability for the total scale was 0.88.

According to Keyes' criteria,[20,22,24] to exhibit flourishing mental health, individuals must have responded "almost every day" or "every day" to at least one of the three emotional well-being items, and to at least six of the 11 items that measure social and psychological well-being, thereby indicating a combination of feeling good about and functioning well in life.

Pain and activity restriction

Respondents were asked, "Are you usually free of pain or discomfort?" Those who answered "no" were considered to have *chronic pain* and were asked to assess the usual intensity as "mild," "moderate" or "severe." They were also asked how many activities their pain prevents: "none," "a few," "some" or "most." This represents the activity restriction component of the AR model. Levels of pain intensity and "pain-related activity prevention" were moderately correlated (0.44, $p < 0.01$), which suggests that they are related, but distinct, concepts. Variance inflation factors (≤ 2.9) and tolerance estimates (≥ 0.2) demonstrated that multicolinearity was not a problem.

Covariates

Marital status was categorized as having a partner (married/common-law) or not (single/separated/divorced/widowed).

Based on the highest level of *education* in the household, respondents were grouped into two categories: less than postsecondary graduation and postsecondary graduation.

Household income level was divided into quintiles: lowest, low-middle, middle, high-middle and highest.

Race has previously been associated with mental health.[25] In this study, *race/cultural identity* was defined as White,

Black, or other (includes multiple racial/cultural origins).

The number of *positive health behaviours* was categorized as none, one, two or three: not currently smoking (daily or occasionally); being physically active; and healthy drinking (no more than 14 drinks a week for men and 7 for women, and heavy episodic drinking—5 or more drinks on one occasion—less than once a month).

The presence of *chronic physical conditions* was established by asking respondents if a health professional had diagnosed them as having a condition that had lasted, or was expected to last, at least six months. The interviewer read a list of conditions. Individual conditions reported in this study included asthma, arthritis, back problems excluding fibromyalgia and arthritis, migraine headaches, COPD, diabetes, heart disease, cancer, stomach or intestinal ulcers, effects of stroke, urinary incontinence, bowel disorder, Alzheimer's disease or other dementia, and high blood pressure. The number of chronic physical conditions was categorized into four groups: none, one, two, and three or more.

Analytical techniques

Bivariate correlations and frequencies were used to examine the association between chronic pain, pain intensity, the number of activities prevented by pain, and flourishing mental health. Separate multiple logistic regressions were used to examine associations between pain intensity, pain-related activity prevention and flourishing mental health, while controlling for socio-demographic and health factors that may be related to mental well-being. The Baron and Kenny[26,27] method of mediation was employed, using three multivariate logistic regressions to examine associations between: 1) pain intensity and flourishing; 2) pain intensity and the mediating variable (pain-related activity prevention); and 3) both pain intensity and pain-related activity prevention and flourishing. The percent change in estimated effects was calculated as:

$$100(ORM\text{-} - ORM\text{+})/(ORM\text{-} - 1))$$

Table 1

Percentage reporting flourishing mental health, by chronic pain and selected characteristics, household population aged 18 or older, Canada, 2011/2012

Characteristic	%	95% confidence interval	
		from	to
Total	76.6	76.0	77.1
Chronic pain			
Yes	68.5**	67.4	69.6
No†	78.8	78.2	79.4
Socio-demographic characteristics			
Sex			
Men†	76.5	75.8	77.2
Women	76.6	75.9	77.3
Age group			
18 to 34†	75.7	74.7	76.7
35 to 49	76.3	75.3	77.3
50 to 64	77.1*	76.2	78.0
65 or older	77.5**	76.6	78.3
Education			
Postsecondary graduation	78.2**	77.7	78.8
Less than postsecondary graduation†	69.1	67.8	70.4
Marital status			
Married/Common-law	79.4**	78.8	80.0
No partner†	78.4	77.4	79.4
Household income quintile			
Lowest†	69.1	67.8	70.4
Low-middle	75.2**	74.0	76.3
Middle	77.2**	76.1	78.2
High-middle	78.4**	77.4	79.4
Highest	82.1**	81.1	83.1
Race/Cultural identity			
White†	77.3	76.7	77.8
Black	78.6	74.3	82.3
Other	74.9**	73.2	76.5
Health characteristics			
Positive health behaviours			
None†	67.1	65.3	68.9
One	73.2**	72.2	74.2
Two	78.6**	77.9	79.3
Three	81.5**	80.5	82.5
Chronic physical conditions			
None†	79.3	78.5	80.0
One	76.7**	75.8	77.6
Two	74.2**	73.0	75.5
Three or more	70.0**	68.8	71.1

† reference category
* significantly different from reference category (p < 0.05)
** significantly different from reference category (p < 0.01)
Source: 2011/2012 Canadian Community Health Survey.

where ORM- is the odds ratio for levels of pain intensity from a logistic regression unadjusted for the mediator (pain-related activity prevention), and ORM+ is the odds ratio for the same regression that adjusts for pain related activity prevention.[28] Sobel test statistics were calculated to assess the significance of the mediation effect.

To determine whether the "pain–flourishing" relationship differed by sex or age group, interactions between these variables and pain intensity and pain-related activity prevention were tested in logistic regression models.

To account for survey design effects, standard errors and coefficients of variation were estimated with the bootstrap technique.[29,30] A significance level of p < 0.05 was used.

Results

Chronic pain and flourishing mental health

According to the 2011/2012 CCHS, chronic pain affected an estimated 22% of Canadians aged 18 or older (6 million); that is, they replied "no" to the question, "Are you usually free of pain and discomfort?"

Overall, 77% of adults were in flourishing mental health (Table 1). However, people with chronic pain were significantly less likely to be in this category than were those who were free of chronic pain: 69% versus 79%. Flourishing mental health was more common at older than at younger ages. Men and women were equally likely to be flourishing.

## Pain intensity and pain-related activity prevention in relation to mental health

Among people with chronic pain, the prevalence of flourishing mental health declined as pain intensity and the number of activities prevented by pain increased (Figure 1). For example, 59% of people reporting severe pain were flourishing, compared with 68% of those with moderate pain, and 73% of those with mild pain. Similarly, 57% of those whose pain prevented most activities were flourishing, compared with 75% of those whose pain did not prevent any activities.

When socio-demographic and health characteristics that might also affect mental health were taken into account (restricted model 1, Table 2), individuals with mild or moderate pain had significantly higher odds of flourishing than did those with severe pain (OR = 1.6 and 1.4, respectively, p < 0.01). As well, the fewer the activities prevented by pain, the higher the odds of flourishing mental health (prevents none, OR = 1.9; prevents a few, OR = 1.5; prevents some, OR = 1.3, p < 0.01)(restricted model 2, Table 2).

When pain intensity and pain-related activity prevention were included in the analysis together, as per the AR model (full model, Table 2), both remained

Figure 1

Percentage with flourishing mental health, by pain intensity and number of activities prevented by pain, household population aged 18 or older with chronic pain, Canada, 2011/2012
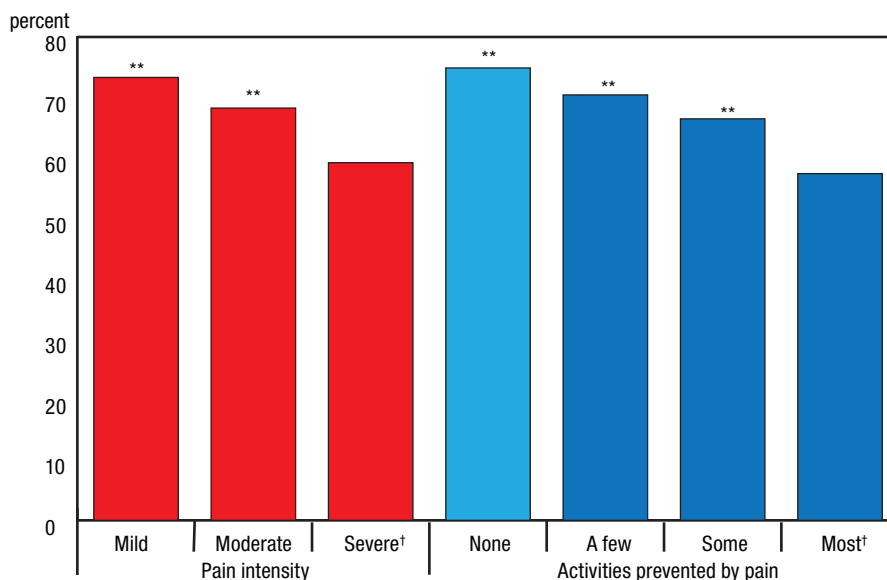
† reference group
** significantly different from reference group (p < 0.01)
Source: 2011/2012 Canadian Community Health Survey.

independently associated with flourishing mental health. As well, gradients were evident, such that the odds of flourishing mental health increased as pain intensity and pain-related activity prevention decreased.

The Baron and Kenney[26,27] method of assessing mediation involves three regressions. The first established a significant association between the independent variable (pain intensity) and the dependent variable (flourishing mental health) (restricted model 1, Table 2). The second regression established an association between the independent variable (pain intensity) and the mediating variable (number of activities prevented by pain, dichotomized as none versus some/a few/most). In that model, mild pain (OR = 0.16, 95% CI: 0.13-0.20) and moderate pain (OR = 0.43, CI: 0.35- 0.52) were both significantly associated with lower odds of activity prevention, compared with severe pain (data not shown in table). In the third model, the association between the independent variable and dependent variable should either be eliminated or diminished

when the mediating variable is included. In this case, pain-related activity prevention partially mediated the association between pain intensity and mental health, such that the odds ratios were diminished for mild pain (from 1.6 to 1.3) and moderate pain (from 1.4 to 1.2)(full model, Table 2). Decreased effects of 52% and 46%, respectively, were observed in the relationship between mild and moderate pain intensity and flourishing when pain-related activity prevention was also included in the model. Thus, the conditions of partial mediation, as set out by Baron and Kenny,[26] were met in the results of this study.

Although not part of the framework of the AR model, the odds ratios for pain-related activity prevention were also attenuated in the complete model (prevents none, from 1.9 to 1.7; prevents a few, from 1.5 to 1.4; prevents some, from 1.3 to 1.2)(restricted model 2 and full model, Table 2). Decreased effects in the association between pain-related activity prevention and flourishing mental health were 20.3%, 24.5% and 28.8%, respec-

tively, for prevention of none, a few and some activities, compared with most.

Mediation analyses have continued to develop in recent decades,[31,32] but all of them do not easily accommodate complex survey designs, survey weights and simultaneous inclusion of independent and mediator variables with multiple cat-

egories. Therefore, supplementary logistic regression analyses that treated pain intensity and pain-related activity prevention first as dichotomous, and second, as continuous variables were conducted to derive one beta coefficient for each variable that could be used in a Sobel test to assess the significance of the mediation effect.[33]

In the case of dichotomous (Sobel 4.49, $p < 0.01$) and continuous (Sobel -5.99, $p < 0.01$) variables, the results indicated that the indirect effect of pain intensity on flourishing mental health via pain-related activity prevention was significantly different from zero.

Differences by sex or age group

Although sex was not bivariately associated with flourishing in the overall population (Table 1), being a woman was associated with increased odds (1.2) of flourishing mental health in the multivariate logistic regressions that focussed on the chronic pain subpopulation (Table 2). Advancing age was also associated with higher odds of flourishing mental health in the chronic pain subpopulation. Four interactions were tested separately: pain intensity and sex, pain intensity and age, pain-related activity prevention and sex; and pain-related activity prevention and age. None were significant.

Discussion

Compared with estimates for other countries, the prevalence of flourishing mental health in Canada was high—77%. Such differences may reflect cultural factors, the age groups and subpopulations studied, and survey collection methods.[34]

The prevalence of flourishing mental health in the population with chronic pain was relatively high (69%), but significantly lower than among those without chronic pain (79%). Clearly, not everyone with chronic pain experiences less-than-optimal mental health. The role of pain-related activity prevention in the pain–mental health relationship may help in understanding why some people flourish despite chronic pain.[35]

The analysis of this nationally representative sample of adults with chronic pain suggests that pain-related activity prevention partially mediated the relationship between pain intensity and flourishing mental health. The results support the AR model and extend it to a *mental health* rather than a *mental illness* outcome. Pain affected mental health through restriction of activities, but not entirely, as an independent effect

Table 2

Adjusted odds ratios relating chronic pain to flourishing mental health, adjusting for selected characteristics, household population aged 18 or older with chronic pain, Canada, 2011/2012

Characteristics	Restricted‡ model 1 Adjusted odds ratio	95% confidence interval from	to	Restricted§ model 2 Adjusted odds ratio	95% confidence interval from	to	Full†† model Adjusted odds ratio	95% confidence interval from	to
Chronic pain									
Pain intensity									
Mild	1.6**	1.4	1.9	...	...	...	1.3**	1.1	1.6
Moderate	1.4**	1.2	1.6	...	...	...	1.2*	1.0	1.4
Severe†	1.0	...	...	...	...	...	1.0		
Number of activites prevented by pain									
None	...	...	...	1.9**	1.6	2.3	1.7**	1.4	2.1
A few	...	...	...	1.5**	1.3	1.8	1.4**	1.2	1.6
Some	...	...	...	1.3**	1.1	1.5	1.2*	1.0	1.4
Most†	...	...	...	1.0	...	...	1.0	...	...
Socio-demographic characteristics									
Sex									
Men†	1.0	...	...	1.0	...	...	1.0	...	...
Women	1.2**	1.1	1.4	1.2**	1.1	1.4	1.2**	1.1	1.4
Age (continuous)	1.01**	1.01	1.01	1.01**	1.01	1.01	1.01**	1.01	1.01
Education									
Postsecondary graduation	1.0	0.9	1.1	1.0	0.9	1.1	1.0	0.9	1.1
Less than postsecondary graduation†	1.0	...	...	1.0	...	...	1.0	...	...
Marital status									
Married/Common-law	1.5**	1.3	1.6	1.4**	1.3	1.6	1.4**	1.3	1.6
No partner†	1.0	...	...	1.0	...	...	1.0	...	...
Household income quintile									
Lowest†	1.0	...	...	1.0	...	...	1.0	...	...
Low-middle	1.3**	1.1	1.5	1.3**	1.1	1.5	1.3**	1.1	1.5
Middle	1.3**	1.1	1.5	1.3**	1.1	1.5	1.3**	1.1	1.5
High-middle	1.3**	1.1	1.6	1.3**	1.1	1.6	1.3**	1.1	1.6
Highest	1.9**	1.5	2.2	1.8**	1.5	2.2	1.8**	1.5	2.2
Race/Cultural identity									
White†	1.0	...	...	1.0	...	...	1.0	...	...
Black	0.8	0.5	1.5	0.8	0.5	1.5	0.8	0.5	1.5
Other	1.0	0.9	1.3	1.0	0.9	1.3	1.0	0.9	1.3
Health characteristics									
Positive health behaviours									
None†	1.0	...	...	1.0	...	...	1.0	...	...
One	1.3**	1.1	1.5	1.3**	1.1	1.5	1.2*	1.0	1.5
Two	1.4**	1.2	1.7	1.4**	1.2	1.7	1.4**	1.2	1.7
Three	1.7**	1.3	2.1	1.6**	1.2	2.0	1.6**	1.2	2.0
Chronic physical conditions									
None†	1.0	...	...	1.0	...	...	1.0	...	...
One	1.1	0.9	1.3	1.1	0.9	1.3	1.1	0.9	1.3
Two	1.0	0.8	1.2	1.0	0.8	1.2	1.0	0.8	1.3
Three or more	0.9	0.7	1.0	0.9	0.8	1.1	1.0	0.8	1.2

† reference category
* significantly different from reference category ($p < 0.05$)
** significantly different from reference category ($p < 0.01$)
‡ adjusted for pain intensity, socio-demographic and health characteristics
§ adjusted for number of activites prevented by pain and socio-demographic and health characteristics
†† adjusted for pain intensity, number of activities prevented by pain, and socio-demographic and health characteristics
... not applicable
Source: 2011/2012 Canadian Community Health Survey.

of pain on mental health persisted. Some previous studies also reported full or partial mediation,[5,8,12,13] but others found no mediation effect.[2,6,7,11,35] The fact that pain intensity also mediated the relationship between pain-related activity prevention and flourishing suggests a complex bidirectional or cyclical relationship between pain and prevention of activities.

Methodological differences may contribute to discrepancies from previous research. For example, unlike this analysis, some earlier studies did not include information on activity restriction specifically related to pain.[6,8,12,35] The control variables were not consistent from study to study, and some explicitly incorporated a social or recreation element in measures of activity restriction.[2,8,12-14] By contrast, the measure of pain-related activity prevention in this analysis is based on a general question that does not specify physical or social/recreational activities.

Depression was the most common outcome in previous research using the AR model, although two studies of arthritis, pain and activity restriction examined self-perceived health,[2,8] and another, social participation.[16] The results of the present study support extension of the AR model to other outcomes, in this case, flourishing mental health.

Many previous studies were limited to subpopulations such as older adults or people with a condition such as osteoarthritis knee pain or breast cancer. This study covers the population aged 18 or older who reported chronic pain, regardless of the cause, and thereby demonstrates that the AR model can be generalized to the chronic pain population overall.

The lack of interactions between sex and the pain variables indicates that the pain–flourishing relationship did not differ by sex. However, although sex was not significantly associated with flourishing mental health in the general population, in the pain subpopulation, women had higher odds of flourishing than did men. This gender difference supports the results of a study of older adults that found pain was more related to mental illness in men than in women.[35] Differences in how men and women report pain intensity and activity prevention and in how they cope with pain may play a role in both mental health and mental illness. This area warrants further research.

Some studies found that the mediating role of activity restriction was reduced in older adults.[5,13] Because activity restriction is more common among older people, they may be more adept at developing coping strategies. As well, older adults may have fewer roles and responsibilities, compared with younger adults. In the present analysis, interactions were not significant between age and pain intensity or pain-related activity prevention.

Studies of depression in the chronic pain population have found that psychological resources such as social support,[3,36,37] self-efficacy,[38] coping,[3,36,39] personal control,[5] and mastery[1] may be important. Such resources may also mitigate the effects of pain and pain-related activity prevention on mental health. This study could not incorporate measures of these concepts; however, the significant association between marital status and flourishing could be an indication of the role of social support in relation to mental health in the chronic pain population.

Limitations

The results of this study should be interpreted in the light of a number of limitations. Respondents were not asked about the duration, frequency, or site of their pain. Data on personal factors that may mediate the association between chronic pain and mental health (for instance, coping behaviours, mastery and social support) were not collected for all respondents in the 2011/2012 CCHS sample. As well, information about pain medications was not available for the entire sample.

The pain-related activity prevention variable does not distinguish between functional or social/leisure activities, which have been found to be important in the pain–activity restriction–mental health dynamic.[2,7,16]

Like most research examining the AR model, this study is cross-sectional, and therefore, precludes conclusions about temporal order—that is, whether pain or associated activity restrictions led to less-than-flourishing mental health or

What is already known on this subject?

- Results of previous research on the role of activity restriction as a mediator in the relationship between pain and mental illness have been inconclusive.

- Many studies were based on small samples, examined specific subpopulations, and assessed mental illness with measures of depression.

- A longitudinal study found flourishing mental health to be protective of all-cause mortality.

What does this study add?

- The relationship between pain, prevention of activities, and mental health rather than mental illness was assessed.

- More than 6 million adults (22%) reported chronic pain in 2011/2012.

- Those in chronic pain were less likely to be in flourishing mental health (69% versus 79%).

- Even when socio-demographic and health characteristics were taken into account, those with moderate or severe pain intensity had lower odds of flourishing mental health than did those with mild pain.

- Activity restriction was independently associated with flourishing mental health, and mediated the association between pain intensity and flourishing mental health, supporting the Activity Restriction (AR) model.

- Differences in the AR model by age group and sex were not apparent.

vice versa. Although the pain-mental *illness* relationship may be bidirectional, pain is generally considered to be more likely to lead to depression than the other way around.[1] Whether this is also true for mental *health* is not known.

Finally, data from the CCHS were self-reported and not verified by another source.

Conclusion

This study emphasizes that both pain intensity and pain-related activity prevention play direct and indirect roles in the impact of chronic pain on mental health. The findings support the AR model in a general population of adults with chronic pain using mental health, a concept independent from mental illness, as the outcome. Differences by age group or by sex were not found in this study. Understanding factors that mediate the effects of pain intensity might reveal areas of intervention that could reduce the impact of pain on mental health. Further research might examine factors such as the role of psychological resources in the pain-mental health relationship. ∎

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Appendix

Table A

Study sample and percentage distribution of selected characteristics, household population aged 18 or older with chronic pain, Canada, 2011/2012

Characteristic	Sample number	Population estimates ('000)	%
Total	26,429	5,595.1	100.0
Sex			
Men	10,165	2,427.7	43.4
Women	16,264	3,167.4	56.6
Age group			
18 to 34	3,277	973.8	17.4
35 to 49	4,792	1,441.9	25.8
50 to 64	9,493	1,895.4	33.9
65 or older	8,867	1,283.9	22.9
Education			
Postsecondary graduation	16,365	3,793.3	73.4
Less than postsecondary graduation	8,355	1,375.0	26.6
Marital status			
Married/Common-law	14,138	3,512.5	62.9
No partner	12,233	2,073.9	37.1
Household income quintile			
Lowest	6,432	1,378.2	24.7
Low-middle	5,773	1,213.9	21.7
Middle	5,342	1,097.5	19.7
High-middle	4,223	977.4	17.5
Highest	4,144	914.9	16.4
Race/Cultural identity			
White	22,709	4,420.6	84.6
Black	227	112.9	2.2
Other	1,359	691.2	13.2
Pain intensity			
Mild	7,792	1,851.5	33.2
Moderate	14,024	2,864.1	51.4
Severe	4,417	855.8	15.4
Number of activites prevented by pain			
None	7,406	1,654.1	29.7
A few	7,354	1,661.6	29.8
Some	6,222	1,275.6	22.9
Most	5,290	980.1	17.6
Flourishing mental health	18,074	3,832.7	68.5
Chronic physical conditions			
None	3,404	954.8	17.3
One	5,890	1,487.8	26.9
Two	6,091	1,278.1	23.1
Three or more	10,700	1,812.2	32.8

Note: Because of missing data, detail may not sum to total.
Source: 2011/2012 Canadian Community Health Survey.