

**Back Pain Beliefs and their Impact on Treatment Seeking Behaviour**

by

Alexander Jordan Bell-Moratto

A thesis submitted in partial fulfillment of the requirements for the degree of

Master of Science

in

Rehabilitation Science

Faculty of Rehabilitation Medicine

University of Alberta

© Alexander Jordan Bell-Moratto, 2019

## Abstract

**Background:** Back pain is the world's leading cause of disability, and has high associated cost. Psychosocial factors such as unhelpful, maladaptive beliefs can be instrumental in the transition from acute to chronic disabling back pain. One such maladaptive belief is that back pain is due to serious spinal pathology and therefore requires rest. Many mass media campaigns have been undertaken in an effort to impact back pain beliefs (including staying active during bouts of back pain), but only a select few campaigns have had a significant impact on health behaviours.

**Objectives:** To determine the clinical and demographic factors associated with holding adaptive vs maladaptive beliefs about physical activity during back pain. To test if believing people should stay active with back pain is associated with often back pain is discussed with healthcare providers. Finally, to see if respondents that endorse 'staying active with back pain' utilize more physically active treatments compared to people endorsing maladaptive beliefs.

**Methods:** Secondary analysis of a cross sectional survey evaluating a mass media campaign. 1979 Canadian adults were surveyed between 2014-2017. Questions included demographic and clinical factors, a 5-point Likert scale of their agreement with the statement "If you have back pain, you should stay active", and information about their healthcare use and treatment preference. The nonparametric Kruskal-Wallis Test was used to compare respondents who endorsed the 'stay active' belief, to those who endorse rest.

**Results:** Average pain rating was the only demographic/clinical factor that statistically differed based on respondents' agreement that people should stay active with back pain ( $p < 0.01$ ).

Treatment preference lacked differentiation based on agreement with the stay active belief ( $p = 0.02$ ). Agreement with the 'stay active' belief was associated with more discussions with healthcare practitioners about back pain treatment ( $p = 0.01$ ).

Implications: The link between average pain score and beliefs was small and likely not meaningful. Considering other research, some demographic/clinical factors may have been oversimplified in the analysis. Treatment preference also lacked differentiation based on agreement with the stay active belief. Further research is needed in order to clarify this relationship. This study did display that beliefs are pertinent to treatment behaviour in back pain. Other research has shown that mass media campaigns on this topic have changed beliefs but struggle to change behaviours. Rather than targeting beliefs at a population level, perhaps a better strategy would be ensuring practitioners properly address beliefs during clinical interactions. A limitation for generalizing these findings are that the majority of respondents agreed with the ‘stay active’ belief, therefore the results should be verified using objective measures.

## Preface

Ethical approval was obtained from the University of Alberta prior to conducting this study. This study was a secondary analysis, and the original study was approved by the University of Alberta Health Research Ethics Board.

## Acknowledgements

Thank you to my supervisors, Dr. Gross and Dr. Bostick for their continued insightful guidance. Thank you Dr. Suman for all the helpful input. I would also like to recognize my wife and family for the abundance of support.

## Table of Contents

List of Tables	viii
List of Abbreviations	ix
Glossary of Terms	x
1. Epidemiology of Back Pain	1
i. Global Burden of Back Pain	1
ii. Burden of Chronic Back Pain	1
2. Psychological Factors Associated with Back Pain	2
i. Pessimistic Beliefs about Back Pain	3
ii. Fear and Avoidance	3
3. Behavioural Theories	4
i. Overview	6
ii. Relevant Behavioural Theories	7
4. Treatment Behaviours	13
i. Seeking Treatment	13
ii. Patient Preference	14
5. Social Marketing Targeting Back Pain Beliefs	15
6. Knowledge Gap	16
7. Purpose	16
8. Research Questions	17
9. Hypotheses	17
10. Methods	17
i. Study Design	17
ii. Study Population	18
iii. Data Collection and Measures	18
iv. Variables	21
v. Data Analysis	22
11. Ethical Considerations	23
12. Results	23
i. Sample Characteristics	23
ii. Experience with Back Pain	25
iii. Hypothesis 1	27
	vi

iv. Hypothesis 2	30
v. Hypothesis 3	31
13. Discussion	32
i. Hypothesis 1	32
ii. Hypothesis 2	33
iii. Hypothesis 3	35
iv. Limitations	36
14. Conclusion	37
Bibliography	38
Appendix I	50
Appendix II	52
Appendix III	64
Appendix IV	68

## **List of Tables**

3. Table 1: Behavioural Theories.
12. Table 2. Sample population characteristics.
12. Table 3. Results of survey question, “Check up to 5 activities you are most likely to do to help deal with your back pain” and how each variable was dichotomized.
12. Table 4. Mean pain intensity and standard deviation in each analysis.
12. Table 5. Demographic and clinical factors correlation to agreement with statement ‘if you have back pain, you should try to stay active’.
12. Table 6. Seeking treatment vs agreement with statement ‘if you have back pain, you should try to stay active’, including greyscale to represent category distribution, 2014/2015.

## **List of Abbreviations**

LBP: Low back pain.

US: United States of America.

HIV: Human Immunodeficiency Virus.

COM-B: capability, opportunity, motivation related to behaviour.

SCT: Social Cognitive Theory.

HBM: Health Belief Model.

TPB: Theory of Planned Behaviour.

TMC: Transtheoretical Model of Change.

AIDS: Acquired Immune Deficiency Syndrome.

BCW: Behavioural Change Wheel.

ER: Emergency Room.

STROBE: Strengthening The Reporting of OBServational Studies in Epidemiology.

## **Glossary of Terms**

1. Back Pain: Waddell, 2005, defines back pain as a general term referring to pain related symptoms felt in either the lower, middle, or upper region of the back.
2. Low Back Pain: Dionne, 2008, classifies low back pain as a symptom that is defined by the location of pain, typically between the lower rib margins and the buttock creases.
3. Belief: As defined by Fishbein, 1963, “concepts that individuals find to be probable (or likely true)”.
4. Adaptive Belief: Beliefs that help facilitate recovery from back pain.
5. Maladaptive Belief: Any belief that hinders recovery from back pain.
6. Health Behaviour: Conner & Norman, 2005, claim health behaviour is “any activity undertaken for the purpose of preventing or detecting disease, or for improving health and wellbeing”.
7. Active Treatment: Any treatment where the patient has a task to perform in order for the treatment to occur. Examples are exercise or stretching.
8. Passive Treatment: Any treatment where the patient is merely a recipient of treatment that is done to them. Examples are getting a massage, or do nothing/wait it out.

## **1. Epidemiology of Back Pain**

### **i. Global Burden of Back Pain**

Back pain is a general term that refers to pain related symptoms felt in either the lower, middle, or upper region of the back.<sup>1</sup> The vast majority (approximately 85-90%) of back pain is not attributed to a specific pathology.<sup>2</sup> Because of the unknown cause, these cases are deemed non-specific back pain.<sup>1,2</sup> In 2016, low back pain (LBP) was ranked the number one cause of disability in the world and it has been atop the list since the nineties.<sup>3</sup> Out of all conditions, LBP globally causes roughly 11% of all years lived in disability.<sup>4</sup> LBP is also the leading global cause of activity limitation,<sup>5</sup> is USA's second largest reason for consulting a physician,<sup>6</sup> and is Australia's top reason for early retirement and income poverty.<sup>7</sup> Estimates of the lifetime prevalence of LBP are as high as 84% globally,<sup>8-10</sup> although a definitive number is difficult to estimate given the large variation in definitions of back pain.<sup>10</sup> Canadians experience back pain at a similar rate to the global rate (approximately 84% lifetime prevalence).<sup>11</sup>

Given the high prevalence rates of back pain, it is not surprising that there are enormous associated costs. One study from the US found that LBP had the biggest increase in patient healthcare spending between 1996 and 2013 and was the third most expensive condition for patients.<sup>12</sup> In 2013, people with LBP and neck pain spent 87.6 billion dollars out of pocket in health services in the US, and this figure is quickly climbing.<sup>13</sup> Although expenditures have increased dramatically, this has not resulted in a substantial improvement in patient outcomes.<sup>14</sup>

### **ii. Burden of Chronic Back Pain**

Back pain lasting longer than three months (i.e. chronic back pain) has a global lifetime prevalence of 39.9%, and several studies indicate that this prevalence is climbing.<sup>15-17</sup> One study found that the prevalence of chronic LBP in North Carolina soared 162% between 1992-2006.<sup>17</sup> This is a troubling statistic, as people with chronic pain (including chronic back pain) have been shown to have higher associated disability and costs compared to acute injuries.<sup>18,19</sup> One study of patients with chronic LBP in Brazil found that 52.5% of participants had moderate to severe disability.<sup>20</sup> Patients with chronic LBP have higher unemployment, work absenteeism, and lost productivity compared with other employees,<sup>21</sup> and are also prescribed opioids more commonly

than other pain conditions.<sup>22</sup> Chronic pain is associated with higher rates of suicide and psychiatric disorders<sup>18</sup> and is highly prevalent in Canada. The lower back is the most commonly affected body site with more than a third of Canadian patients with chronic pain reporting LBP.<sup>23</sup>

Back pain is a highly prevalent and global problem.<sup>8</sup> Chronic case can have poor outcomes and high associated costs.<sup>18,19</sup> Therefore, an important question arises: “What factors facilitate the shift from an acute bout of back pain to chronic cases?” Understanding this transition is a vital step for effective prevention and rehabilitation. Dealing with any complex medical issue is multifaceted, but one element crucial to back pain management are psychological factors.

## 2. Psychological Factors Associated with Back Pain

Most guidelines recommend that management of non-specific back pain focuses on three things: advice to stay active, providing reassurance, and symptom control.<sup>24-27</sup> Additional treatment beyond these basics (during first-line care) has shown no further long-term outcome benefit.<sup>24</sup> Advice and reassurance are both interventions that address psychological factors, such as beliefs. Beliefs are concepts that individuals find to be probable (or likely true).<sup>28</sup> Psychological factors are the mental or emotional characteristics that can either enhance health or increase risk of disease (such as anxiety, depression, or “perceived control over life”).<sup>29</sup> Beliefs and other psychological factors are pertinent to patients with chronic pain in several ways; depression and anxiety are more common in people with chronic pain.<sup>16,30,31</sup> Even a person’s understanding of their condition can impact their health. Attributing back pain to structural, biomedical explanations (rather than believing back pain has more of a psychological cause) has been found to be associated with higher disability in several studies.<sup>30,32,33</sup>

One treatment that can address patient beliefs, is patient education. Adding education (such as teaching patients to stay active) to initial treatment of back pain has been shown to reduce pain, disability, psychological distress, use of healthcare, and improve rates of return to work.<sup>29,34,35</sup> These recommendations are often underutilized in back pain. This results in many patients incurring large medical cost for treatments which may be of little value.<sup>36</sup> This is unfortunate, as the effectiveness of intensive, individual patient education is on par with other conventional treatment (joint manipulation or physiotherapy) for acute and sub-acute LBP.<sup>27</sup> Better management of back pain during early stages may reduce chronic cases. An education

element can be easily integrated with other treatments<sup>27</sup> and addresses beliefs that are maladaptive to coping with an episode of back pain. Relevant beliefs that can influence disability (and should be addressed during interventions) are discussed below.

### **i. Pessimistic Beliefs about Back Pain**

Positive or negative beliefs surrounding the cause and course of back pain have been shown to influence disability. Unhelpful perceptions about one's back pain (e.g. that it will cause serious ramifications, or that it is not easily controlled) is related to persistent and higher levels of disability.<sup>32,37-40</sup> A real life example would be if an individual believes their back pain is due to serious pathology, avoids physical activity, then subsequently abandons their usual life activities.<sup>41</sup> For example, poor scores on the Back Beliefs Questionnaire (which rates level of agreement on statements such as: back trouble makes everything in life worse and back trouble should be rested) has been shown to be associated with higher disability.<sup>38,41</sup> These maladaptive views appear to be prevalent. Results of a 2017 study indicate that patients with chronic LBP believe their condition is very negative, complex, permanent, and 'like a broken machine'.<sup>40</sup> Most troubling was that 89% of the participants identified Health Practitioners as the source of their beliefs.<sup>40</sup>

### **ii. Fear and Avoidance**

Beliefs about the course of pain is an important determinant of outcome (namely pain and disability).<sup>42</sup> Fear-avoidance beliefs are common among people with highly disabling chronic back pain.<sup>18,43-49</sup> Fear-avoidance is where the individual avoids certain activities due to pain-related fear.<sup>43,44,46,49</sup> Pain-related fear is distress caused by anxiety related to experiencing pain, participating in painful activities, movement, injury, or re-injury.<sup>43</sup> Avoidance of strenuous or pain-generating activity may facilitate healing in acute injury, but is problematic in chronic cases.<sup>18</sup> Avoidance in chronic cases can spiral into more fear and subsequent avoidance, which can cause these patients to do less movement/activities (i.e. increased disability).<sup>18</sup> High fear-avoidance beliefs have been shown to predict poor outcomes (including disability),<sup>43</sup> and correlates with higher pain intensity.<sup>50</sup> The fear-avoidance/disability relationship has been shown in chronic pain patients<sup>43</sup> as well as acute pain.<sup>51</sup> Some research indicates that fear-avoidance beliefs that healthy individuals hold preinjury can potentially predict future outcomes.<sup>49,51,52</sup> It is

important to note that the activity patterns of individuals with chronic pain are not simple<sup>46</sup>; some acts might elicit fear/avoidance beliefs, while others will not. This is a complex phenomenon which is most likely context specific.<sup>46</sup>

Another key precursor to prolonged pain and disability is catastrophization.<sup>46</sup> Catastrophizing occurs when individuals have a belief that they will experience severe negative outcomes from an actual or anticipated pain experience.<sup>53</sup> These worries of worse outcomes can result in higher disability and more prolonged pain.<sup>46,54</sup> Some research suggests that catastrophizing may be part of the cycle of fear and avoidance.<sup>52,55</sup> According to the Fear-Avoidance Model, these worries lead to pain related fear, which results in a spiral of avoidance causing more fear and subsequent avoidance.<sup>52,55</sup> This process can lead to disuse and hindering the physical activity necessary for recovery.<sup>52,55</sup> There is conflicting research on the specific order of these relationships, but the culmination of these factors are pertinent nonetheless.<sup>46</sup>

Highlighting the fear-avoidance cycle outlines how individuals can arrive at maladaptive beliefs, such as: back trouble should be rested. These maladaptive beliefs are prevalent among clinical populations and the general public (according to several reports throughout different cultures).<sup>52,56-59</sup> Catastrophizing and pain-related fear unfortunately facilitate these beliefs, which can result in higher disuse and disability.<sup>52,57</sup> Therefore, such beliefs are possible targets for interventions aimed at promoting health behaviours that minimize patient disability.

### 3. Behavioural Theories

Beliefs are often modifiable, making them ideal candidates for intervention in an attempt to have an effect on patients' health.<sup>60</sup> In some instances, changing beliefs can improve the likelihood that individuals will try (and succeed) in changing behaviour.<sup>61</sup> A useful example is HIV prevention: the HIV epidemic in sub-Saharan Africa was exacerbated by a lack of understanding that sharing needles during injection drug use can transmit HIV.<sup>62</sup> Had the region's population held the belief that sharing needles can increase risk of contracting HIV, the rate of participating in this risky behaviour may have dropped.<sup>62</sup> The ultimate goal of studying beliefs in this context, is to have an impact on patients' health behaviour (and subsequently their health and wellbeing).

Health behaviours are "any activity undertaken for the purpose of preventing or detecting disease, or for improving health and wellbeing".<sup>63</sup> Examples of health behaviours include

vaccination, participating in health screening, and self-directed behaviours like diet or exercise.<sup>60</sup> Holding different beliefs can lead some individuals to participate in adaptive health behaviours (that is, behaviours that will foster wellbeing) and others to not.<sup>60</sup> Several examples of beliefs relevant to health behaviour are as follows<sup>60</sup>:

- knowledge of potential health risks
- perceptions of health risks
- potential efficacy of behaviours in reducing risk
- perceived social pressures to perform behaviour
- control over performance during the behaviour

Behaviour change interventions can be difficult to implement successfully.<sup>64</sup> Many interventions aimed at changing behaviour have not shown positive results in formal evaluations.<sup>65-67</sup> There are many variables involved in behaviour change which can complicate the situation (policy environment, the type of behaviour, choosing an appropriate intervention).<sup>68</sup> Selecting an appropriate behavioural theory based on the literature to guide interventions may increase potential effectiveness.<sup>68</sup> Every health behaviour is different, so certain theories will be well suited for some behaviour but not others. A simple example is that some interventions aim to implement healthy (or adaptive) behaviour while others aim to de-implement maladaptive behaviour.<sup>69</sup> The purpose of this section is to discuss the best suited theories to apply to promoting exercise for patients with back pain. Given the large variation of terms used in different health fields, we must first find an acceptable definition of ‘theory’. Much of the behavioural science research uses a variety of terms for the same purpose, which can create confusion (for example, framework, theory, or model).<sup>70</sup> Thus, clarifying key definitions such as ‘theory’ represents a key first step in identifying the most relevant theories for this work. In a scoping review paper aimed at identifying behavioural change theories, Davis et al. (2015) used an iterative process to arrive at an expert consensus on a working definition of the term ‘theory’. The definition they agreed on was: “A set of concepts and/or statements with specification of how phenomena relate to each other. Theory provides an organising description of a system that accounts for what is known, and explains and predicts phenomena”.<sup>70</sup> With this definition in mind, theories that are best suited to explore the relationship between health behaviours and beliefs about exercise will be discussed.

## **i. Overview**

There are an enormous amount of health behaviour theories in research. Some theories were specifically created with general behaviour change in mind (health belief model, transtheoretical model), some were designed for specific behaviours (Aids Risk Reduction Model,<sup>71</sup> Ecological Model of Diabetes Prevention<sup>72</sup>), and some theories originated in other contexts and are being applied to health behaviour (theory of planned behaviour, social cognitive theory).<sup>73</sup> Also, many theories have evolved over time (for example the theory of reasoned action to the theory of planned behaviour).<sup>74</sup> Theories that will be considered in this review have a strong body of research showing their ability to predict if individuals will engage in the desired behaviour, and have a good fit with the complexity of back pain.

Back pain is unique in several ways. Many potential psychological factors that can influence back pain and its associated disability have already been discussed in previous sections. These psychological factors can involve any aspect of life (such as employment, home life, recreation). For example, a father with back pain may be worried that he will not be able to lift his child, or an employee may be afraid they will be unable to perform their work tasks and fear they might lose their job. These situations are multifactorial, and physical activity can add even more to the equation. Asking a patient to stay active despite pain may be counterintuitive and clash with deeply-held beliefs. The individual's environment is another important consideration as illustrated in this scenario: what if an employee tries to modify their activities in order to stay at work, only to find out that they will only receive insurance coverage for injuries requiring time off work? These examples illustrate the many ways that an episode of back pain can become complex. An overarching theory will have to acknowledge this complexity by addressing constructs on an individual level as well as environmental or external factors that can influence behaviour.

Also, ideal theories will have good capability to predict if someone will perform a behaviour or not. It is unreasonable to expect a theory to account for 100% of the variance in behaviour, but many models have been shown to predict a substantial amount of variance. Rosenthal and Rubin (1982) showed that if a model could account for 19% of variance in behaviour, that would equate to a large difference in a study of behaviour change. A model accounting for 19% of the variation would mean the difference between 72% of the treatment group performing the behaviour, compared to just 28% in the control group.<sup>75</sup>

## ii. Relevant Behavioural Theories

Below are tables providing an overview of several relevant theories, including their strengths and weaknesses in application to back pain.<sup>68,76-79</sup> From this list, we will select the most appropriate and explain the decision.

*Table 1: Behavioural Theories.*

	Rothschild Framework	Behaviour Change Wheel
Creator(s)/Initial Reference/Year	Rothschild, M. Carrots, Sticks, and Promises: A Conceptual Framework for the Management of Public Health and Social Issue Behaviors. 1999.	Michie, S. West, R. The behaviour change wheel: A new method for characterising and designing behaviour change interventions. 2011.
Notable Constructs	Education is a mechanism capable of changing individuals, law is a societal change, social marketing is some combination of the two.	Inner layer: COM-B (capability, opportunity, motivation related to behaviour). Outer layer: policy environment. Middle layer is the intervention functions: education, restrictions, persuasion, modeling, training, etc.
Summary	Interventions are on continuum from libertarian approach (public education), to authoritarian (law/policy interventions). In the middle stands social marketing. Needs assessment is done	Culmination of 19 behaviour change frameworks. Involves three layers: Inner layer speaks to barriers/facilitators on individual level. Mid layer is interventions. Outer layer is policy/legal aspects in which

	<p>initially, to determine what category of intervention is most pertinent. Taking into account aspects from many points along the continuum is recommended in order to take a holistic approach.</p>	<p>the interventions exists. Aim is to be comprehensive (apply to every possible intervention), cohesive (categories are all exemplars of the same type and specificity of entity). Also links to an overarching model of behaviour.</p>
<p>Strengths &amp; Applicability to Back Pain Messaging</p>	<p>Social marketing subtly guides individuals towards behaviours, to maintain their autonomy and responsibility. Either upstream to policy makers or downstream to individuals. Policy environment is a key factor in back pain.</p>	<p>Other models that try to be this comprehensive usually lack structure (Michie, 2011). The Behaviour Change Wheel attempts to be more systematic while staying encompassing.</p>
<p>Potential Drawbacks or Critiques</p>	<p>Interventions rooted solely in one end of the continuum may be ineffective with complex behaviour such as back pain. Messages only effective if the alternative to the status quo is appealing. May also require something in place to prohibit undesired behaviour. Social marketing assumes behaviour is based</p>	<p>If important behavioural change frameworks were missed during the wheel's inception, those concepts will be lacking. It may be difficult to implement due to the complexity.</p>

	on lack of opportunity, not lack of motivation.	
--	---	--

	Social Cognitive Theory (SCT)	Health Belief Model (HBM)
Creator(s)/Initial Reference/Year	Bandura, A. Social foundations of thought and action : a social cognitive theory. 1986.	Rosenstock, I. Hochbaum, G. Kegeles, S. Leventhal, H. Why people use health services. 1966.
Notable Constructs	Goals, outcome expectancies, self efficacy, and socio-structural factors.	Cues to action (can be internal or external), self efficacy, perceived threat, and perceived benefits vs barriers.
Summary	Goals are intentions to perform a behaviour. Outcome expectancies are physical, social, or self-evaluative (similar to behavioural beliefs of TPB). Self efficacy is the ability to perform behaviour in the face of obstacles. Newer theory includes socio-structural factors (inhibitors or facilitators such as living conditions, politics, health systems).	Health behaviours are based on perception of illness threat, and evaluation of behaviours to counteract the threat. Illness threat is based on self appraisal of likelihood of getting the illness/injury, and perceived severity. Behaviours to counter risk are based on the potential benefits/barriers to action. A 'cue to action' to partake in healthy behaviours is necessary to change

		behaviours (the theory claims). The individual also needs adequate self efficacy to make behaviour change.
Strengths & Applicability to Back Pain Messaging	The cognitions are considered valid/reliable and are clearly defined. Describes motivations underlying behaviours. Identifies key targets to change motivation.	It is straightforward and easy to measure all variables. Rich literature base to draw from (has been used for compliance, lifestyle changes, response to symptoms, and behaviour interventions).
Potential Drawbacks or Critiques	Cognitions other than the ones outlined are negated (for example moral norms). Interventions not rooted in cognitions of SCM can also be neglected (for example legislation change). There lacks a discussion of means to change motivation.	Does not include some factors that have shown relevance in other research such as: impulsivity, habit, self-control, associative learning, and emotional processing. There are also many environmental elements that could impact the behaviour, yet are out of the individual's control.

	Theory of Planned Behaviour (TPB)
Creator(s)/Initial Reference/Year	Ajzen, I. From intentions to actions: A theory of planned

	behavior. 1985.
Notable Constructs	Attitude, subjective norms, and perceived behavioural control. These lead to intention and behaviour.
Summary	An individual's attitude towards the behaviour, their perception of what others in society think about the behaviour (subjective norms), and the perceived behavioural control (ostensibly the same as self-efficacy) all determine an individual's intentions and behaviour.
Strengths & Applicability to Back Pain Messaging	Able to somewhat predict if behaviour will occur in variety of different behaviours (including social and health issues). The theory has also proved beneficial in interpreting adherence to treatment in several instances. By including 'perceived behavioural control', the theory is conscious of elements out of the individual's control.

Potential Drawbacks or Critiques	Degree of predictability varies greatly between behaviours. It is much more accurate when looking at beliefs and intentions rather than behaviours. Many studies simply show correlation rather than causation. Many studies are somewhat simplistic (healthy student subjects, examining one behaviour).
----------------------------------	---

Some notable exclusions to the list are the Transtheoretical Model of Change (TMC), Self Determination Theory, and Health Action Process Approach. The constructs of Self Determination Theory and Health Action Process Approach mirror the constructs of selected theories closely. Additionally, selected theories such as the SCT have shown predictability in a wide range of behaviours, such as exercise, nutrition, quitting smoking, alcohol consumption, AIDS prevention, and many more.<sup>80,81</sup> The TCM has been critiqued on many grounds.<sup>70,82</sup> The applicability to physical activity has been questioned, as the model may not be appropriate for such a complex behaviour.<sup>83</sup> There are questions as to the validity of what ‘stage’ people are in, and may be missing relevant determinants for what causes people to shift ‘stages’.<sup>83</sup> Many studies showing association between the TCM and behaviour show a weak connection.<sup>84,85</sup> The TCM is more commonly applied to addictions behaviour,<sup>86</sup> whereas other theories seem to fit back pain behaviour better.

In the following study, the Behavioural Change Wheel (BCW) will be applied. The utilization of the BCW will help us understand the relationship between beliefs and behaviour in a back pain context. The BCW takes a systematic approach that accounts for the individual factors as well as the relevant environmental factors.<sup>68</sup> The balance of comprehensiveness and cohesiveness is well suited to guide an exploration into the complex health behaviours related to back pain. As for the ability of the theory to predict if individuals will change a behaviour, it is

based on a systematic review of 19 frameworks and appears to be a reliable way to identify components of intervention functions or policy categories.<sup>68</sup> As with any theory it has limitations, including the potential that an important framework was missed during the review, and that certain frameworks may be more important with certain behaviours (and less with others).<sup>68</sup> Overall these limitations are acceptable, given that the BCW will be used for a discussion of the implications of this work, rather than guiding how an intervention will be carried out.

#### 4. Treatment Behaviours

##### **i. Seeking Treatment**

Every decision that individuals make is influenced by their beliefs to some degree. In the treatment of back pain, a health behaviour of particular importance is electing to seek treatment or not. Although seeking treatment in itself is not a negative behaviour,<sup>87</sup> there are many patients with back pain who are not getting substantial benefit from using many healthcare resources.<sup>26,36</sup> Around half of all people with LBP seek treatment,<sup>88</sup> but rates for chronic cases are much higher and are increasing (one US study found 84% of chronic LBP patients sought treatment).<sup>17</sup> High rates of potentially ineffective treatment is an inefficient approach to this problem. As an example, one American study from 2012 found participants reporting “a lot of pain” occurring “most days” or “everyday” saw their healthcare practitioner just under once every two weeks (0.69 and 0.72 respectively).<sup>89</sup> They also averaged over one ER visit per year (1.35 and 1.38 respectively).<sup>89</sup> If research of increased treatment seeking<sup>17</sup> and healthcare spending<sup>14</sup> was associated with lower prevalence rates for back pain, this would be a sign of an effective healthcare strategy against this epidemic. Unfortunately the increase in spending has not resulted in better outcomes,<sup>14</sup> and the prevalence of back pain remains extremely high.<sup>3,8</sup> Additionally, there are risks and side effects associated with many of these ineffective treatments.<sup>90,91</sup>

Establishing what drives the choice of seeking treatment for back pain is therefore an important question to answer. Some studies have shown that sex or socioeconomic status correlate with higher rates of healthcare utilization for LBP,<sup>87,92,93</sup> but the majority of studies on demographic characteristics find no relation with healthcare utilization.<sup>92-96</sup> Clinical or

psychological factors such as increased pain, more perceived disability, maladaptive fear avoidance beliefs, and increased frequency of back pain incidents have been found to be associated with increased rates of seeking treatment for back pain.<sup>56,87-89,92,97</sup> Patients with chronic back pain may also have increased consultation rates due to comorbid depression or having an external locus of control for pain.<sup>88</sup>

One 2016 study found that the odds of seeking treatment was higher for individuals who rated their pain higher.<sup>97</sup> Interestingly enough, if the participant's pain rating was compared to their own previous pain ratings, rather than to others in the sample, it was more predictive of treatment seeking.<sup>97</sup> Potentially, it may not be the specific numeric pain rating that indicates a higher likelihood of more treatment seeking, but instead a person's past experiences. Past experiences with back pain help individuals shape their beliefs, which is part of the context in which people deal with their injury or illness. These beliefs then drive decisions such as whether or not to seek treatment.<sup>87</sup>

## **ii. Patient Preference**

If individuals decide to seek treatment for their back pain, an important question arises: what treatment do they prefer? Patient values and preferences are one of the pillars of evidence based practice,<sup>98</sup> and have been found to be associated with satisfaction with treatment.<sup>99</sup> If the patient finds the rehabilitation process satisfying, they are more likely to follow the advice of the healthcare practitioner and adhere to recommendations.<sup>99</sup> Problems arise when the approach that is in line with best practice guidelines, is in conflict with the patient's preferred treatment. Correctly identifying what treatment patients with back pain prefer is the first step in minimizing any potential discord.

Qualitative studies have found several preferences that patients with back pain consistently voice a desire for:

- In many instances the highest priority is decreased pain.<sup>99</sup> Especially treatments that help them return to activities of daily living rather than just temporary relief.<sup>100</sup>
- Many patients particularly value a clear diagnosis (many request diagnostic assessments and imaging), which may help validate and legitimize pain.<sup>99,101</sup>
- Understandably, many state they are "willing to try anything" on the stipulation that it

seems potentially effective or is deemed necessary by their healthcare practitioner.<sup>100</sup>

There are also many aspects of treatment interventions that patients commonly cite as necessary:

- Interventions that work in a way they can understand.
- Interventions that have more benefits than perceived risks.
- Individualized interventions, in order to get to the root cause of their back pain.<sup>100</sup>
- Interventions that they perceive as effective treatment, regardless of what the evidence says.

These preferences sometimes have the potential to generate patient dissatisfaction. If healthcare practitioners use evidence-based interventions while patients base their decisions on any information they have been exposed to (regardless of the source or credibility), this can cause friction. Additionally, patients with highly disabling chronic back pain have been shown to be more open to getting information about their condition from sources outside of their healthcare practitioner. These alternative sources include the internet or other people who have experienced back pain.<sup>38</sup> Oncology provides a poignant example of this phenomenon. Several studies have shown that fear, misconception, and unsubstantiated claims of survival potential often drive patient's treatment choices in oncology.<sup>101</sup> Extensive education from their healthcare practitioner can alter these preferences,<sup>101</sup> but it is unclear if this is true for back pain. Many health decisions made by patients with back pain can be based on misconceptions. For example, misinformation can cause the patient to believe that pain is an indication that movement is the cause of pain and should be avoided, resulting in a perpetual cycle of rest (due to fear/avoidance beliefs) and overutilization of ineffective healthcare.<sup>41</sup>

## 5. Social Marketing Targeting Back Pain Beliefs

Giving advice to patients that clashes with their beliefs about back pain or their established behaviours can be challenging for clinicians.<sup>38,41</sup> Changing beliefs is a difficult task. Adding to this difficulty is the fact that many clinicians do not follow guidelines for back pain treatment.<sup>102</sup> Whether through clinical interaction, or patients independently finding information from unknown sources, either scenario can result in maladaptive beliefs. This can put the patient at a disadvantage. One way to circumnavigate all the issues is to address the problem at a populational level. Media campaigns about back pain that aim to disseminate evidence-based health information are another way to change beliefs at the societal level.

Several back pain mass media campaigns have been done in North America, Europe and Australia,<sup>103-108</sup> and it would appear that if the breadth of the campaign is large enough, it is possible to change beliefs about back pain, en masse.<sup>105-107,109,110</sup> Some campaigns have used scale and cost to achieve their goal.<sup>106</sup> This allows the population sufficient exposure to the message.<sup>106</sup> Differences in budget (including media used and size of campaign) accounted for much of the variation in outcomes.<sup>103,106</sup> Lower budget campaigns were not as effective.<sup>103,106</sup> Evaluations of some of these campaigns have not assessed if the change in belief resulted in actual change in health behaviour.<sup>104,107</sup> Others cited that there has yet to be significant changes in health behaviour.<sup>103,105,106</sup>

Specificity of the message seems to be required for improvement in behaviour.<sup>103,105</sup> Any behaviour that is targeted, should be explicitly discussed in the message<sup>103,105</sup>; as was the case in the Australian campaign that successfully targeted a decrease of workers' compensation claims for back pain.<sup>105,108</sup> This media campaign was presented through the workers' compensation board, and several messages were work-related.<sup>105,108</sup> This would indicate using such explicit, tailored messages is a potential means of changing not only the beliefs, but the actual relevant health behaviours.<sup>103,110,111</sup>

## 6. Knowledge Gap

The highly prevalent problem of back pain appears to be continuing despite increasing visits to HCP and the associated costs.<sup>8,14</sup> It appears that patients with back pain have the potential for worse outcomes if they hold maladaptive beliefs.<sup>32,37-39,87,92</sup> One such maladaptive belief is that most back pain is due to serious pathology and requires rest.<sup>55,58,59</sup> This is a common assumption amongst the public,<sup>56,58,59</sup> despite much of the literature highlighting that staying active is a better course of action.<sup>112</sup> Media campaigns have resulted in some change in these back pain beliefs, but have had modest effects on health behaviour.<sup>103,105,106</sup> It seems intuitive that behaviours should follow beliefs, but so far this has not been the case. As indicated by the BCW, perhaps the many individual and environmental factors that make back pain and its associated disability unique are not well suited for population level education interventions.

## 7. Purpose

This study will examine the characteristics of people who endorse the adaptive belief that

one should stay active during back pain. The characteristics of this group will be compared to people who endorse a more maladaptive belief (that back pain is due to serious pathology and requires rest) to examine differences between groups. We will also examine whether people holding adaptive beliefs discuss treating their back pain at different rates than people holding maladaptive beliefs. Lastly, if they prefer active or passive treatment.

## 8. Research Questions

- Is there a difference in the demographic or clinical factors of individuals who endorse the adaptive belief ‘if you have back pain, you should stay active’ compared to those who do not?
- Do people endorsing the adaptive belief ‘if you have back pain, you should try to stay active’ discuss treatment less than those with more maladaptive beliefs?
- Do people who endorse the adaptive belief ‘if you have back pain, you should try to stay active’, prefer more active treatments (exercise, walk, etc.), rather than solely passive treatments (bedrest, massage, etc.)?

## 9. Hypotheses

1. Employed respondents will endorse the adaptive belief that ‘if you have back pain, you should stay active’, more than unemployed respondents.
2. Respondents endorsing the adaptive belief ‘if you have back pain, you should stay active’ will discuss with practitioners about treatment less than respondents endorsing a maladaptive belief.
3. Respondents endorsing the adaptive belief ‘if you have back pain, you should try to stay active’ will prefer more active treatments, whereas endorsing a maladaptive belief will prefer more passive treatments.

## 10. Methods

### **i. Study Design**

This study was conducted using a retrospective cross sectional study design. As such, we were guided by the STROBE Statement Checklist, which can be found in Appendix I. Data previously collected evaluating a mass media campaign on general population back beliefs was used.<sup>103</sup> Partners in Alberta, Canada (including the Workers’ Compensation Board) implemented

this mass media campaign in an attempt to improve beliefs about activity during back pain in this population.<sup>103</sup> Each year (starting in 2006) surveys were completed by inhabitants of Alberta, where the media campaign was undertaken.<sup>103</sup> During this period, Leger Marketing conducted the surveys. In 2014, the study used a different research firm called Advanis.<sup>110</sup> The change in firm was accompanied by a change in survey. This will be discussed in more detail below, but this change included not only questions about back beliefs, but detailed questions about respondents' behaviours.<sup>110</sup> The surveys also included demographic and clinical factors of the respondents.<sup>110</sup> This study involved a secondary analysis of the Advanis surveys that were completed from 2014-2017.

## **ii. Study Population**

Approximately 500 Albertans (aged 18-65) were surveyed each year from 2014 to 2017.<sup>110</sup> Thus, the sample size for this population is approximately 2,000 respondents, which gives ample power to the study. People under the age of 18 were excluded from the original study since the campaign was targeting the beliefs of working aged individuals.<sup>103</sup> Rather than randomly sample, the Advanis research firm utilizes a panel of participants through the data collection company "Research Now". Any Albertans are eligible to enroll to take part in a research panel. The incentive to enroll is that the participant can complete surveys in exchange for loyalty rewards points, vouchers, or virtual currency relevant to the publisher they enrolled through (Appendix II). Once they sign up, they are able to take as many (or as few) surveys as they like. They can stop the survey at any time, and will be emailed about future surveys that they are eligible for. The panels are considered representative of the Canadian population based on sex, age, income per year, and education (Appendix II).

## **iii. Data Collection and Measures**

Utilizing a data collection company allowed researchers to obtain results from thousands of respondents for a fraction of the cost. This data collection method facilitates collecting lots of information from each respondent, without greatly diminishing the response rate that typically accompanies long surveys. Appendix II provides more information about the panel's statistical makeup. Appendix III outlines all the questions that were included in the surveys. The questions relevant to the hypotheses are as follows.

Belief about physical activity with back pain:

- Response to the 5-point Likert scale statement “If you have back pain, you should try to stay active”. If the respondent agreed with that statement, they were categorized as endorsing this adaptive belief, whereas disagreement was categorized as endorsing the maladaptive belief. In previous studies, this question was able to detect changes in beliefs about back pain (throughout different cultures).<sup>103,110</sup> The 5-point Likert scale (completely disagree, disagree, neutral, agree, completely agree) will be grouped into a disagree group (completely disagree and disagree), a neutral group, and an agree group (combining completely agree with agree). It should be noted that only half the surveyed population answered the question “Rate your agreement with the following statement ‘If you have back pain, you should try to stay active’.” The other half was asked if they agree with the reverse, “If you have back pain, you should not be active, you should rest”.<sup>103</sup> This was done in an attempt to validate the question. For this study only the “stay active” wording was used since it is the most clear and concise.

Demographic factors included in the survey:

- Age range. This was grouped into 18-24, 25-34, 35-44, 45-54, 55-64, and over 65.
- Sex. Selection options were: male or female.
- Region in which they live. Selection options were: In Edmonton, near Edmonton, in Calgary, near Calgary, northern Alberta, southern Alberta, central Alberta, Rocky Mountains, or somewhere else. This was dichotomized into Urban (Edmonton, near Edmonton, Calgary, and near Calgary) and Rural (northern Alberta, southern Alberta, central Alberta, Rocky Mountains, or somewhere else).
- Employment status. Respondents were asked what best describes them: employed full time, employed part time, homemaker, retired, unemployed, student, other, prefer not to answer, self-employed, maternity leave, or receiving disability benefits. This was dichotomized into employed (employed full time, employed part time, maternity leave, or self-employed) or unemployed (homemaker, retired, unemployed, student, other, prefer not to answer, or receiving disability benefits).
- Exposure to the back beliefs mass media campaign. The respondents were asked if they have seen or heard any ‘Back pain, don’t take it lying down’ campaign ads. They selected a response from the options: ‘Yes, I have definitely seen/heard this before’, ‘I might have

seen/heard this before’, or ‘No, I have not seen/heard this before’.

- Primary language spoken at home or at work. In a yes/no format, the respondents were asked if English, French, or other is the primary language spoken at home or at work.

Clinical variables included in the survey:

- A. “How often would you say you experience any type of back pain?” (ranked on a five point Likert scale with 0=never and 5=always).
- B. “Which area do you experience back pain most often?” (response options are lower, upper, or mid back).
- C. “On a scale of 1-10, how would you rate the typical pain in your back?” (1=extremely mild, 10=extremely painful).

Frequency of discussion with healthcare practitioners:

- The amount that each individual discusses was measured using a 5-point Likert scale question. Respondents were asked “How often do you discuss ways to relieve your back pain with your doctor (or other healthcare providers)?”. Individual’s responded either very often, often, sometimes, rarely, or never.

Treatment preference:

- Respondents selected their top five of twenty-one treatment options in response to the question: “Check up to 5 activities you are most likely to do to help deal with your back pain”. The twenty-one options given range from “Do Nothing/Wait it out”, “Take a Nap”, all the way to “Getting a Massage”, “Going for a Walk”, or “Doing Exercise More Intense than Walking”. Respondents can also select a twenty-second option: “Other”. These treatments were dichotomized into either passive or active treatments. Passive options are any treatment where the patient is merely a recipient of treatment that is done to them. Examples are getting a massage, or do nothing/wait it out. Active options are any treatment where the patient has a task to perform in order for the treatment to occur. Examples are exercise or stretching. This distinction between active and passive treatment has been used in other studies with back pain.<sup>113,114</sup> Active interventions have shown more symptom relief,<sup>114</sup> and greater improvements in disability.<sup>114</sup> These response options will be used to form one of four categories: selecting only passive management strategies/treatments, selecting only one active management strategy/treatment, selecting

two active management strategies/treatment, selecting more than two active management strategies/treatment.

#### **iv. Variables**

Hypothesis 1) Employed respondents will endorse the adaptive belief that ‘if you have back pain, you should stay active’, more than unemployed respondents.

- Dependent Variable: Respondents’ score on the 5-point Likert agreement scale with the statement “If you have back pain, you should try to stay active”.
- Independent Variable: The demographic and clinical factors listed above (for example: age, sex, employment status, or frequency of back pain).

Hypothesis 2) Respondents endorsing the adaptive belief ‘if you have back pain, you should stay active’ will discuss treatment less than respondents endorsing a maladaptive belief.

- Dependent Variable: Respondents’ score on the 5-point Likert scale question “How often do you discuss ways to relieve your back pain with your doctor (or other healthcare providers)?”.
- Independent Variable: Respondents’ score on the 5-point Likert agreement scale with the statement “If you have back pain, you should try to stay active”.

Hypothesis 3) People endorsing the adaptive belief ‘if you have back pain, you should try to stay active’ will prefer more active treatments, whereas endorsing a maladaptive belief will prefer more passive treatments.

- Dependent Variable: The dichotomized answer the respondents gave to the question: “Check up to 5 activities you are most likely to do to help deal with your back pain”. The twenty two options were categorized into either active or passive treatment. These responses will be used to form one of four categories: selecting only passive management strategies/treatments, selecting only one active management strategy/treatment, selecting two active management strategies/treatment, selecting more than two active management strategies/treatment.
- Independent Variable: Respondents’ score on the 5-point Likert agreement scale with the statement “If you have back pain, you should try to stay active”.

## **v. Data Analysis**

The analysis was done using the IBM SPSS Statistics Version 25 software. Means and standard deviations (continuous variables) and percentages and interquartile ranges (categorical variables) were calculated as descriptive statistics to summarize the composition of the studied population.

Hypothesis 1: Each of the demographic or clinical factors of individual's endorsing the adaptive belief were compared to those who endorse the maladaptive belief. The nonparametric statistical test, the Kruskal-Wallis Test was used for the analysis. This test allowed comparison between the three groups without the assumption of normality, which allows the use of the nominal level independent variable and ordinal dependent. The only other assumptions to be checked before using this test are:

- That each observation is independent of one another.
- That the sample is random.

Significance for these hypotheses was set at an alpha of 0.01. Using an alpha of 0.01 helped to combat the fact that a large sample size can yield erroneous significant findings.

Hypothesis 2: To test the difference between people who do and do not endorse the adaptive belief (IV) in regards to how often they discuss their back pain with their healthcare provider (DV), a Kruskal-Wallis Test was used. Significance level for the hypothesis was set at an alpha of 0.01.

The independent variable of the adaptive belief was separated into three groups (agree with the belief, disagree, or neutral). The dependent variable of treatment seeking was determined through the respondents answer to the Likert 5 point question "How often do you discuss ways to relieve your back pain with your doctor (or other healthcare providers)?".

Hypothesis 3: To determine the difference between respondents endorsing the adaptive belief or maladaptive (IV) in relation to their treatment preference (passive or active) (DV). To test if these groups were different, a Kruskal-Wallis Test was used. Significance level for the hypothesis was set at an alpha of 0.01.

Given the large sample, there is an inherent risk of type I error. In order to minimize this risk, testing all three hypotheses will be carried out with the first two years of data, then again

with the last two years. Running the analysis twice allowed for validation of the results.

## 11. Ethical Considerations

Ethical approval was obtained from the University of Alberta prior to conducting this study (Appendix IV). As a secondary analysis, the database has been cleaned of any identifying features (such as participants’ names) to ensure confidentiality. The original study was approved by the University of Alberta Health Research Ethics Board.<sup>103</sup> The study’s data file exists on a computer in a locked lab located in Corbett Hall at the University of Alberta. Access to this computer is password protected.

## 12. Results

### i. Sample Characteristics

There were 4,073 respondents included in the survey. Of that total, 2,094 respondents were excluded since they were not asked the question “Rate your agreement with the following: ‘If you have back pain, you should try to stay active’”. These 2,094 respondents were asked the reverse - “If you have back pain, you should not be active, you should rest”.<sup>103</sup> This was done in an attempt to validate the question, but our analysis will use the ‘If you have back pain, you should try to stay active’ wording since it is the most clear and concise. Those that were asked the ‘stay active’ question were included in the study (n = 1,979). The characteristics of the population can be seen in Table 2. The majority of respondents were age 35-54 (41.2%), female (56.9%), living in urban centers (78.7%), spoke English as a first language (99.0%), and were employed (89.1%).

When the respondents were asked: ‘Have you seen or heard any of the following advertising messages in radio or television, newspaper or magazine stories, posters, online, or in other advertising?’ about the ‘Back pain: don’t take it lying down’ campaign, 21.9% said ‘Yes’, 32.1% said ‘Maybe’, and 45.9% said ‘No’ they had not seen this type of messaging.

*Table 2. Sample population characteristics.*

	2014 (n=502)	2015 (n=485)	2016 (n=495)	2017 (n=497)	Total 2014-2017 (n=1,979)
All values represent number (percent)					

Age Category					
18-34	130 (25.9)	75 (15.5)	147 (30.0)	128 (25.7)	480 (24.3)
35-54	218 (43.4)	187 (38.5)	209 (42.7)	200 (40.2)	814 (41.2)
55+	154 (30.7)	223 (46.0)	134 (27.3)	169 (34.0)	680 (34.4)
<i>Not Reported</i>	0	0	5	0	5
Sex					
Male	233 (46.9)	191 (39.4)	181 (36.6)	245 (49.5)	850 (43.1)
Female	264 (53.1)	294 (60.6)	313 (63.4)	250 (50.5)	1121 (56.9)
<i>Not Reported</i>	5	0	1	2	8
Location of Residence					
Urban (In/Near Edmonton or Calgary)	390 (78.0)	372 (76.9)	387 (78.3)	403 (81.4)	1552 (78.7)
Rural	110 (22.0)	112 (23.1)	107 (21.7)	92 (18.6)	421 (21.3)
<i>Not Reported</i>	2	1	1	2	6
Language					
English	497 (99.6)	480 (99.0)	488 (98.8)	487 (98.8)	1952 (99.0)
<i>Not Reported</i>	3	0	1	4	8
Employment Status					
Full/Part Time/Self Employment, Maternal Leave	451 (89.8)	451 (94.5)	379 (77.3)	471 (94.8)	1752 (89.1)
Unemployed, Homemaker,	39 (7.8)	23 (4.8)	97 (19.8)	22 (4.4)	181 (9.2)

Student					
<i>Preferred Not To Answer/ Other</i>	12	11	19	4	46
Agreement with the statement: 'If you have back pain, you should try to stay active'					
Disagree	30 (6.0)	30 (6.2)	35 (7.1)	31 (6.2)	126 (6.3)
Neither Agree or Disagree	57 (11.4)	57 (11.8)	59 (11.9)	49 (9.9)	222 (11.2)
Agree	415 (82.7)	398 (82.0)	401 (81.0)	417 (83.9)	1631 (82.5)
<i>Not Reported</i>	0	0	0	0	0

## ii. Experience with Back Pain

When asked how often they experienced back pain, 41.1% of respondents claimed to experience it sometimes, followed by 28.2% experiencing it often, 18.0% experienced it rarely, 9.9% experienced it always, and 2.8% never experienced it. The majority of cases (67.9%) were LBP (as opposed to upper or mid back pain at 18.8% and 13.3% respectively).

When asked the question "How often do you discuss ways to relieve your back pain with your doctor (or other healthcare providers)", the 2014/2015 analysis found that respondents who disagreed with the 'stay active' belief answered 'never' 30.0% of the time and 'rarely' 30.0% of the time. The respondents who agreed with the 'stay active' belief 'rarely' discussed with a practitioner 34.6% of the time, and 'sometimes' 33.3%. In the 2016/2017 analysis, 45% of the disagree group selected that they 'sometimes' discuss with a practitioner. In the agree group, 31.7% of respondents 'rarely' discussed with a practitioner and 33.7% 'sometimes' discussed with a practitioner.

Table 3 lists which treatment options were selected most often by respondents when asked, "Check up to 5 activities you are most likely to do to help deal with your back pain". The table also shows whether each variable was dichotomized to either an 'Active' or 'Passive' treatment option. The earlier analysis found that 50.0% of respondents who did not agree with the 'stay active' belief selected one active treatment option in their top five. The respondents

who agreed with the ‘stay active’ belief had one active option 45.1% of the time. In the later analysis, the disagree group had one active option in their top five 40.9% of the time. The agree group had one active option 42.7% of the time.

*Table 3: Results of survey question, “Check up to 5 activities you are most likely to do to help deal with your back pain” and how each variable was dichotomized.*

Treatment activity.	Percent of respondents that selected variable.		How variable was dichotomized. (Active or Passive)
	2014/2015 % of n (rank)	2016/2017 % of n (rank)	
Take pain killers.	52.1 (1)	52.4 (1)	Passive.
Lie down (but stay awake).	14.5 (6)	21.2 (8)	Passive.
Stretch out the affected area.	31.2 (2)	49.8 (2)	Active.
Go for a walk.	10.2 (9)	19.7 (10)	Active.
Apply heat.	20.9 (3)	32.0 (5)	Passive.
Apply cold.	6.6 (14)	12.9 (15)	Passive.
Get a massage.	19.4 (4)	36.7 (3)	Passive.
Sleep on it.	10.3 (8)	18.6 (12)	Passive.
Get physiotherapy.	6.3 (15)	13.2 (14)	Passive.
Get chiropractic care.	11.6 (7)	21.5 (7)	Passive.
Exercise more active than walking.	7.6 (12)	16.7 (13)	Active.
Stop doing the task that caused the pain.	15.6 (5)	20.9 (9)	Passive.
Do yoga.	3.5 (17)	12.0 (16)	Active.
Rehydrate.	8.5 (10)	19.1 (11)	Passive.
Go swimming.	1.5 (18)	5.3 (18)	Active.

Meditate.	0.6 (19)	2.3 (19)	Active.
Do nothing/wait it out.	7.7 (11)	9.6 (17)	Passive.
I don't know.	0.0 (21)	0.1 (21)	Passive.
Take a bath/shower/hot tub.	6.3 (15)	32.3 (4)	Passive.
Apply an ointment or cream.	7.3 (13)	31.1 (6)	Passive.
Other.	0.3 (20)	1.2 (20)	N/A

### iii. Hypothesis 1

During the first analysis (which looked at the years 2014 and 2015), there was a statistically significant difference between respondents who agreed, disagreed, or were neutral to the ‘stay active’ statement when comparing their intensity of back pain (Kruskal-Wallis H = 14.47,  $p < 0.01$ ). These results were confirmed by the second analysis (for the years 2016 and 2017: Kruskal-Wallis H = 15.33,  $p < 0.01$ ). Both analyses found that respondents in the ‘agree’ group had a higher mean pain score than the disagree group. Table 4 shows the mean and standard deviation of pain scores in each belief category for the two analyses (the years 2014/2015, then 2016/2017). The mean pain score for all four years combined was 5.0 out of 10 (SD = 2.37).

*Table 4. Mean pain intensity and standard deviation in each analysis.*

Agreement with ‘Stay Active with Back Pain’	Pain Intensity Rating					
	2014 & 2015		2016 & 2017		Total	
	Mean	SD	Mean	SD	Mean	SD
Disagree	4.8	2.30	5.2	2.23	4.8	2.82
Neutral	4.5	2.18	5.0	1.86	4.5	2.97

Agree	5.0	1.90	5.2	2.05	5.0	2.24
Total of 3 Categories	4.9	1.96	5.2	2.00	5.0	2.37
Significance	p < 0.01		p < 0.01			

No other variables showed a significant difference for agreement with the ‘stay active’ statement (as shown in Table 5). Exposure to the mass media campaign ‘Back Pain: Don’t take it lying down’ also showed no significant difference between the three ‘stay active’ beliefs (in 2014/2015, Kruskal-Wallis H = 5.96, p = 0.05, in 2016/2017, Kruskal-Wallis H = 5.60, p = 0.06).

*Table 5. Demographic and clinical factors correlation to agreement with statement ‘if you have back pain, you should try to stay active’.*

Age	Agreement with ‘stay active with back pain’								
	2014/2015			2015/2016			Total		
	Disagree	Neutral	Agree	Disagree	Neutral	Agree	Disagree	Neutral	Agree
18-34	14	32	159	24	40	216	38	72	375
35-54	31	41	333	30	37	342	61	78	675
55	15	41	321	12	31	260	27	72	581
Significance	p = 0.03			p = 0.03					
Sex	Agreement with ‘stay active with back pain’								
	2014/2015			2015/2016			Total		
	Disagree	Neutral	Agree	Disagree	Neutral	Agree	Disagree	Neutral	Agree
Male	37	56	331	32	50	344	69	106	675
Female	23	56	479	34	58	471	57	114	950
Significance	p = 0.10			p = 0.10					
	Agreement with ‘stay active with back pain’								

Location	Agreement with 'stay active with back pain'								
	2014/2015			2015/2016			Total		
	Disagree	Neutral	Agree	Disagree	Neutral	Agree	Disagree	Neutral	Agree
Urban	45	96	621	53	87	650	98	183	1271
Rural	15	17	190	13	20	166	28	37	356
Significance	p = 0.16			p = 0.16					
Employment Status	Agreement with 'stay active with back pain'								
	2014/2015			2015/2016			Total		
	Disagree	Neutral	Agree	Disagree	Neutral	Agree	Disagree	Neutral	Agree
Employed*	49	101	752	57	91	707	106	192	1459
Not Employed**	9	7	46	9	12	98	18	19	144
Significance	p = 0.65			p = 0.16					
Primary Language	Agreement with 'stay active with back pain'								
	2014/2015			2015/2016			Total		
	Disagree	Neutral	Agree	Disagree	Neutral	Agree	Disagree	Neutral	Agree
English	59	112	806	66	106	803	125	218	1609
Other	1	1	5	0	2	10	1	3	15
Significance	p = 0.63			p = 0.56					
Frequency of Back Pain	Agreement with 'stay active with back pain'								
	2014/2015			2015/2016			Total		
	Disagree	Neutral	Agree	Disagree	Neutral	Agree	Disagree	Neutral	Agree
Never	3	9	15	5	3	20	8	12	35
Rarely	13	30	148	10	22	134	23	52	282
Sometimes	26	37	339	29	45	337	55	82	676
Often	17	31	224	19	31	236	36	62	460
Always	1	7	87	3	7	91	4	14	178

Significance		p = 0.03			p = 0.03					
Location of Back Pain	Agreement with 'stay active with back pain'									
	2014/2015			2015/2016			Total			
	Disagree	Neutral	Agree	Disagree	Neutral	Agree	Disagree	Neutral	Agree	
Upper or mid back	18	20	249	26	36	268	44	56	517	
Low Back	39	85	549	35	69	530	74	154	1079	
Significance		p = 0.16			p = 0.10					

\*Employed includes: Full time, part time, self-employed, maternity leave.

\*\*Not Employed includes: Unemployed, student, retired, homemaker.

#### iv. Hypothesis 2

In the years 2014/2015, there was a statistically significant difference between respondents who agreed with the 'stay active' statement and seeking healthcare (Kruskal-Wallis  $H = 9.34$ ,  $p = 0.01$ ). The difference in the three beliefs can be seen in table 6; the table shows that the disagree group is more concentrated towards responding 'never' or 'rarely', whereas the agree group is more concentrated around 'rarely' and 'sometimes'. The 2016/2017 analysis was also significantly different between groups (Kruskal-Wallis  $H = 10.67$ ,  $p < 0.01$ ). The disagree group selected 'sometimes' 45.5% of the time. The agree group selected 'rarely' 34.6% of the time, and 'sometimes' 33.3% of the time. The neutral group selected 'never' 20.4% of the times, 'rarely' 38.0% of the time, and 'sometimes' 26.9% of the time.

Table 6. Seeking treatment vs agreement with statement 'if you have back pain, you should try to stay active', 2014/2015.

Agreement with 'Stay Active with Pain'	Frequency of discussing Back Pain with Health Care Professional					
	Never (%)	Rarely (%)	Sometimes (%)	Often (%)	Always (%)	Total (n)
Disagree	30.0	30.0	28.3	6.7	5.0	60
Neutral	19.3	38.6	23.7	14.0	4.4	114

Agree	15.3	34.6	33.3	13.5	3.3	813
Significance	p = 0.01					

### v. Hypothesis 3

When asked what their top 5 preferred treatments are for back pain, the agree, disagree, and neutral groups did not significantly differ in the number of active treatments (such as walking for exercises) selected. For the 2014/2015 years and 2016/2017 years the respective Kruskal-Wallis results are:  $H = 7.73$ ,  $p = 0.02$ , and  $H = 7.27$ ,  $p = 0.03$ . The mean number of active selections in 2014/2015 was 1.24 (SD = 0.85), and in 2016/2017 was 1.06 (SD = 0.87).

### 13. Discussion

Pertaining to all three hypotheses, it should be noted that the beliefs of the sampled population were exceedingly homogeneous (table 2). Respondents either agreed or strongly agreed with the statement, “If you have back pain, you should try to stay active” over 80% of the time in each year of the study. For example in 2014/2015, there were 813 respondents who agreed with the ‘stay active with back pain’ statement, whereas in the disagree group there were only 60 respondents. This is likely a result of the ongoing and persistent back pain campaign messaging that has resulted in improved ‘stay active’ beliefs of the Alberta population.<sup>110</sup> While this is a positive finding, it posed significant challenges for this research due to the limited variability in respondents’ beliefs.

#### **i. Hypothesis 1**

Contrary to the hypothesis that employment status would differentiate which respondents agree or disagree with the statement ‘when you have low back pain, you should try to keep active’, it did not. This analysis found no significant relationship between the belief and any of the other demographic or clinical variables other than average pain intensity. Respondents who agreed with the statement ‘when you have low back pain, you should try to keep active’ did appear to have higher average intensity of back pain (based on the numeric pain rating scale). It is unlikely that this statistical significance equates to a clinically significant effect, as the difference in pain rating between the agree and disagree groups was only 0.2 in both 2014/2015 and 2016/2017. The Minimum Clinically Important Difference for numeric pain rating is consistently over 1.0 for many different populations.<sup>115-120</sup> The respondents’ exposure to the mass media campaign ‘Back pain: don’t take it lying down’ did not differ between groups that agreed or disagreed with the ‘stay active’ belief ( $p = 0.05$  and  $0.06$ ). The Albertan population has been exposed to this mass media campaign since 2005,<sup>11</sup> and a high percentage of the sampled population agrees that people should try to stay active with back pain (Table 2). Perhaps at this point, the belief has thoroughly circulated within the population, regardless of exposure to the mass media campaign.

The original hypothesis was that employment status would differentiate respondents who held the ‘stay active’ belief, but neither analysis showed significant difference ( $p = 0.65$  and

0.16). Finding no clinically relevant significance was at odds with other research on socioeconomic status.<sup>121</sup> The limitations section below will expand on likely reasons for this result.

## **ii. Hypothesis 2**

This hypothesis proposed that individuals who take the more adaptive stance (that staying active is superior for back pain treatment), may have less discussions about treatment with practitioners. However, we found the opposite in our analysis. The group that agreed with the ‘stay active’ statement spoke with healthcare professionals more often than people who disagreed with the statement (Table 6). These results were significant in both the 2014/2015 analysis and the 2016/2017 analysis. The Kruskal-Wallis Test does not determine which group is significantly different. The latter analysis was less clear which group was significantly different, and may have been the group that was neutral to the belief. If agreement with the ‘stay active’ statement does associate with seeking more treatment, this could indicate that more clinical interactions increases the odds that individuals will hear the adaptive message from a practitioner. A recent qualitative study found that most people (89% in that particular study) learn their back pain related beliefs from their healthcare practitioners.<sup>40</sup> This shows just how consequential information given from healthcare practitioners can be. Unfortunately many maladaptive beliefs were prevalent in that sample.<sup>40</sup> Words from a trusted practitioner are powerful, and it is imperative that back pain patients are getting adaptive messages during their initial clinical interactions.<sup>122</sup>

It is well established that many back pain patients are getting unnecessary care that adds little value.<sup>14,36</sup> Mortimer et al (2003), found back pain with high pain and disability was linked to seeking care more often. The study noted there was an unfortunately large amount of people with low disability and/or pain who also sought out treatment.<sup>92</sup> Other studies have noted that there has been a large rise in treatment and tests related to chronic back pain without accompanied decrease in incidents.<sup>14,36</sup> This is one reason mass media campaigns about staying active with back pain were implemented in the first place: to correct the widely held perception about what people should do with back pain. Campaigns are attempting to veer towards a ‘less is more’ first line of defense (of reassurance and advice to stay active), which is more in accordance with guideline recommendations.<sup>14</sup> Unfortunately, one of the major takeaways from

mass media campaigns on this subject is that getting behaviour to change is a major challenge. Previous campaigns specifically targeting back pain physical activity beliefs have had some success changing beliefs.<sup>105-107,109,110</sup> Although the only campaigns addressing this problem to make any substantial improvement in behaviour change, target explicit behaviour with a large budget/scope.<sup>108,110,123</sup> The current study, in accordance with the lack of behaviour change in previous mass media campaigns about this belief, points to two better solutions for modifying the current approach to the societal problem of high prevalence of nonspecific back pain: Rather than trying to foster self-management through population level education strategies, the focus should be on decreasing low value care and increasing high value care.<sup>122</sup> Given this analysis found having a more adaptive belief about back pain was associated with more discussions with healthcare practitioners, maybe addressing beliefs during clinical interactions are better than via mass media campaigns. Other research has highlighted the potential of using more psychologically informed content during clinical interactions.<sup>124,125</sup> Better addressing patients' beliefs may be one way to improve outcomes.<sup>124,125,126</sup> Another effective alternative to solely educational interventions that have had little effect on behaviour,<sup>122,123</sup> could be subgrouping patients. Other research has found that there is potentially a subpopulation of people at risk of poor prognosis, who need tailored biopsychosocial interventions.<sup>126</sup> Theoretically, these back pain patients could get better outcomes via stratification based on fear-avoidance beliefs, although current literature has shown mixed results.<sup>47,125-127</sup> If subgrouping based on beliefs does predict treatment outcomes, specifically targeting patients at high risk of maladaptive beliefs could be a more precise means of intervention.<sup>123,125-128</sup>

It is unsurprising that the simplistic approach of purely educational, population level interventions has not been very effective on such a multifaceted problem as back pain. Education interventions are best executed in an intensive, individualized manner on acute or sub acute cases, or with supplemental treatment.<sup>27,35</sup> A change is warranted to a strategy that accounts for the many individual and environmental variables present in many back pain cases (these complexities are outlined in the Behavioural Theories section).<sup>68</sup> Future research will guide if addressing beliefs in clinical interaction, or subgrouping is the most effective strategy. These strategies could potentially improve outcomes, save healthcare resources, and decrease the risks associated with various treatments (such as addiction to opioids).<sup>122</sup>

Our analysis highlights that beliefs about physical activity are pertinent to individuals' behaviour in back pain management, which other research has failed to show conclusively.<sup>129</sup> In order to verify the current premise put forth, beliefs about physical activity during back pain should be compared to an objective measure (such as healthcare practitioner visits per year). The current analysis used a self-report measure of frequency of discussing back pain treatment options with practitioners. This measure cannot distinguish between healthcare utilization or treatment seeking, which are two distinct entities.<sup>130</sup> Healthcare utilization is the actual consumption of healthcare resources, whereas treatment seeking is "how the patient interfaces with the healthcare system".<sup>130</sup> Future research should differentiate the two.

One of the benefits to the design of this study was that the sample was selected from any adult from the general public. Some studies on treatment seeking only included individuals who have sought treatment, which negates the behaviour of individuals who choose not to seek treatment.<sup>87</sup> It should be noted that there are several indications in the demographic factors that this sample is not representative of the general Canadian population, such as the distribution living in urban vs rural locations, and the composition of the sample's ages (Table 2). This may limit the generalizability of the results. Implementing a longitudinal study design could further illuminate if this relationship exists in reality.<sup>129</sup>

### **iii. Hypothesis 3**

This analysis showed that there was not a relationship between the belief in trying to stay active with back pain, and the number of 'active' treatments in respondents' top 5 preferred back pain treatments. The reasons for this lack of relationship are likely due to limitations in the study, which are discussed in the next section. Although many studies have compared active treatment options to passive,<sup>131,132</sup> there is a dearth of research looking into if patient preference for active or passive treatment has any relationship to outcomes in back pain. Previous research has established that treatment expectation and preference can be important with interventions. Patient preference is associated with treatment satisfaction,<sup>99</sup> and expectations have been shown to influence outcomes.<sup>133</sup> The details of the relationship between treatment preference or treatment expectations on back pain patient outcomes, have yet to be clarified. Perhaps an affinity for a certain type of treatment is a differentiating factor to how successful 'active' or 'passive'

treatments will be. Shedding light on these concepts could aid the effort to address beliefs more thoroughly during back pain rehabilitation.

#### **iv. Limitations**

As previously discussed, the vast majority of respondents in the study agreed that one should stay active with back pain (this was true in all four years of the study). Fortunately, the Kruskal-Wallis Test is a robust statistical test even in the presence of considerably different group sizes.<sup>134</sup> Different group sizes is not necessarily a limitation, but could indicate a biased sample, or that the unbalanced group distribution is representative of this particular population. Either the respondents to the survey are disproportionately in agreement with the ‘stay active’ belief, or the population truly reflects this unbalanced proportion. In either case, our results should be interpreted cautiously prior to replication in other settings.<sup>134</sup>

Hypothesis one found no clinically significant relationships between the demographic or clinical factors and agreement with the ‘stay active belief’. Many of the factors, such as level of pain, disability, sex, and socioeconomic status have been shown to correlate with beliefs in other instances.<sup>87,88,121,129</sup> Socioeconomic status for example, has previously been shown (using multivariable logistic regression) to correlate with beliefs about staying active with back pain.<sup>121</sup> Other than the unbalanced groups sizes, potentially some variables could have been oversimplified when they were dichotomized. For example when looking at employment status, the analysis compared two groups: respondents working full time/part time/self employed/maternity leave and respondents who were unemployed/students/retired/homemaker.

Because of the large sample, the study design took several measures to counteract the higher potential for a type 1 error, including using an alpha of 0.01. Some relationships may have been missed since the analysis was so conservative. Age and frequency of back pain would have both been significant, had we used an alpha of 0.05. The majority of significance tests in this analysis stayed consistent during the second (verification) analysis (see Table 5). Another possible reason for the discrepancy with other research is that different countries can have vastly different healthcare systems, policy environments, and societal beliefs about healthcare.<sup>135</sup> As explained by the BCW, back pain is a complex problem; educational campaigns using the same messages in different countries could have vastly different outcomes.<sup>68</sup>

Lastly, It is unlikely that the results of hypothesis 3 can infer a determination on the treatment preference by people holding different beliefs. As an example, a respondent could list their top 5 treatment choices as: 4 passive treatment options and one active. This fact does not differentiate how much the respondent uses each treatment, in fact the one active choice could constitute 90% of treatment. A useful way to further study this concept would be to differentiate respondents' ranking for each individual treatment option.

#### 14. Conclusion

Pain was the only demographic or clinical factor that statistically differed based on respondents' agreement that people should stay active with back pain. The magnitude of this difference was small and likely not meaningful. Treatment preference also lacked differentiation based on agreement with the stay active belief. Further research is needed in order to clarify this relationship. However, this study did display that beliefs are pertinent to treatment behaviour in back pain. The analysis showed that agreement with the 'stay active' belief was associated with more discussions with healthcare practitioners about back pain treatment. Other research has shown that mass media campaigns about physical activity during back pain have changed beliefs but struggle to change behaviours. If education interventions alone are not sufficient to change treatment behaviours, perhaps a better strategy is ensuring that practitioners properly address beliefs during clinical interactions. This analysis should be interpreted with caution, as the vast majority of respondents agreed with the 'stay active' belief. These results should be verified using objective measures, that can differentiate treatment seeking from healthcare utilization, and subsequently determine if there is a causal relationship.

## Bibliography

1. Waddell G. The back pain revolution. Edinburgh [u.a.]: Churchill Livingstone, 2005.
2. Hicks GS, Duddleston DN, Russell LD, Holman HE, Shepherd JM, Brown CA. Low back pain. *Am J Med Sci* 2002;324:207-11.
3. Vos T, Abajobir AA, Abbafati C, et al. Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016. *The Lancet* 2017;390:1211-59.
4. Vos T, Flaxman AD, Naghavi M, et al. Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 2012;380:2163-96.
5. Hoy D, March L, Brooks P, et al. The global burden of low back pain: estimates from the Global Burden of Disease 2010 study. *Ann Rheum Dis* 2014;73:968-74.
6. Deyo RA, Weinstein JN. Low back pain. *N Engl J Med* 2001;344:363-70.
7. Schofield DJ, Callander EJ, Shrestha RN, Percival R, Kelly SJ, Passey ME. Labor force participation and the influence of having back problems on income poverty in Australia. *Spine* 2012;37:1156-63.
8. Balagué F, Mannion AF, Pellisé F, Cedraschi C. Non-specific low back pain. *Lancet* 2012;379:482-91.
9. Tousignant-Laflamme Y, Martel MO, Joshi AB, Cook CE. Rehabilitation management of low back pain - it's time to pull it all together! *J Pain Res* 2017;10:2373-85.
10. Airaksinen O, Brox JI, Cedraschi C, et al. Chapter 4. European guidelines for the management of chronic nonspecific low back pain. *Eur Spine J* 2006;15 Suppl 2:192.
11. Gross DP, Ferrari R, Russell AS, et al. A population-based survey of back pain beliefs in Canada. *Spine* 2006;31:2142-5.
12. Dieleman JL, Baral R, Birger M, et al. US Spending on Personal Health Care and Public Health, 1996-2013. *JAMA* 2016;316:2627-46.

13. Traeger A, Buchbinder R, Harris I, Maher C. Diagnosis and management of low-back pain in primary care. *CMAJ* 2017;189:E1395.
14. Deyo RA, Mirza SK, Turner JA, Martin BI. Overtreating chronic back pain: time to back off? *J Am Board Fam Med* 2009;22:62-8.
15. Hoy D, Bain C, Williams G, et al. A systematic review of the global prevalence of low back pain. *Arthritis Rheum* 2012;64:2028-37.
16. Manchikanti L, Singh V, Falco FJE, Benyamin RM, Hirsch JA. Epidemiology of low back pain in adults. *Neuromodulation* 2014;17 Suppl 2:3-10.
17. Freburger JK, Holmes GM, Agans RP, et al. The rising prevalence of chronic low back pain. *Arch Intern Med* 2009;169:251-8.
18. Zale EL, Lange KL, Fields SA, Ditre JW. The relation between pain-related fear and disability: a meta-analysis. *J Pain* 2013;14:1019-30.
19. Andersson GB. Epidemiological features of chronic low-back pain. *Lancet* 1999;354:581-5.
20. Salvetti MdG, Pimenta, Cibele Andrucio de Mattos, Braga PE, Corrêa CF. [Disability related to chronic low back pain: prevalence and associated factors]. *Rev Esc Enferm USP* 2012;46 Spec No:16-23.
21. Braden JB, Zhang L, Zimmerman FJ, Sullivan MD. Employment outcomes of persons with a mental disorder and comorbid chronic pain. *Psychiatr Serv* 2008;59:878-85.
22. Morasco BJ, Duckart JP, Carr TP, Deyo RA, Dobscha SK. Clinical characteristics of veterans prescribed high doses of opioid medications for chronic non-cancer pain. *Pain* 2010;151:625-32.
23. Donald Schopflocher, Paul Taenzer, Roman Jovey. The Prevalence of Chronic Pain in Canada. *Pain research & management* 2011;16:445-50.
24. Bier JD, Kamper SJ, Verhagen AP, Maher CG, Williams CM. Patient Nonadherence to Guideline-Recommended Care in Acute Low Back Pain. *Arch Phys Med Rehabil* 2017;98:2416-21.
25. National Guideline Center. *Low Back Pain and Sciatica in Over 16s: Assessment and Management*. London: National Institute for Health and Care Excellence (UK), 2016.

26. Qaseem A, Wilt TJ, McLean RM, Forcica MA. Noninvasive Treatments for Acute, Subacute, and Chronic Low Back Pain: A Clinical Practice Guideline From the American College of Physicians. *Ann Intern Med* 2017;166:514-30.
27. Engers A, Jellema P, Wensing M, van der Windt, D a W M, Grol R, van Tulder MW. Individual patient education for low back pain. *Cochrane Database Syst Rev* 2008;:CD004057.
28. Fishbein M. An Investigation of the Relationships between Beliefs about an Object and the Attitude toward that Object An Investigation of the Relationships between Beliefs about an Object and the Attitude toward that Object. *Human Relations* 1963;16:233-9.
29. Nilsson E, Kristenson M. Psychological factors related to physical, social, and mental dimensions of the SF-36: a population-based study of middle-aged women and men. *Patient Relat Outcome Meas* 2010;1:153-62.
30. Baird A, Sheffield D. The Relationship between Pain Beliefs and Physical and Mental Health Outcome Measures in Chronic Low Back Pain: Direct and Indirect Effects. *Healthcare (Basel, Switzerland)* 2016;4:58.
31. Bener A, Verjee M, Dafeeah EE, et al. Psychological factors: anxiety, depression, and somatization symptoms in low back pain patients. *J Pain Res* 2013;6:95-101.
32. Walsh DA, Radcliffe JC. Pain beliefs and perceived physical disability of patients with chronic low back pain. *Pain* 2002;97:23-31.
33. Baird AJ, Haslam RA. Exploring differences in pain beliefs within and between a large nonclinical (workplace) population and a clinical (chronic low back pain) population using the pain beliefs questionnaire. *Phys Ther* 2013;93:1615-24.
34. Traeger AC, Hübscher M, Henschke N, Moseley GL, Lee H, McAuley JH. Effect of Primary Care-Based Education on Reassurance in Patients With Acute Low Back Pain: Systematic Review and Meta-analysis. *JAMA Intern Med* 2015;175:733-43.
35. Henrotin YE, Cedraschi C, Duplan B, Bazin T, Duquesnoy B. Information and low back pain management: a systematic review. *Spine* 2006;31:326.
36. Ivanova JI, Birnbaum HG, Schiller M, Kantor E, Johnstone BM, Swindle RW. Real-world practice patterns, health-care utilization, and costs in patients with low back pain: the long road to guideline-concordant care. *Spine J* 2011;11:622-32.

37. Foster NE, Bishop A, Thomas E, et al. Illness perceptions of low back pain patients in primary care: what are they, do they change and are they associated with outcome? *Pain* 2008;136:177-87.
38. Briggs AM, Jordan JE, Buchbinder R, et al. Health literacy and beliefs among a community cohort with and without chronic low back pain. *Pain* 2010;150:275-83.
39. Urquhart DM, Bell RJ, Cicuttini FM, Cui J, Forbes A, Davis SR. Negative beliefs about low back pain are associated with high pain intensity and high level disability in community-based women. *BMC Musculoskelet Disord* 2008;9:148.
40. Setchell J, Costa N, Ferreira M, Makovey J, Nielsen M, Hodges PW. Individuals' explanations for their persistent or recurrent low back pain: a cross-sectional survey. *BMC Musculoskelet Disord* 2017;18:466.
41. Main CJ, Foster N, Buchbinder R. How important are back pain beliefs and expectations for satisfactory recovery from back pain? *Best Pract Res Clin Rheumatol* 2010;24:205-17.
42. Vlaeyen JW, Linton SJ. Fear-avoidance and its consequences in chronic musculoskeletal pain: a state of the art. *Pain* 2000;85:317-32.
43. Zale EL, Ditre JW. Pain-related fear, disability, and the fear-avoidance model of chronic pain. *Current Opinion in Psychology* 2015;5:24-30.
44. Grotle M, Vøllestad NK, Veierød MB, Brox JI. Fear-avoidance beliefs and distress in relation to disability in acute and chronic low back pain. *Pain* 2004;112:343-52.
45. Perry EV, Francis AJP. Self-efficacy, pain-related fear, and disability in a heterogeneous pain sample. *Pain Manag Nurs* 2013;14:124.
46. Wideman TH, Asmundson GGJ, Smeets, Rob J E M, et al. Rethinking the fear avoidance model: toward a multidimensional framework of pain-related disability. *Pain* 2013;154:2262-5.
47. Wertli MM, Rasmussen-Barr E, Weiser S, Bachmann LM, Brunner F. The role of fear avoidance beliefs as a prognostic factor for outcome in patients with nonspecific low back pain: a systematic review. *Spine J* 2014;14:836.e4.
48. Lee H, Hübscher M, Moseley GL, et al. How does pain lead to disability? A systematic review and meta-analysis of mediation studies in people with back and neck pain. *Pain*

2015;156:988-97.

49. Fritz JM, George SZ, Delitto A. The role of fear-avoidance beliefs in acute low back pain: relationships with current and future disability and work status. *Pain* 2001;94:7-15.
50. Kroska EB. A meta-analysis of fear-avoidance and pain intensity: The paradox of chronic pain. *Scand J Pain* 2016;13:43-58.
51. Parr JJ, Borsa PA, Fillingim RB, et al. Pain-related fear and catastrophizing predict pain intensity and disability independently using an induced muscle injury model. *J Pain* 2012;13:370-8.
52. Linton SJ, Buer N, Vlaeyen J, Hellsing AL. Are fear-avoidance beliefs related to the inception of an episode of back pain? A prospective study. *Psychol Health* 2000;14:1051-9.
53. Sullivan MJ, D'Eon JL. Relation between catastrophizing and depression in chronic pain patients. *J Abnorm Psychol* 1990;99:260-3.
54. Wideman TH, Sullivan MJL. Development of a cumulative psychosocial factor index for problematic recovery following work-related musculoskeletal injuries. *Phys Ther* 2012;92:58-68.
55. Vlaeyen JWS, Linton SJ. Fear-avoidance model of chronic musculoskeletal pain: 12 years on. *Pain* 2012;153:1144-7.
56. Munigangaiah S, Basavaraju N, Jadaan DY, Devitt AT, McCabe JP. Do "Myths" of low back pain exist among Irish population? A cross-sectional study. *Eur J Orthop Surg Traumatol* 2016;26:41-6.
57. Buer N, Linton SJ. Fear-avoidance beliefs and catastrophizing: occurrence and risk factor in back pain and ADL in the general population. *Pain* 2002;99:485-91.
58. Pagare VK, Dhanraj T, Thakkar D, Sareen A, Palekar TJ. Beliefs about low back pain: Status quo in Indian general population. *J Back Musculoskelet Rehabil* 2015;28:731-7.
59. Ihlebaek C, Eriksen HR. The "myths" of low back pain: status quo in norwegian general practitioners and physiotherapists. *Spine* 2004;29:1818-22.
60. Abraham C, Conner M, Jones F, O'Connor D. *Health Psychology: Topics in Applied Psychology*. , 2008.
61. *Predicting and Changing Behavior: The Reasoned Action Approach*, 1st Edition (e-Book) -

Routledge. Anonymous . (Accessed Feb 5, 2019, at <https://www.routledge.com/Predicting-and-Changing-Behavior-The-Reasoned-Action-Approach-1st-Edition/Fishbein-Ajzen/p/book/9780203838020>).

62. Reid SR. Injection drug use, unsafe medical injections, and HIV in Africa: a systematic review. *Harm reduction journal* 2009;6:24.
63. Conner M, Norman P. *Predicting Health Behaviour*. , 2005.
64. Wakefield MA, Loken B, Hornik RC. Use of mass media campaigns to change health behaviour. *The Lancet* 2010;376:1261-71.
65. Grimshaw JM, Shirran L, Thomas R, et al. Changing provider behavior: an overview of systematic reviews of interventions. *Med Care* 2001;39:45.
66. Summerbell CD, Waters E, Edmunds LD, Kelly S, Brown T, Campbell KJ. Interventions for preventing obesity in children. *Cochrane Database Syst Rev* 2005;:CD001871.
67. Coleman T. Do financial incentives for delivering health promotion counselling work? Analysis of smoking cessation activities stimulated by the quality and outcomes framework. *BMC Public Health* 2010;10:167.
68. Michie S, van Stralen MM, West R. The behaviour change wheel: a new method for characterising and designing behaviour change interventions. *Implement Sci* 2011;6:42.
69. Patey AM, Hurt CS, Grimshaw JM, Francis JJ. Changing behaviour ‘more or less’—do theories of behaviour inform strategies for implementation and de-implementation? A critical interpretive synthesis. *Implementation Science* 2018;13:1-13.
70. Davis R, Campbell R, Hildon Z, Hobbs L, Michie S. Theories of behaviour and behaviour change across the social and behavioural sciences: a scoping review. *Health Psychol Rev* 2015;9:323-44.
71. Catania JA, Kegeles SM, Coates TJ. Towards an understanding of risk behavior: an AIDS risk reduction model (ARRM). *Health Educ Q* 1990;17:53-72.
72. Burnet D, Plaut A, Courtney R, Chin MH. A practical model for preventing type 2 diabetes in minority youth. *Diabetes Educ* 2002;28:779-95.
73. Fisher WA, Fisher JD, Harman J. *The Information-Motivation-Behavioral Skills Model: A*

- General Social Psychological Approach to Understanding and Promoting Health Behavior. In: Anonymous Social Psychological Foundations of Health and Illness. John Wiley & Sons, Ltd, 2009:82-106.
74. Ajzen I. The theory of planned behavior. *Organizational Behavior and Human Decision Processes* 1991;50:179-211.
75. Rosenthal R, Rubin DB. A simple, general purpose display of magnitude of experimental effect. *Journal of Educational Psychology* 1982;74:166-9.
76. Rothschild ML. Carrots, Sticks, and Promises: A Conceptual Framework for the Management of Public Health and Social Issue Behaviors. *Social Marketing Quarterly* 2000;6:86-114.
77. Bandura A. *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ, US: Prentice-Hall, Inc, 1986.
78. Rosenstock IM. Why people use health services. *Milbank Mem Fund Q* 1966;44:127.
79. Ajzen I. From Intentions to Actions: A Theory of Planned Behavior. *Action Control* 1985;:11-39.
80. Maibach E, Flora JA, Nass C. Changes in Self-Efficacy and Health Behavior in Response to a Minimal Contact Community Health Campaign. *Health Communication* 1991;3:1-15.
81. Bandura A. Health promotion by social cognitive means. *Health Educ Behav* 2004;31:143-64.
82. West R. Time for a change: putting the Transtheoretical (Stages of Change) Model to rest. *Addiction* 2005;100:1036-9.
83. Brug J, Conner M, Harré N, Kremers S, McKellar S, Whitelaw S. The Transtheoretical Model and stages of change: a critique Observations by five Commentators on the paper by Adams, J. and White, M. (2004) Why don't stage-based activity promotion interventions work? *Health Educ Res* 2005;20:244-58.
84. Sutton S. Another Nail in the Coffin of the Transtheoretical Model? A Comment on West (2005). *Addiction* 2005;100:1043-5.
85. Sutton S. A critical review of the transtheoretical model applied to smoking cessation. In:

- Anonymous Understanding and changing health behaviour: From health beliefs to self-regulation. Amsterdam, Netherlands: Harwood Academic Publishers, 2000:207-225.
86. Felicíssimo FB, Barros VV, Pereira SM, Rocha NQ, Lourenço LM. A systematic review of the transtheoretical model of behaviour change and alcohol use. *Psychologica* 2014;:7-22.
87. Mannion AF, Wieser S, Elfering A. Association between beliefs and care-seeking behavior for low back pain. *Spine* 2013;38:1016-25.
88. Waxman R, Tennant A, Helliwell P. Community survey of factors associated with consultation for low back pain. *BMJ* 1998;317:1564-7.
89. Nahin RL. Categorizing the severity of pain using questions from the 2012 National Health Interview Survey. *J Pain Res* 2016;9:105-13.
90. Deyo RA, Mirza SK, Martin BI, Kreuter W, Goodman DC, Jarvik JG. Trends, Major Medical Complications, and Charges Associated With Surgery for Lumbar Spinal Stenosis in Older Adults. *JAMA* 2010;303:1259-65.
91. Deyo RA, Von Korff M, Duhkoop D. Opioids for low back pain. *BMJ* 2015;350:g6380.
92. Mortimer M, Ahlberg G. To seek or not to seek? Care-seeking behaviour among people with low-back pain. *Scand J Public Health* 2003;31:194-203.
93. Sharma R, Haas M, Stano M. Patient attitudes, insurance, and other determinants of self-referral to medical and chiropractic physicians. *Am J Public Health* 2003;93:2111-7.
94. Carey TS, Freburger JK, Holmes GM, et al. Race, care seeking, and utilization for chronic back and neck pain: population perspectives. *J Pain* 2010;11:343-50.
95. Hunt K, Adamson J, Hewitt C, Nazareth I. Do women consult more than men? A review of gender and consultation for back pain and headache. *J Health Serv Res Policy* 2011;16:108-17.
96. Adamson J, Hunt K, Nazareth I. The influence of socio-demographic characteristics on consultation for back pain—a review of the literature. *Fam Pract* 2011;28:163-71.
97. Woodhouse A, Pape K, Romundstad PR, Vasseljen O. Health care contact following a new incident neck or low back pain episode in the general population; the HUNT study. *BMC health services research* 2016;16:81.
98. Metzdorff MT. Evidence-based medicine. *Journal of Trauma and Acute Care Surgery*

2013;75:927-35.

99. Verbeek J, Sengers M, Riemens L, Haafkens J. Patient expectations of treatment for back pain: a systematic review of qualitative and quantitative studies. *Spine* 2004;29:2309-18.

100. Dima A, Lewith GT, Little P, Moss-Morris R, Foster NE, Bishop FL. Identifying patients' beliefs about treatments for chronic low back pain in primary care: a focus group study. *Br J Gen Pract* 2013;63:490.

101. Donaldson M, Learman K, O'Halloran B, Showalter C, Cook C. The role of patients' expectation of appropriate initial manual therapy treatment in outcomes for patients with low back pain. *J Manipulative Physiol Ther* 2013;36:276-83.

102. Slade SC, Kent P, Patel S, Bucknall T, Buchbinder R. Barriers to Primary Care Clinician Adherence to Clinical Guidelines for the Management of Low Back Pain: A Systematic Review and Metasynthesis of Qualitative Studies. *Clin J Pain* 2016;32:800-16.

103. Gross DP, Russell AS, Ferrari R, et al. Evaluation of a Canadian back pain mass media campaign. *Spine* 2010;35:906-13.

104. Suman A, Schaafsma FG, Bamarni J, Tulder MWv, Anema JR. A multimedia campaign to improve back beliefs in patients with non-specific low back pain: a process evaluation. *BMC Musculoskeletal Disorders* 2017;18:200.

105. Waddell G, O'Connor M, Boorman S, Torsney B. Working Backs Scotland: a public and professional health education campaign for back pain. *Spine* 2007;32:2139-43.

106. Werner EL, Ihlebaek C, Laerum E, Wormgoor MEA, Indahl A. Low back pain media campaign: no effect on sickness behaviour. *Patient Educ Couns* 2008;71:198-203.

107. George SZ, Teyhen DS, Wu SS, et al. Psychosocial education improves low back pain beliefs: results from a cluster randomized clinical trial (NCT00373009) in a primary prevention setting. *Eur Spine J* 2009;18:1050-8.

108. Buchbinder R, Jolley D, Wyatt M. 2001 Volvo Award Winner in Clinical Studies: Effects of a media campaign on back pain beliefs and its potential influence on management of low back pain in general practice. *Spine* 2001;26:2535-42.

109. Buchbinder R, Jolley D. Effects of a media campaign on back beliefs is sustained 3 years

after its cessation. *Spine* 2005;30:1323-30.

110. Suman A, Bostick GP, Schopflocher D, et al. Long-term evaluation of a Canadian back pain mass media campaign. *Eur Spine J* 2017;.

111. Darlow B, Perry M, Stanley J, et al. Cross-sectional survey of attitudes and beliefs about back pain in New Zealand. *BMJ open* 2014;4:e004725.

112. Hagen KB, Jamtvedt G, Hilde G, Winnem MF. The updated cochrane review of bed rest for low back pain and sciatica. *Spine* 2005;30:542-6.

113. Timm KE. A randomized-control study of active and passive treatments for chronic low back pain following L5 laminectomy. *J Orthop Sports Phys Ther* 1994;20:276-86.

114. Anderson B. Randomized clinical trial comparing active versus passive approaches to the treatment of recurrent and chronic low back pain. *Dissertations from ProQuest* 2005;.

115. Childs JD, Piva SR, Fritz JM. Responsiveness of the numeric pain rating scale in patients with low back pain. *Spine* 2005;30:1331-4.

116. Salaffi F, Stancati A, Silvestri CA, Ciapetti A, Grassi W. Minimal clinically important changes in chronic musculoskeletal pain intensity measured on a numerical rating scale. *Eur J Pain* 2004;8:283-91.

117. Michener LA, Snyder AR, Leggin BG. Responsiveness of the numeric pain rating scale in patients with shoulder pain and the effect of surgical status. *J Sport Rehabil* 2011;20:115-28.

118. Farrar JT, Young JP, LaMoreaux L, Werth JL, Poole RM. Clinical importance of changes in chronic pain intensity measured on an 11-point numerical pain rating scale. *Pain* 2001;94:149-58.

119. Sloman R, Wruble AW, Rosen G, Rom M. Determination of clinically meaningful levels of pain reduction in patients experiencing acute postoperative pain. *Pain Manag Nurs* 2006;7:153-8.

120. Bijur PE, Latimer CT, Gallagher EJ. Validation of a verbally administered numerical rating scale of acute pain for use in the emergency department. *Acad Emerg Med* 2003;10:390-2.

121. Suman A, Bostick GP, Schaafsma FG, Anema JR, Gross DP. Associations between measures of socio-economic status, beliefs about back pain, and exposure to a mass media campaign to improve back beliefs. *BMC Public Health* 2017;17:504.

122. Foster NE, Anema JR, Cherkin D, et al. Prevention and treatment of low back pain: evidence, challenges, and promising directions. *Lancet* 2018;391:2368-83.
123. Rainville J, Smeets, Rob J. E. M., Bendix T, Tveito TH, Poiraudreau S, Indahl AJ. Fear-avoidance beliefs and pain avoidance in low back pain--translating research into clinical practice. *Spine J* 2011;11:895-903.
124. Salathé CR, Melloh M, Crawford R, Scherrer S, Boos N, Elfering A. Treatment Efficacy, Clinical Utility, and Cost-Effectiveness of Multidisciplinary Biopsychosocial Rehabilitation Treatments for Persistent Low Back Pain: A Systematic Review. *Global Spine J* 2018;8:872-86.
125. Archer K, Coronado R, Wegener S. The Role of Psychologically Informed Physical Therapy for Musculoskeletal Pain. *Current Physical Medicine and Rehabilitation Reports* 2018;.
126. Pincus T, Smeets, Rob J. E. M., Simmonds MJ, Sullivan MJL. The fear avoidance model disentangled: improving the clinical utility of the fear avoidance model. *Clin J Pain* 2010;26:739-46.
127. Boersma K, Linton SJ. Expectancy, fear and pain in the prediction of chronic pain and disability: a prospective analysis. *Eur J Pain* 2006;10:551-7.
128. Beneciuk JM, Bishop MD, Fritz JM, et al. The STarT back screening tool and individual psychological measures: evaluation of prognostic capabilities for low back pain clinical outcomes in outpatient physical therapy settings. *Phys Ther* 2013;93:321-33.
129. Morton L, de Bruin M, Krajewska M, Whibley D, Macfarlane GJ. Beliefs about back pain and pain management behaviours, and their associations in the general population: A systematic review. *Eur J Pain* 2019;23:15-30.
130. Derek Clewley, Dan Rhon, Timothy Flynn, Shane Koppenhaver, Chad Cook. Health seeking behavior as a predictor of healthcare utilization in a population of patients with spinal pain. *PLoS One* 2018;13:e0201348.
131. van Tulder M, Malmivaara A, Esmail R, Koes B. Exercise therapy for low back pain: a systematic review within the framework of the cochrane collaboration back review group. *Spine* 2000;25:2784-96.
132. Waddell G, Feder G, Lewis M. Systematic reviews of bed rest and advice to stay active for acute low back pain. *Br J Gen Pract* 1997;47:647-52.

133. Goossens, Mariëlle E. J. B., Vlaeyen JWS, Hidding A, Kole-Snijders A, Evers, Silvia M. A. Treatment expectancy affects the outcome of cognitive-behavioral interventions in chronic pain. *Clin J Pain* 2005;21:72.
134. MacFarland TW, Yates JM. *Introduction to Nonparametric Statistics for the Biological Sciences Using R*. Springer International Publishing, 2016.
135. Main CJ, George SZ. Psychologically informed practice for management of low back pain: future directions in practice and research. *Phys Ther* 2011;91:820-4.

## Appendix I

STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation
<b>Title and abstract</b>	1	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found
<b>Introduction</b>		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported
Objectives	3	State specific objectives, including any prespecified hypotheses
<b>Methods</b>		
Study design	4	Present key elements of study design early in the paper
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias
Study size	10	Explain how the study size was arrived at
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) If applicable, describe analytical methods taking account of sampling strategy (e) Describe any sensitivity analyses
<b>Results</b>		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram

Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest
Outcome data	15*	Report numbers of outcome events or summary measures
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
<b>Discussion</b>		
Key results	18	Summarise key results with reference to study objectives
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	21	Discuss the generalisability (external validity) of the study results
<b>Other information</b>		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

\*Give information separately for exposed and unexposed groups.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at [www.strobe-statement.org](http://www.strobe-statement.org).

## Appendix II



## Leading Digital Data Collection Worldwide

### Who is Research Now?

As the established expert in digital market research data, Research Now optimizes market research through its data assets, innovative solutions, and consultative services to drive better business decisions and results for companies and agencies around the world. Founded in 1999, we were pioneers in originating online data sampling and created the first B2B panel, and continue to provide robust research data through rigorous first-party consumer and B2B data collection for more than 3,000 clients worldwide. As a trusted provider of comprehensive research services and data solutions – such as survey programming and optimizing sampling, and feature-rich automated research, integrated data, and advertising measurement – we enable powerful insights for competitive advantage.

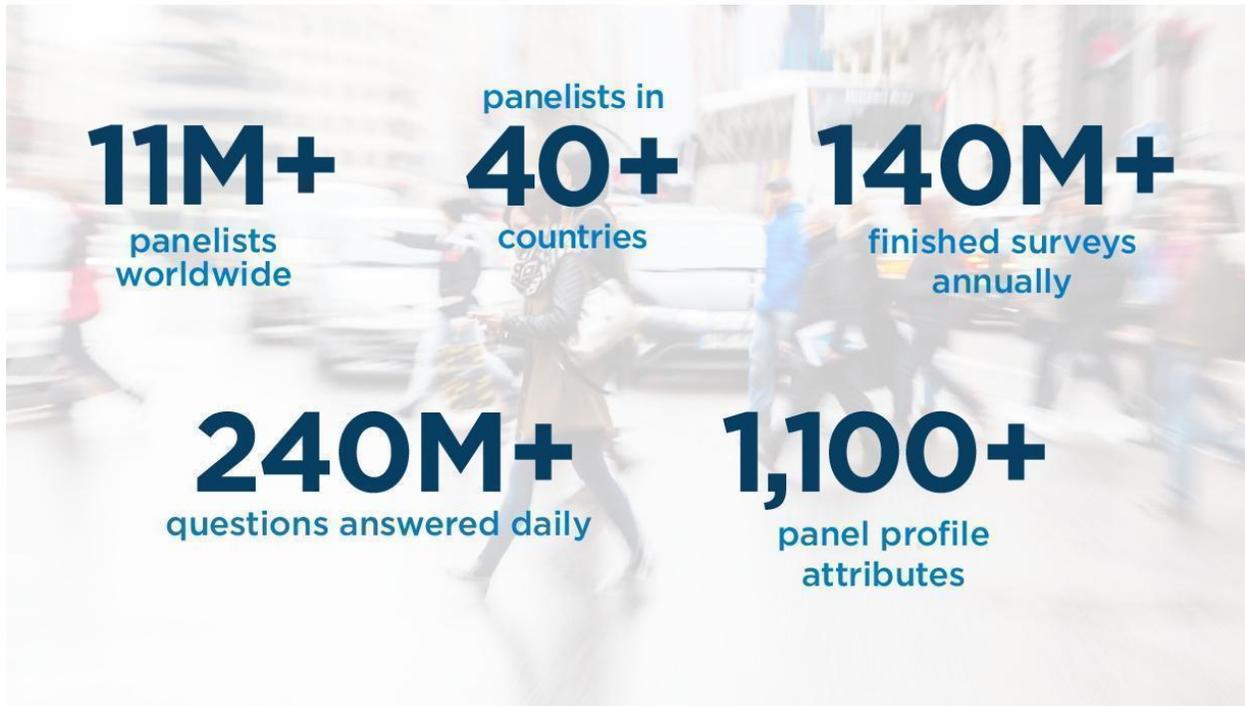


Source: 2014 – 2017 Annual Survey of Market Research Professionals (MarketResearchCareers.com)

### Our Approach to Data Quality

From simple to complex surveying, Research Now has proven to be the leading online sample provider globally across all audience types. Quality data requires the strongest online panels, industry leading technologies and top research talent to execute flawless data collection.

Our Total Research Quality® system is a comprehensive integrated system of tools, metrics, procedures, and policies that operates throughout the entire lifecycle of each panelist across every project we complete to ensure our clients are receiving the highest quality data available. The system begins long before the data is collected and ends long after the analysis is complete.



### Panel Recruitment

At the heart of Research Now are our highly-diversified panels. We acquire panelists through three distinct programs: eRewards® opinion panel, Valued Opinions® panel, and Peanut Labs® program. Through the network effect of these in-house assets, Research Now can give you access to one of the largest representative and highest quality audiences in the industry.

We have the ability to deliver census-balanced general population consumer data, and with our deep panel profiling, we make it easier and more efficient to reach complex audiences. Our recruitment methods allow you to gain access to hard-to-reach business professionals and consumers, including low-incidence audiences, who are less likely to join panels.

Research Now works to optimally blend these assets based on your project needs with a specific strength in large, census-balanced sampling that generates consistent, quality research data.



<b>How We Recruit</b>	We partner with over 60 leading global brands to enable a "By-Invitation-Only"™ recruitment methodology	Members are recruited in partnership with over 70 global online publishers	Participants are recruited via hundreds of websites and online communities
<b>Who We Reach</b>	The highest-quality global resource to reach B2B and B2C audiences	A broad reach of diverse audiences on a global scale	Unique access to hard-to-reach online (e.g. Youth) audiences
<b>How Many We Reach</b>	4 million unique participants in the 10 key global research markets	4.1 million unique participants in 39 global research markets	2.9 million annual participants across 29 countries
<b>Why People Take Our Surveys</b>	Members earn points for completed surveys that are transferable to loyalty rewards applicable to the partner they've joined through	Members are enticed with monetary incentives with the ability to redeem through specific mechanisms or vouchers	Participants are rewarded virtual currency relevant to the publisher they joined through

### Healthcare Specialty Panel

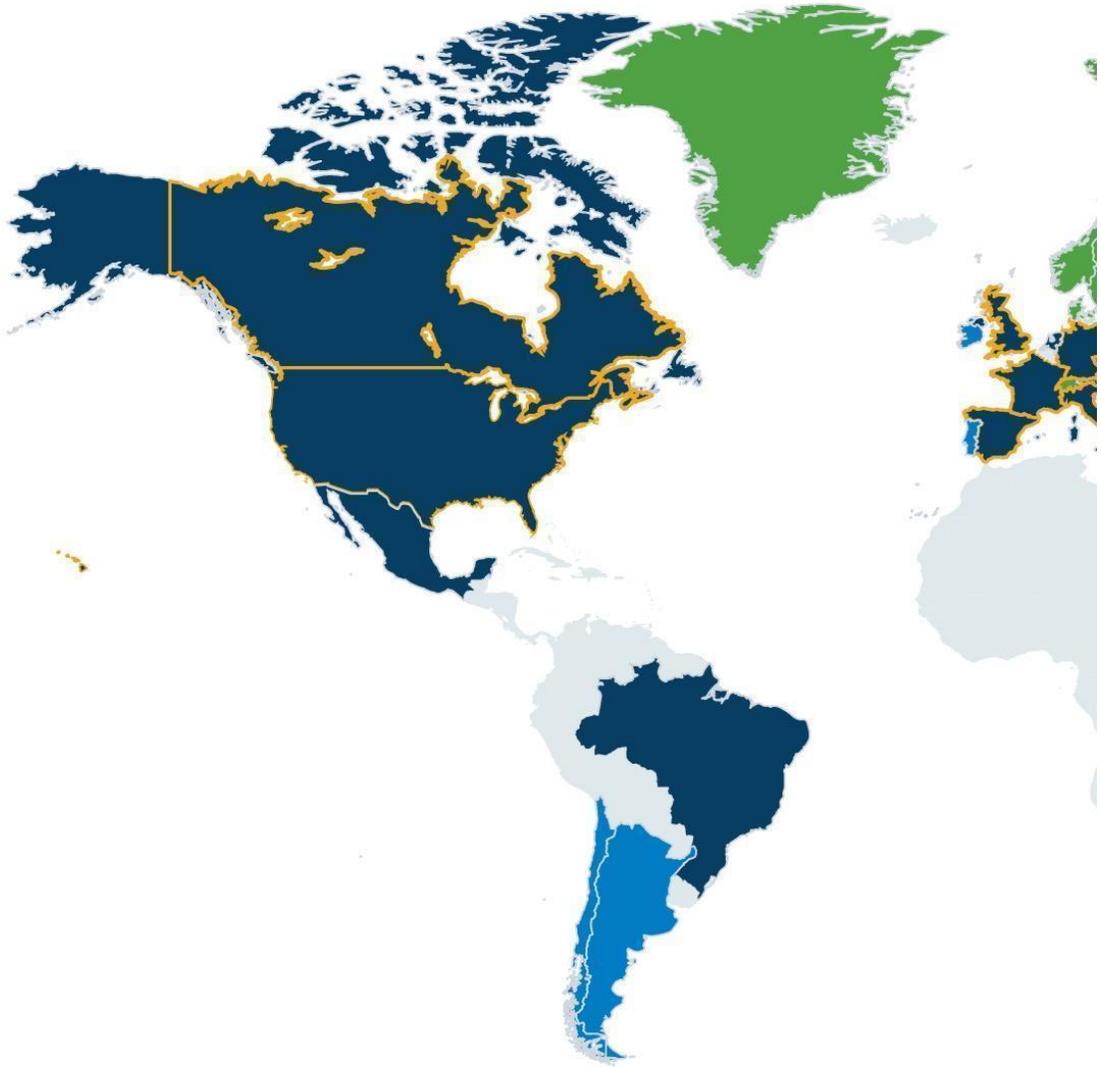
Connect to hard-to-reach healthcare professionals via our e-Rewards® Medical Market Research® panel.



- Access to more than 180,000 physicians, nurses, and other healthcare professionals via our "By-Invitation-Only"™ recruitment methodology
- One of the largest, highest-quality medical market research panels available to the professional healthcare community
- These healthcare professionals enjoy making a difference and sharing their expertise through their membership. They are given monetary incentives for completing surveys and are able to redeem a virtual e-Rewards Medical Visa® Prepaid Card (currently only US), physical Prepaid Card or check

It's important to understand the heart of our panel members. Engaging our participants is crucial to ensure we deliver the highest quality for our clients. If our members are attentive and content, that means accurate, thoughtful answers and, ultimately, better data quality.

## Global Panel Footprint

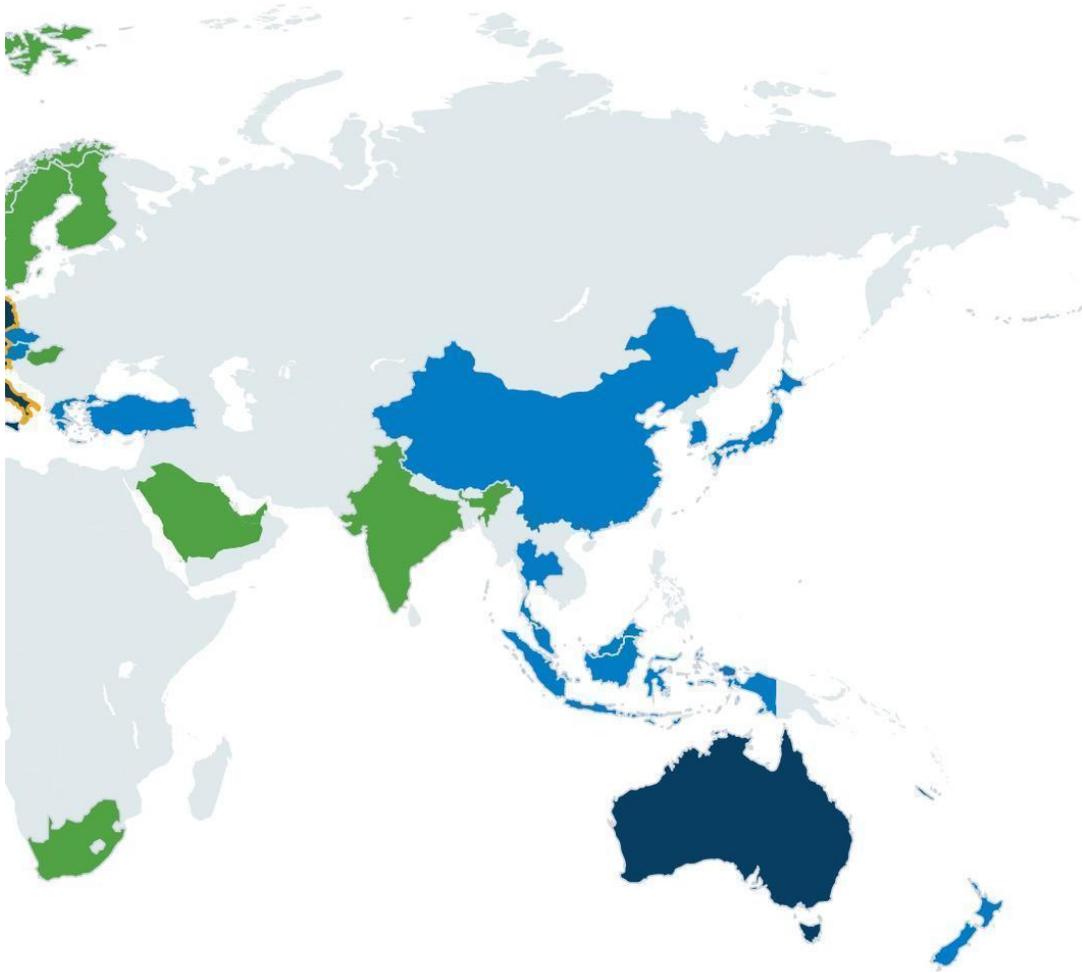


  
Consumer,  
Business  
& Social Media

Australia | Brazil  
Canada | France  
Germany | Italy  
Mexico | Spain  
Netherlands  
United Kingdom  
United States

  
Consumer  
& Business

Bahrain | Denmark  
Finland | India  
Norway | Qatar  
Saudi Arabia  
South Africa  
Sweden  
Switzerland  
United Arab Emirates



Consumer

Argentina | Austria | Belgium  
 Chile | China | Czech Republic  
 Greece | Hong Kong | Hungary  
 Indonesia | Ireland | Japan  
 Malaysia | New Zealand  
 Poland | Portugal | Singapore  
 South Korea | Taiwan  
 Thailand | Turkey



Healthcare  
 Professionals,  
 Patients  
 & Consumer  
 Ailments

Canada  
 France  
 Germany  
 Italy  
 Spain  
 United Kingdom  
 United States



### **Data Collection**

Data quality is at the forefront of Research Now's role as the leading provider of digital data. Our recruitment methodologies ensure our panels are comprised of real people who are giving considered, accurate responses.

#### [We Know Who Our Panelists Are and We Keep Them Safe](#)

Research Now tracks and stores all panel member activity and assigns a unique ID number which stays with the panelist throughout their entire panel membership. These tracking records consist of profile information provided during enrollment, profile updates, survey screeners, past survey participation, and client feedback. In addition to this, our member privacy policies ensure respondents' identities are protected when supplying data to our clients.

### **Data Cleaning & Analysis**

Research Now monitors the quality of our data through various quality checks, as part of the Total Research Quality system, to save you time and give you confidence in data accuracy. These quality checks include participation limits, screening questions, digital fingerprinting, random and illogical responding, capturing and removing flatliners and speeders, and more.

We also regularly measure panelist satisfaction on elements such as frequency of invitations, value and diversity of incentives and redemption choices, their willingness to complete various lengths of surveys, and our level of responsiveness to any questions or concerns they share with our Member Services team.

## Selected Panel Attributes

Research Now maintains over 1,100 attributes collected across our B2B and B2C panels.

### Business



#### Basic Attributes

- Business Type
- Industry Segment
- Annual Revenue
- Number of Employees at All Locations
- Number of Employees at Local Location



#### Business Professional

- Title
- Occupation
- Functional Role
- Purchase Decision Makers
- Primary Role
- Human Resources Role



#### Expanded Business Variables by Industry

- Business Services
- Computer Hardware
- Computer Software
- Consulting
- Consumer Products
- Consumer Services
- Entertainment / Sports
- Energy & Utilities / Oil & Gas
- Food / Beverages / Restaurant
- Media / Publishing
- Non-Profit
- Retail
- Telecommunications
- Equipment
- Travel / Hospitality / Leisure



#### Legal Services

- Legal Occupation
- Legal Role



#### Real Estate

- Type of Business
- Primary Real Estate Role



#### Banking / Financial Services / Insurance

- Type of Business
- Primary Role



#### Transport & Logistics

- Type of Business
- Professional Driver Work Type



#### Education

- Educator Role
- Educator - Education Level Type
- Educator - Educational Institute



#### Government / Military

- Law Enforcement / Emergency Service Types
- Military Branch of Part-Time Service
- Military Branch Served
- National Guard Service Branch
- Military Service Status
- Government Level of Employment



#### Business Owner

- Type of Business Owned / Operated
- Type of Personal Service



#### Healthcare

- Healthcare / Medical Professionals
- Nursing
- Physician Primary Specialty



#### ITDM / IT Roles

- Type of IT Professional
- Developer Roles
- Primary IT Functions/Responsibility
- Roles in Various IT Areas Including:
  - PCs, Tablets, or Client Devices
  - Mobile Technology/Applications
  - Servers
  - Data Center
  - Cloud Computing
  - Network/Data Technology
  - Voice Technology
  - Business Applications & Process
  - Software
  - Business Intelligence, Big Data,
  - Analytics
  - Virtualization Software
  - Unified Communications



## Consumer



### Basic Demographics

- Gender
- Age
- Marital Status
- Language
- Number in Household
- Children
- Education
- Household Income
- Employment Status
- Own or Rent
- Region
- Sexual Orientation
- Religious Affiliation
- Ethnicity or Race
- Hispanic Origin
- Registered Voter
- Political Party Affiliation
- Voter History



### Automotive

- Vehicles in Household
- Type of Automobile
- Primary Make, Model, Year
- Secondary Make, Model, Year
- DIY Maintenance
- Intent to Buy



### Home Features / Improvements

- Home Improvement/ Upkeep / Repair
- Role in Decision Making
- Lawn Equipment Used



### Utilities

- Service Provider
- Role in Decision



### Travel for Leisure

- Travel Websites Used
- Car Rentals
- Airlines
- Hotels



### Interests / Hobbies

- General
- Health / Fitness / Wellness
- Hobbies / Leisure
- Outdoor Activities
- Sports Activities



### Electronics / Gadgets

- Electronic Devices Owned (32 types)
- Desktop & Notebook Computer (19 brands)
- Printer (14 brands)
- Tablet or e-Reader (49 brands)
- Online Activities
- Internet (30 Providers)
- Video Game Accessories
- Video Game System (13 brands)



### Mobile Phone

- Mobile Phone Use
- Type of Mobile Phone
- Mobile Only Phone User
- Operating Systems
- Network Providers (16 providers)
- Average Monthly Billing
- Contract Type
- Plan Type
- Role in Decision
- Phone Brand (22 brands)



### Tobacco Products

- Products Used
- Cigarettes by Brand (37 brands)
- Smoking Habits & History
- Smoking Cessation or Alternatives Used



### Department Stores

- Shopping Frequency
- Items Purchased



### Dining Out

- Frequency
- Amount Spent Per Person
- Type of Restaurant
- Considerations



### Insurance

- Auto Insurance Provider (152 providers)
- Home Insurance Provider (152 providers)
- Health Insurance Provider (66 providers)
- Health Insurance Coverage



### Consumer Banking

- Interest
- Financial Advice (11 services)
- Online Trading Accounts
- Financial Advisor
- Investment Account Types (13 types)
- Investment Account Firm
- Primary Brokerage Firm
- Type of Checking Account
- Primary Mutual Fund Firm (61 firms)
- Retirement Firm (26 firms)
- Total Investable Assets
- Type of Investment
- Financial Products
- Credit Cards
- Financial Institutions (134 banks)



### Groceries

- Primary Shopper
- Stores Shopped (56 stores)
- Amount Spent Per Week



### Beer, Wine, Liquor

- Beverage Consumption
- Beer Consumption
- Domestic / Import / Craft Beer Brands (76 brands)
- Wine Purchases
- Liquor Type & Brands



### Entertainment

- Television
- Books
- Movies
- Music
- Magazine Readership (40 genres, 270 titles)
- Radio Stations (39 markets)



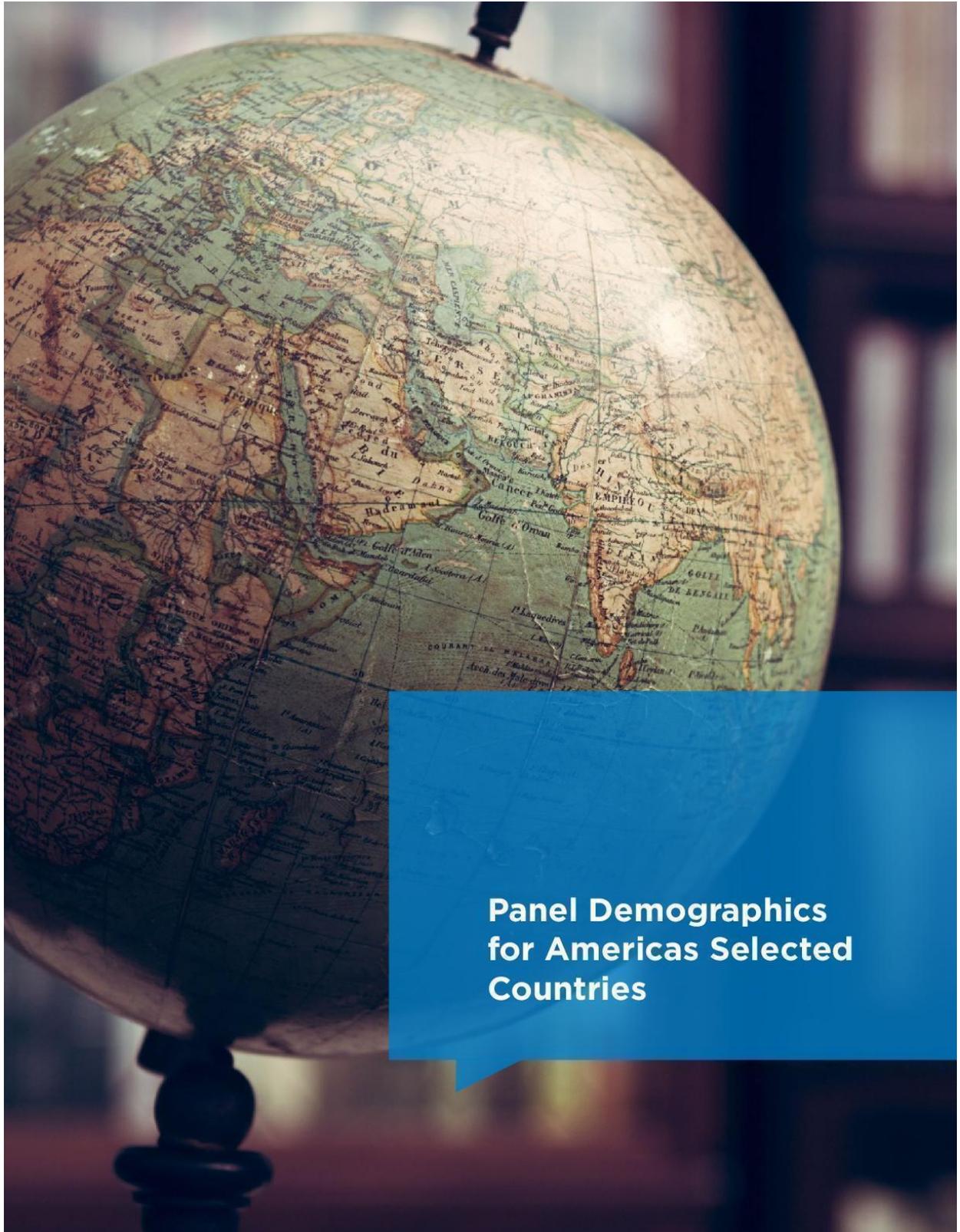
### General Household

- Pets or Animals
- Recreational Vehicles



### Ailments and Health Conditions

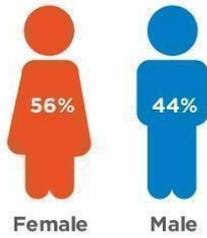
- Allergy / Asthma / Respiratory
- Arthritis / Joint Ailments
- Autoimmune / Blood
- Cancer
- Cardiovascular / Heart
- Diabetes / Thyroid / Obesity
- Gastric / Digestive / Urinary
- Male / Female Health
- Mental Health
- Neurologic / Nervous
- Pain
- Skin / Dermatologic
- Sleep Disorders
- Vision / Hearing Impairments



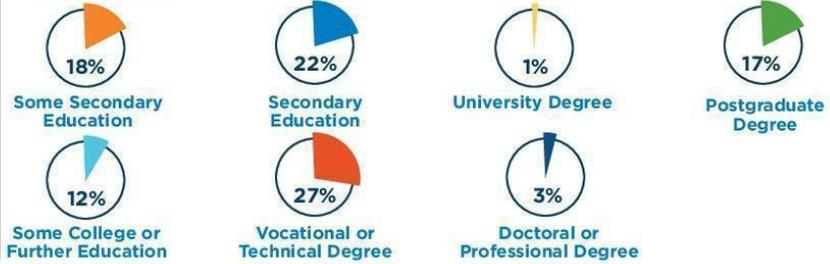
**Panel Demographics  
for Americas Selected  
Countries**

## Canada

### Gender:



### Education:



### Income:

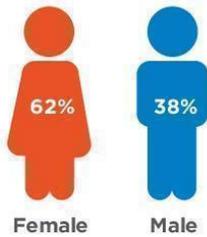


### Age:

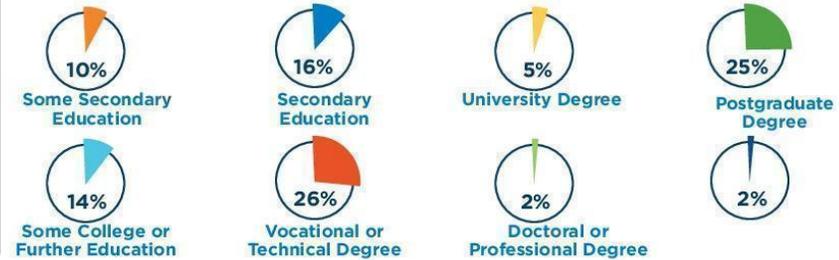


## United States

### Gender:



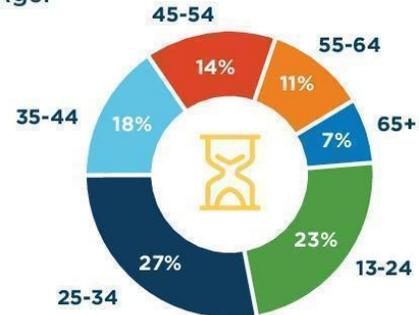
### Education:



### Income:



### Age:



**Dallas**  
United States  
+1 214 365 5000  
info@researchnow.com



**Better Decisions. Better Results.**

ResearchNow.com

<b>London</b> United Kingdom +44 (0)20 7084 3000 infoUK@researchnow.com	<b>Sydney</b> Australia +61 2 9273 7800 infoAU@researchnow.com	<b>Athens</b> Greece +30 211 180 8200 info@researchnow.com	<b>Auckland</b> New Zealand +64 (9) 486 5740 infoNZ@researchnow.com	<b>Hamburg</b> Germany +49 40 3980676-0 infoDE@researchnow.com
<b>Houten</b> Netherlands +31 30 877 42 01 infoNL@researchnow.com	<b>Los Angeles</b> United States +1 323 993 4400 info@researchnow.com	<b>Melbourne</b> Australia +61 3 9626 4700 infoAU@researchnow.com	<b>Milan</b> Italy +39 02 9157 5607 infoIT@researchnow.com	<b>Munich</b> Germany +49(0)811 9987768-0 infoDE@researchnow.com
<b>New Delhi</b> India +91 124 480 7840 infoIN@researchnow.com	<b>New York</b> United States +1 212 805 2800 info@researchnow.com	<b>Paris</b> France +33 (0)142 97 55 64 infoFR@researchnow.com	<b>San Francisco</b> United States +1 415-948-2266 info@researchnow.com	<b>Singapore</b> +65 6513 9366 infoSG@researchnow.com
<b>Tokyo</b> Japan +81 3 4580 2767 infoJP@researchnow.com	<b>Toronto</b> Canada +1 800 599 7938 infoCA@researchnow.com			

© 2017 Research Now Group, Inc. All rights reserved.

## Appendix III

### Back Pain: Don't Take it Lying Down Survey Questions

1. Are you:
  - a. Under 18
  - b. 18-24
  - c. 25-34
  - d. 35-44
  - e. 45-54
  - f. 55-64
  - g. 65 and Over
2. Which of the following most closely describes your employment status?
  - a. Employed full-time
  - b. Maternity leave
  - c. Self-employed
  - d. On disability leave
  - e. Employed part-time
  - f. Homemaker
  - g. Unemployed
  - h. Student
  - i. I prefer not answering
  - j. Other
3. Which of the following best describes what region of Alberta you live in?
  - a. In Edmonton
  - b. Near Edmonton
  - c. In Calgary
  - d. Near Calgary
  - e. Northern Alberta
  - f. Central Alberta
  - g. Southern Alberta
  - h. Rocky Mountains
  - i. Somewhere else
4. How often would you say that you experience any type of back pain?
5. Which of the following areas would you say that you experience back pain most often?
  - a. Upper
  - b. Middle

- c. Lower
6. On a scale from 1 to 10, how would you rate the typical pain in your?
  7. How is your job affected given the typical pain in your back?
  8. How often do you discuss ways to relieve your back pain with your doctor or other health professionals?
  9. How often do you discuss ways to relieve your back pain with your family or friends?
  10. Please check up to 5 activities that you are most likely to do to help deal with your back pain / back pain you may have in the future.
    - a. take pain killers
    - b. lie down but stay awake
    - c. stretch out the affected area
    - d. go for a walk
    - e. apply a hot pack
    - f. apply a cold pack
    - g. get a massage
    - h. get chiropractic care
    - i. get physiotherapy
    - j. exercise more active than walking
    - k. stop doing the task that caused the pain
    - l. sleep on it
    - m. do yoga/rehydrate
    - n. go swimming
    - o. meditate
    - p. do nothing/wait it out
    - q. I don't know
    - r. take a bath/shower/hot tub
    - s. apply an ointment or cream
    - t. other
  11. And which of these would you expect to be most helpful in alleviating your back pain?
  12. Please rate your agreement with the following: If you have back pain, you should try to stay active.
  13. Please rate your agreement with the following: You should still go to work if you have back pain, even if it means doing different tasks.
  14. How likely are you to spread the word that it is important to stay active through back pain?
  15. Why did you [agree / disagree] with the statement 'If you have back pain, you should try to stay active.'?
    - a. pain decreases with exercise/activity

- b. Exercise helps loosen muscles and joints/helps with blood flow
  - c. Using back may aggravate/resting is better
  - d. Staying still makes it worse
  - e. Depends on the type of injury
  - f. Advice from doctor/professional
  - g. No time/Have other responsibilities
  - h. Positive personal experience
  - i. Resting and being active are both important
  - j. It's difficult to be active when in pain
  - k. Word of mouth
  - l. Don't know
  - m. Other (specify):
  - n. No comment/Prefer not to answer
16. Have you ever seen any advertisements (TV, radio, newspaper, billboards, transit ads, social media, etc.) advising you how to help relieve back pain?
17. What did the advertisements suggest you do to relieve back pain?
- a. Take pain killers/medication
  - b. Be active/exercise
  - c. See a chiropractor
  - d. Get physiotherapy
  - e. Use a patch
  - f. Apply ointment/cream
  - g. Apply heat
  - h. Apply cold
  - i. Don't know
  - j. Other
  - k. No comment
18. Have you seen or heard any of the following advertising messages in radio or television, newspaper or magazine stories, posters, online, or in other advertising?
- a. Back pain: Don't take it lying down
  - b. Staying active is better for your back
  - c. Break your back habits
  - d. Relax to help your back
  - e. Back pain: don't stretch it out
  - f. Be heart healthy
  - g. Run for the cure
  - h. Take a Walk Day

19. How often do you do each of the following?

- a. Listen to the radio
- b. Read the print or online version of a newspaper
- c. Watch TV
- d. Use Twitter
- e. Use Facebook
- f. Use some other social media
- g. Surf the web
- h. Use public transit (e.g., local bus, LRT, or CTrain)
- i. Commute to work or school in a private vehicle

20. Are you:

- a. Male
- b. Female

21. Which of the following best describes your occupation?

- a. Transportation
- b. Manufacturing
- c. Hotels
- d. Construction
- e. Health
- f. Mining/Oil/Gas
- g. Agriculture/Forrestry
- h. Wholesale/Retail
- i. Service IndustryGovernment/Education
- j. Transportation
- k. Other

22. What languages do you speak at home or at work?

- a. English
- b. French
- c. Other

## Appendix IV



### RESEARCH ETHICS OFFICE

308 Campus Tower  
Edmonton, AB, Canada T6G 1K8  
Tel: 780.492.0459  
Fax: 780.492.9429  
www.reo.ualberta.ca

### Notification of Approval

Date: October 2, 2018  
Study ID: Pro00084609  
Principal Investigator: [Alexander Bell-Moratto](#)  
Study Supervisor: [Douglas Gross](#)  
Study Title: Maladaptive Back Pain Beliefs and their Impact on Treatment Seeking Behaviour  
Approval Expiry Date: Tuesday, October 1, 2019

Thank you for submitting the above study to the Research Ethics Board 2. Your application has been reviewed and approved on behalf of the committee.

A renewal report must be submitted next year prior to the expiry of this approval if your study still requires ethics approval. If you do not renew on or before the renewal expiry date, you will have to re-submit an ethics application.

Approval by the Research Ethics Board does not encompass authorization to access the staff, students, facilities or resources of local institutions for the purposes of the research.

Sincerely,

Ubaka Ogbogu, LLB, BL, LLM, SJD  
Chair, Research Ethics Board 2

*Note: This correspondence includes an electronic signature (validation and approval via an online system).*