A Five-Year Longitudinal Study of Perceived Control and Well-Being Among Older Individuals in Chronic Pain

By

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A Thesis
Submitted to the Faculty of Graduate Studies
In Partial Fulfilment of the Requirements
For the Degree of

Master of Arts

Department of Psychology
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THE UNIVERSITY OF MANITOBA

FACULTY OF GRADUATE STUDIES

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Acknowledgments

Many thanks go to my advisor Dr. Judith Chipperfield for her guidance and encouragement throughout this project. Thanks to my committee members Dr. Raymond Perry and Dr. Alex Segall for their thought provoking suggestions and comments. My gratitude to Dr. Betty Havens and her staff at the Aging In Manitoba project for the use of the AIM data in this thesis and to the Manitoba Health Research Council for their funding of my Masters studies.

Abstract

As individuals age, their perceptions of control come under increasing threat. Age associated changes in social roles, loss of loved ones, and declining health likely diminish an individual's perceived control. Using data from the large scale, longitudinal Aging In Manitoba project, perceptions of control are examined using responses from in-person interviews with 485 community dwelling older adults suffering from chronic pain. Because our understanding of perceived control can be improved by considering distinct control domains, this study examines domain-specific control (DSC) over one's health as well as general control (GC) over life and the role that pain intensity (PI) plays in the control – well-being relationship. Cross sectional (*n* = 485) and longitudinal analyses over a 5-year period (*n* = 214) are conducted. Comparison of means show that individuals report higher levels of GC than of DSC and that DSC but not GC is associated with measures of physical health. The results of sequential hierarchical regression analyses support the hypothesis that that the general control – well-being relationship is moderated by pain intensity as illustrated by a significant *GC* x *PI* interaction. In particular, perceived general control appears to play a protective role, being more strongly associated with physical (self-rated health, functional independence), psychological (life satisfaction, depression), and social (loneliness) well-being for individuals with high pain intensity than for those with low pain intensity. Thus, among those with high pain intensity, having low general control may be relatively disadvantageous, suggesting that these individuals may stand to benefit most from interventions aimed at increasing perceived control over life in general.

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A Five-Year Longitudinal Study of Perceived Control and Well-Being Among Older Individuals in Chronic Pain

As the proportion of our population aged 65 and older grows, the study of health and aging becomes increasingly valuable. The World Health Organization (WHO) defines health as “A state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity” (WHO, 1948). When studying *health* per se we must be aware that in addition to being a heterogeneous construct, each of the components that contribute to our understanding of health also interact with one another. For example, an individual’s psychological well-being will have an impact on his or her physical and social well-being, while simultaneously coming under the influence of these same factors. In this way, a person’s state of health can be seen as a balance between various components encompassing the physical, psychological, and social systems. If we are to understand what identifies a person as healthy we will need to examine each of these systems and how they interact another.

The current thesis examines how the psychological state of perceived control, defined as one’s belief in one’s ability to influence outcomes or events (Chipperfield & Greenslade, 1999), relates to individuals’ physical, psychological, and social well-being. *Perceived* control refers to an individual’s *subjective* sense of control rather than to the objective, or actual amount of control that the person believes is available in a given situation (Perry, 1991). Specifically, the current study considers the role of perceived control in the lives of older individuals who face the challenge of living with chronic pain. It is essential to study perceived control in this population because as previous researchers have stated, "the elderly are doubly vulnerable” to the effects of uncontrollability (Rodin, 1986, p. 150) due to the fact that as individuals age they encounter experiences, both physically and socially over which they have little control (Heckhausen & Schulz, 1995).

Perceived control is one psychogenic factor that has been found to influence well-being (Chipperfield, Campbell, & Perry, 2004). Although research on perceived control has been conducted in many contexts such as education (Perry, Hladkyj, Pekrun, & Pelletier, 2001; Ross, & Broh, 2000), adjustment after imprisonment (Halliday & Graham, 2000), and aging (Heckhausen & Baltes, 1991; McConatha & Huba, 1999), much of the research on perceptions of control has involved the relationship between this construct and well-being. In a seminal review of control research, Schulz and Heckhausen (1999) describe the perceived control – well-being linkage as one of the dominant topics in this area. Findings indicate, in general, that greater perceptions of control are associated with positive well-being outcomes such as decreased pain and fewer visits to health professionals (Barlow, Williams & Wright, 1999). It also appears that increases in perceived control are followed by changes in well-being such as decreased pain, fatigue, anxiety, and depression (Barlow, Turner, & Wright, 1998), supporting a causal relationship from control to well-being.

The relationship between perceived control and well-being has been established for short-term outcomes such as reduced pain (Pellino & Ward, 1998) and functional independence (Chipperfield, Campbell, et al., 2004), as well as for well-being outcomes over the long-term (Peterson, Seligman, & Vailant, 1988) including the use of health-care services (Chipperfield, & Greenslade, 1999) and survival

(Bailis, Chipperfield, & Perry, in press; Chipperfield, 1993a; Menec, Chipperfield, & Perry, 1999). Perceptions of control have been examined in the context of specific diseases such as cancer (Taylor, Lichtman, & Wood, 1984; Visintainer, Volpicelli, & Seligman, 1982), cardiovascular disease (Taylor, Helgeson, Reed, & Skokan, 1991), stroke and heart attacks (Chipperfield, Perry, Bailis, & Chuchmach, 2004), AIDS (Reed, Taylor, & Kemeny, 1993; Thompson, Nanni, & Levine, 1994), and arthritis (Tennen, Affleck, Urrows, Higgins, & Mendola, 1992) with the strength and direction of the control – well-being relationship differing for specific populations and for distinct types of control.

Since the control – well-being relationship is a complex one, the potential moderating effect of pain intensity to alter the nature of this relationship will be the focus of this thesis. The specific objectives of this study will be provided following a review of the relevant literature that focuses on the conceptual and measurement issues inherent in the study of well-being and perceived control, the differences between distinct types of perceived control, and the influence of pain intensity on the control – well-being relationship.

Conceptual and Measurement Issues: Well-being

Well-being is a general term often used interchangeably with health. Researchers have long been interested in defining "health" as this construct is an important part of our every day world. In addition, the reliable measurement of health is contingent upon its definition (Litva & Eyles, 1994). Health has been defined in numerous ways in the past. For example, Herzlich (1983) defines three dimensions of health. These include (1) health as a *state* of being, referring to the absence of disease,

(2) health as a *resource*, wherein people are believed to have a *reserve* of health, and (3) health as *equilibrium*, which is described as the full *realization and management* of an individual's reserve of health. This definition of health encompasses an individual's physical state of being and the mental activities involved in maintaining that state. Herzlich also mentions that "equilibrium" is affected by both personal and social factors, and thus echo's the definition of the WHO (1948) in considering physical, mental, and social components of well-being.

Normative standards are another frame of reference used to define health. Parsons' (1951) classic functional definition states that health is "the normal functioning of the total human individual including both the state of the organism as a biological system and of his personal and social adjustments. It is thus partly biologically and partly socially defined." (Parsons, 1951, p. 431). Litva and Eyles (1994) make the point that it is difficult to define what is *normal* for some physiological functions, and that what is normal for one individual or group may not be normal for another. While this may be true, it appears that people do evaluate their health against the standards or norms that they or their peers have set. An example is the use of social comparisons in assessing one's health, whereby an individual's comparison of himself to the health and fitness standards set by relevant others is considered (Bailis & Segall, 2004).

While it is important to consider the ways in which *researchers* have defined health, what is perhaps more important is to examine what defines health among the *participants being interviewed.* In a study of 24 individuals aged 26 – 80 (11 females, 13 males) Litva and Eyles (1994) conducted in-home interviews in a small town in

Ontario, Canada. Individuals in this study were asked, using open-ended questions, about their definitions of *health* and of *being healthy*. Participants found health very difficult to define. Their responses were general and abstract and included descriptors such as: wellness, the ability to do things without physical restriction, the absence of physical and mental disability, and your day-to-day physical state. Definitions of health were often given in negative terms, referring to the absence of disease or impairment and for the most part described a physical state of being.

When asked what *being healthy* meant, individuals were more likely to talk about a sense of well-being, quality of life, or feeling energetic and capable. Litva and Eyles also reported that *being healthy* was a very important aspect of individuals' identities and that illness was only tolerable if the individual was actively working towards becoming healthy or "getting well". Individuals in Litva and Eyles study who reported living with chronic conditions, and who thus could not "get well", still reported being healthy. It was necessary for them to maintain this aspect of their identity in order to avoid the judgements of others. The authors suggested that they were able to maintain their healthy image of themselves despite their chronic conditions by making lifestyle changes that allowed them to accommodate for their condition and continue to function in their daily roles. Alternatively, Litva and Eyles reported that individuals with chronic conditions reported being health by simply ignoring their condition, or denying that it impacted their lives. For these people with chronic conditions it is possible that they referred mainly to their ability to function on a day-to-day basis when assessing their health and could thus report being healthy as long as they could consider themselves *capable* despite the presence of disease.

This function-based definition of health was examined in another study by Calnan (1987) who asked a group of working-aged women to respond to open ended questions about their definitions of health. Calnan expected the working-class, but not the upper-class women to refer to their functional ability to carry out daily tasks in their definitions of health. Findings indicated that neither upper- nor working-class women considered functional ability when evaluating their health. Regardless of social class, the presence of signs and symptoms of ill-health was the prevailing referent for defining health.

It is possible that definitions of health are related to the age of the individual providing the definition. This is appears to be the case in a study by Strain (1993) who examined older individuals living Manitoba, Canada (average age = 71, 59% female) and found that among this group health was defined as the absence of disease, a dimension of strength, and a level of functional fitness with the relationship between these constructs being complex. Criteria listed as necessary for good health by these individuals were the ability to perform usual activities, a general feeling of well-being and the absence of symptoms.

Relevant to the current study is Strain's finding that individuals who had a health problem causing pain within the last year defined health as the absence of symptoms. Contrary to Calnan's finding, that functional ability was not an important referent when defining health, Strain found that older individuals' definition of health varied depending on the age group they were considering. When referring to age peers, Strain's participants defined health in terms of functional ability; whereas, when referring to younger people, participants defined health as a general feeling of well-being. Strain's finding that older individuals who are experiencing pain base their definition of health on physical symptoms should generalize to the current sample which includes a demographically similar group of individuals who report experiencing chronic pain.

It is clear that the term "health" can be used to refer to many aspects of well-being (Herzlich, 1988; Parsons, 1951; WHO, 1948); however, it also appears that this term often connotes an individual's physical state (Calnan, 1987; Litva & Eyles, 1994; Strain, 1993). Thus, in keeping with the terminology of the WHO's broadly inclusive definition of health, this thesis employs the term "well-being" when referring to health in general, including physical, psychological, and social aspects, while the term "health" will be reserved for specific references to physical health.

Considering the intricacies involved in defining "health" it is stands to reason that the measurement of this concept also calls for clarification. Physical health has been measured in numerous ways. A one-item measure of self-rated health is frequently employed for this purpose in social research and national surveys (Krause and Jay, 1994; Liang, 1986) and the reliability and validity of this measure has been established repeatedly (Chappell, 1981; Idler & Benyamini, 1997). While this measure is analytically useful, easily administered and provides a succinct summarization of health, it has been criticized for losing reference to specific conditions and the complexities that these conditions entail (Wallace, 1994). Congruency has however, been reported between one-item health measures and counts of chronic conditions (Chipperfield, 1993b) and it has been found that for individuals whose health conditions have had an impact on their lives, responses to such one-item self-report measures are particularly accurate (Chappell, 1981).

The current study employs this self-rated health measure as an indicator of *physical health*. Recalling the complexities in defining "health" it is important to consider whether this measure is in fact representative of *physical* health. In one study Segovia, Bartlett, and Edwards (1989) conducted a factor analysis of various health status measures which produced five factors. These included (1) disease, (2), happiness, (3) subjective appraisals of physical health, (4) restriction, and (5) social contacts. Included in their analysis was the 1-item self-rated health measure, which loaded with equal weight on the first (disease) and third (subjective appraisals of physical health) factors both of which refer to physical health.

In another pivotal study Krause and Jay (1994) sought to determine exactly what this 1-item health measure was assessing. They interviewed 192 individuals from Michigan, USA (average age = 38.3 years, 58% female) to whom they posed the closed ended self-rated health question followed by prompts such as "Tell me why you say that?" They found that 70% or respondents identified physical health as the basis for their response to the 1-item measure while 6% reported considering social comparisons and only 1 individual referred to psychological well-being. Also notable was the finding that *older* individuals were more likely than younger people to report thinking about *physical* health problems when answering the 1-item question. They suggested that this may not be surprising as older people are more likely than younger people to have health problems, and thus to use this as their reference point for assessing their health.

The use of the self-rated health measure as an indicator of physical health is based on these findings. Participants referred predominantly to physical states when answering the self-rated health measure (Krause & Jay, 1994; Segovia et al., 1989) and health conditions involving the experience of chronic pain would likely have an impact on the lives of the individuals in this study making this measure particularly accurate (Chapell, 1981). It is therefore reasonable to interpret the 1-item self-rated health measure as representing physical health when employed among the current sample of older individuals in chronic pain.

Conceptual and Measurement Issues: Perceived Control

Perceived control is a well-established construct in the health and psychology literatures. It is believed to develop as individuals succeed in reaching the goals they aspire towards. Successful goal attainment encourages feelings of competence, which enhance an individual's sense of control (Brandtstaedter & Renner, 1990; Brandtstaedter & Rothermund, 1994).

Perceived control is not a homogeneous concept as highlighted by Skinner's (1996) review of control-related constructs. Theoretically speaking, there are different types of control that are distinct from one another, although a discussion of all of the distinct forms of perceived control is beyond the scope of this thesis. As is subsequently described in more detail, findings indicate that the relationship between perceived control and well-being differs depending on the type of control that is examined (Thompson, Collins, Newcomb, & Hunt, 1996). Properties of the situation such as the restrictions imposed on prison inmates, and personal characteristics of the individual such as age and gender have also been found to alter the relationship between control and well-being (Chipperfield, 1993a, Thompson et al., 1996).

Researchers have made various distinctions with regards to specific types of perceived control. For example, the early concept of locus control (Lefcourt, 1981; Levinson, 1973; Rotter, 1966) allowed for assignment of control to factors *external* to the individual, such as luck, or powerful others, or to factors *internal* to the person, such as the individual's behaviour, intelligence, or appearance. Another distinction comes from Wells' (1994) statement that it is useful to distinguish between control dimensions such as beliefs about the *controllability of the outcome* and beliefs about the individual's *ability to cope*, as they contribute uniquely to variance in distress and disability. Thompson and her colleagues (Thompson et al., 1994; Thompson, Sobolew-Shubin, Galbraith, Schwankovsky, & Cruzen, 1993) have conducted studies employing a dual conception of perceived control, distinguishing between *central* and *consequence-related* control. In their model *central control* refers to control over the *onset and course* of a disease whereas *consequence-related control* refers to control over the *results* of the symptoms of the disease.

Another distinction, and the one that will be employed in the current study, is the differentiation of domain-specific control from general control, which proposes that control is differentially related to well-being depending on whether one is talking about control over a specific life domain or control over life in general. This conception of perceived control has been employed in various contexts including school performance among children (Skinner, 1990) and more recently among older adults (Lachman & Weaver, 1998, Tan, Jensen, Robinson-Whelen, Thornby, &

Monga, 2002) for whom it has been proven meaningful in understanding the control – well-being relationship. Various studies have examined the control – well-being relationship using domain-specific measures of control but few researchers have compared the utility of general and domain-specific measures in predicting domain-specific well-being outcomes (Tan et al., 2002). An exception is a study by Lachman and Weaver (1998) that showed domain-specific control measures better predicted related domain-specific outcomes than outcomes in other domains.

Based on the proposition that perceived control is a multidimensional construct, Tan et al. (2002) point out that studies of the control – well-being relationship among individuals in pain could be confounded by the fact that different control measures are assessing orthogonal facets of control. This would mean that the control – well-being relationship can not be discussed without clearly specifying which aspect of control has been assessed as distinct domains of perceived control might have unique relationships with well-being. They emphasize the need to determine whether or not different control measures are targeting separate constructs and, if they are, to determine the dimensions of these constructs. Tan et al. (2002) conducted a study of the dimensions of perceived control over pain. They sampled patients with chronic non-malignant pain who had been referred to a pain management program in a Houston teaching hospital (average age = 50.8, 90.3% male). Most people had at least a high school education (84.5%). More than half were white (62.4%) and about half of the sample were married (50.2%). Half of them were on disability compensation for their pain-related condition (48%).

Tan et al.'s factor analyses distilling the distinct types of control produced six factors supporting the hypothesis that pain-related perceptions of control are multidimensional. Regression analyses revealed that perceived control was an important predictor of well-being (pain severity, depression, disability, and pain interference) even when controlling for pain intensity and the relevant demographics. Tan et al. also found that control over *life in general* was consistently related to well-being (i.e. to less depression, less disability, and less pain interference). Although in this study the perception of control over the *effects of pain* was the best predictor of well-being, perceived control over *life in general* was more strongly associated with functioning than perceived control over *the pain itself*. Tan et al. recommended, based on their findings, that clinicians ought to encourage clients to focus on increasing perceived control over the effects of pain and over life in general rather than perceived control over pain itself. The authors also concluded that there is no stand-alone pain control scale in existence that could capture this entire construct.

In another study Lachman and Weaver (1998) examined general and domain-specific control beliefs among 3032 randomly sampled non-institutionalized adults who participated in the Midlife in the United States Survey (MIDUS) conducted by the John D. and Catherine T. MacArthur Foundation Network on Successful Midlife Development. Participants were an average age of 47.06 years. Most (89%) were Caucasian and 49% were male. More than half of their participants were married (64%) and most had at least a high school education (90%). Lachman and Weaver measured control over life in general and over seven specific domains. They employed single-item measures which asked the following question, "Using a 0 – 10 scale where 0 means *no control at all* and 10 means *very much control*, how would you rate the amount of control you have over your ________ these days?" This question was asked with regards to life in general, health, work, finances, contribution to the welfare and well-being of other people, relationship with your children, marriage or close relationship, and sexual aspect of your life.

Several findings from this study are worth noting in the context of the current project. First, the authors found that perceptions of control vary across domains. This supports the hypothesis that it is important to distinguish between domains when studying perceived control. Next, they found that while older adults reported more constraints and restrictions than did younger adults, perceptions of control over life in general did not decline with increasing age. This means that although older adults acknowledged increasing limitations to their potential for actual control in some areas of life, they maintained a high sense of control over their lives in general.

In their study, Lachman and Weaver (1998) found that perceptions of control over health did not differ for younger and older individuals. This contradicted previous studies, which had indicated that perceived control over health declined with age (Lachman, 1986, 1991). It is important to note that the studies finding changes in perceived control with increasing age involved individuals over the age of 75. In their study, Lachman and Weaver assessed individuals younger than 75 years and so it may be that declines in perceived control over health do not occur until after the age of 75. With regards to the implications of perceived control over health, they found that those who had higher perceived control over health also had better health, lower perceived risk for disease, and better access to medical care. These findings support the assertion that domain-specific control measures predict domain-specific outcomes. In fact, all of the domain-specific measures of control employed in Lachman and Weaver's study were more highly correlated with the relevant domain-specific outcomes than they were with outcomes from other domains.

Chipperfield, Perry, Volk, & Hladkyj (2004) provide another example of the use of one-item domain-specific and general control measures. They documented levels of perceived control among the 353 community-dwelling older individuals in their Successful Aging Study (mean age = 80.04, 62.6% female). Participants were asked how much influence they had over 10 specific life domains and over life in general, with possible responses ranging from 1 = *almost no influence* to 10 = *total influence*. The domain in which participants reported the highest levels of perceived control was in their basic activities of daily living (*M* = 8.99, *SD* = 1.70), whereas the lowest mean rating was found in the domain of physical health (*M* = 7.54, *SD* = 1.89). Control over life in general fell between the two extremes with a mean of 8.46 (*SD* = 1.76).

It is possible that when an individual perceives little control in one specific domain, for example the health domain, the potential negative consequences of low perceived control can be offset by maintaining high overall perceptions of control. It may even be beneficial to relinquish control in specific domains where, in objective reality, direct influence is not possible. Maintaining perceptions of control in more general areas of life where individuals can still influence outcomes could provide beneficial effects.

The potential positive effects of general control are further illustrated by Thompson et al. (1993), who measured perceptions of control in cancer patients (*n* = 71) who were contacted through a tumour registry at a university medical centre (average age = 54.6, 63% female). Their measure of control covered four domains including (1) control over emotions and symptoms, (2) control over relationships, (3) control over medical care, and (4) control over the course of the disease. Zero order correlations showed that for each control domain, cancer patients with higher perceptions of control exhibited better adjustment than those reporting lower levels of control. Partial correlations and stepwise multiple regression analyses showed that control over emotions and physical symptoms accounted for most of the variance in well-being. This suggests that while perceived control over the actual course of one's disease or health problem may be desirable and adaptive, it may not be as important or beneficial as having a sense of control over other life domains.

Thompson et al.'s (1994) conception of consequence-related vs. central control is also relevant to the present study because these constructs may map onto general and domain-specific control respectively. Consequence-related control refers to control over the impact an illness may have on many aspects of an individual's life including their emotional health, relationships, job situation, and finances. Consequence-related control is thus more general or broader in scope than is central control which refers specifically to control over the onset and course of the disease. In particular, Thompson et al. (1994) studied a group of HIV-positive men (*n* = 104) receiving treatment at a specialized HIV medical clinic (average age = 32.5). Thompson et al. (1994) expected that perceptions of control should reflect reality and that the potential for actual control over the *consequences* of HIV is greater than the potential for actual control over the *course* of HIV itself. As expected, they found that participants reported higher perceived control over the consequences or the symptoms of HIV (consequence-related control) than they did over the disease itself (central control).

Thompson's findings have implications for the current study if they generalize to the older, chronic pain population being considered and if central control maps on to domain-specific control while consequence-related control maps on to general control as previously described. If this is the case, individuals in the current study should report higher levels of general control than of domain-specific control because perceptions of control would be more realistic over life in general than in the health domain where, by virtue of the chronic pain experience, individuals' potential for actual control may be limited. This reasoning is supported by the work of Mantyselka, Turunen, Ahonen, and Kumpusalo (2003) who found that pain is independently related to poorer health status. That is, to the extent that greater pain is associated with poorer health, individuals in chronic pain may experience compromised perceptions of control over their health. Thompson et al. (1994) also found that higher perceived consequence-related control was associated with fewer reported symptoms and lower levels of depression. To the extent that consequence-related control is akin to general control, this may suggest that individuals who report higher levels of general control will also report more positive well-being than those reporting lower levels.

Congruent with Thompson et al.'s findings (1993; 1994) are those from a study of control and well-being in 92 rheumatoid arthritis patients (average age = 50.4, 66% female) recruited from a university-based faculty rheumatology practice (Affleck, Tennen, Pfeiffer, & Fifield, 1987). This study examined disease state and symptoms, which varied in number, fluctuated in intensity, and included various indicators such as fatigue, pain, and stiffness. Symptoms were thus more general than disease state which was narrowly identified as linear and predictable deformation and erosion of joints. Patients in Affleck et al.'s study reported greater perceptions of control over the *symptoms* of their disease, a more general domain, than over the more specific domain of the course of the disease itself. They also found that greater perceived control over one's care and treatment (similar to Thompson's general concept of consequence-related control) was associated with positive mood and psychological adjustment, further supporting the idea that a sense of perceived general control is adaptive even when domain-specific control is compromised.

Notable in Affleck et al.'s (1987) study is the distinction between groups differing in severity of symptoms and disease states. These distinctions allowed them to determine whether severity of symptoms and disease state moderate the relationship between perceived control and adjustment. Among participants with more severe *symptoms*, those with greater perceived control reported more positive adjustment than those with low perceived control. It is possible that those who reported severe symptoms, such as stiffness and fatigue were, in actuality, still able to influence those symptoms or their consequences. For these individuals, perceiving that they possessed some control may not have been an illusion because the potential for actual control existed. In contrast, among those with more severe *disease,* individuals with greater perceived control exhibited less positive adjustment than those with low perceived control. Severe disease state, as indicated by high numbers of deformed and eroded joints, may be less amenable to personal influence than are severe symptoms. It may thus be maladaptive for individuals with severe disease states to continue to believe unrealistically in their ability to control their condition.

Clearly, perceived control is multi-faceted and can be general or domain-specific. It is important to note that domain-specific control does not refer to one construct, but to control over one of many potential domains, a few of which have been addressed in the previous discussion such as control over pain, health, disease state, symptoms, or the results of symptoms. It is important to stress which domain control has been assessed in when interpreting the control – well-being relationship because control in specific domains might be related to well-being in different ways. In some instances perceived control is beneficial to the individual suffering from pain. Previous research has determined that perceived control is positively related to coping with pain (Petpichetchian, 2001), lower levels of pain severity and interference, disability, pain intensity, and depression (Jensen, Turner, & Romano, 2001; Paterson, 2001; Pellino & Ward, 1998). Additionally, psychotherapeutic interventions promoting perceptions of control have been related to decreases in pain and the use of health care services (Barlow et al., 1998; 1999). Among those suffering from chronic pain however, some forms of perceived control may be more critical than others. In particular, general perceptions of control may be more adaptive than domain-specific perceptions of control over *health.*

When experiencing chronic pain due to compromised physical health, domain-specific perceived control over health might be least adaptive if it is unrealistic to believe in one's ability to influence one's health condition. General perceived control, on the other hand, could be more adaptive if, in fact, it is relatively more attainable. To the extent that previous research on perceived control (Thompson et al., 1993; 1994) generalizes to health conditions involving pain, greater benefits would be expected for individuals whose general control perceptions are high, than for individuals whose domain-specific control perceptions are high.

The Pervasive Nature of Chronic Pain:

Pain is much more than a simple medical problem. It is a complex phenomenon affecting all areas of an individual's daily life (Bendelow & Williams, 1995). Pain pervades every aspect of human existence. It is "never the sole creation of our anatomy and physiology. It emerges only at the intersection of bodies, minds and cultures." (Morris, 1991, p.1). Further, the word "pain" does not describe a single sensation, but rather a collection of sensory, affective, and evaluative experiences with varying causes and qualities (Melzack & Wall, 1988). Pain, when it is experienced and particularly when it is prolonged, takes precedence in an individual's consciousness to the extent that other things that were once important to the individual are no longer of concern. The body, which was once taken for granted, is now the centre of the individual's focus (Leder, 1990). It is clear that pain has the potential to alter every aspect of an individual's life.

The life changes brought on by pain have been referred to as a *biographical disruption* (Bury, 1991) meaning that individuals who experience chronic conditions involving pain must alter their life paths in order to accommodate and adapt to the pain experience. Numerous researchers describe this phenomenon. Scarry (1985) for example, says that "pain unmakes our habitual world" while Baszanger (1989) describes the effects of pain on all aspects of life as "disorganizing".

Baszanger also makes an important point regarding the chronicity of pain. She acknowledges the lack of consensus on the medical category "chronic" and states that conditions are often placed on a continuum ranging from acute to chronic with varying criteria as to what constitutes chronicity. She specifies the criteria of disorganization, duration, and the need to manage the condition as necessary for designating pain as "chronic". She also states that chronic illness cannot, by definition, be cured. She goes on to say that regardless of the criteria used to define "chronic," there are many individuals with chronic conditions who continue to respond as if the situation were acute. She reports that the results of these efforts are waste, ineffectiveness, and delayed readjustment. It would appear that not only does the experience of chronic pain have an all encompassing impact on an individual's life, but the efforts taken to alleviate that pain may lead to further psychological detriment.

Adding to the complexity of the pain experience is its subjective nature. Pain is difficult to evaluate and legitimize because it can only be directly assessed by the individual experiencing it. The evaluation and prioritization of pain varies by person and involves many considerations including the demands of an individual's occupation and family life (Baszanger, 1989).

Of particular relevance to the current study is Baszanger's (1989) finding that people experiencing chronic pain are always trying to control it to some extent. Even individuals who are not attempting to alleviate their pain will continue to concern themselves with maintaining an appearance of competence in a their environment, with which pain has a tendency to interfere. For this reason it is important to consider the role of pain in the control – well-being relationship.

While pain can be discussed in terms of its presence or absence, its true nature is more accurately captured on a continuum of intensity. Pain intensity is typically measured on an interval scale (Affleck, Urrows, Tennen, & Higgins, 1992; Tennen et al., 1992) with possible responses ranging from *no pain* to *severe pain,* or on a 100 mm visual analogue scale (Affleck et al., 1987; Tennen et al., 1992) with similar anchors. Since the relationship between control and well-being may differ for people reporting mild versus intense chronic pain it is important to include this dimension of pain when examining the control – well-being relationship in a chronic pain population.

Pain Intensity as a Moderator in the Perceived Control – Well-being Relationship

There is evidence that pain intensity plays a moderating role in the relationship between control beliefs and well-being (Brown, Nicassio, & Wallston, 1989; Jensen, & Karoly, 1991), although findings are mixed. Some studies find the link between perceived control and well-being is most evident for those with intense pain, while others find that it is most evident for those with less intense pain. Acknowledging the importance of the role of pain intensity in the study of control and well-being, some researchers choose to statistically control for pain intensity (Wells, 1994). Others treat it as a moderating variable in the control – well-being relationship (Jensen, Romano, Turner, Good, & Wald, 1999; Tennen, et al., 1992).

Affleck et al. (1987), in their previously mentioned study, found that among arthritis patients, personal control was found to be significantly associated with positive mood for individuals reporting moderate and severe symptoms, but unrelated to mood for those with mild symptoms. Affleck et al. offer the explanation that if symptoms, as opposed to disease state, are controllable to some degree, then perceptions of control would be realistic and adaptive among individuals with severe symptoms who had previously succeeded in influencing these symptoms. Individuals with less severe symptoms may not have attempted to influence them in the past. Perceptions of control, lacking the confirmation of past success, may serve less of an adaptive function for these individuals.

This explanation proposes that perceived control is only adaptive if it is based on a realistic ability to influence symptoms. Affleck et al.'s assumption that individuals with severe symptoms have been able to influence past symptoms is debatable. It seems equally likely in the case of chronic pain that previous attempts to influence the symptom may have met with failure, which would render perceptions of control, at least to some extent, unrealistic. Empirical evidence exists supporting the notion that individuals with severe symptoms have developed realistic strategies for alleviating these symptoms (Anderson, Bradley, Young, & McDaniel, 1986; Banwell, & Ziebell, 1985). If this is true in all cases, Affleck et al.'s (1987) explanation is plausible.

Other studies appear to contradict the results reported by Affleck et al. (1987). For example, Wells' (1994) examination of the pain-related control beliefs of 71 patients with chronic non-malignant pain (average age = 45.5, 62% female) found that higher levels of perceived control were associated with positive adjustment only for those experiencing low-intensity pain. She found that for individuals with low- to moderate-intensity pain, control beliefs were strongly and inversely related to disability. For individuals with high levels of pain intensity this relationship was very weak. Based on the work of Rosenstiel and Keefe (1983), Wells offers the explanation that individuals with chronic pain have learned from past experience that they *cannot* in reality control their pain. This explanation disagrees with that of Affleck et al. (1987). These opposing interpretations may be a result of the multi-faceted nature of pain as a symptom.

Pain may have unique characteristics and multiple dimensions, making it unlike other symptoms such as fatigue, which may be less complex and more amenable to personal control efforts. It is possible that diminished control is particularly *salient* for those with more intense pain who have made more attempts at controlling the source of the pain. Thus, the inverse relationships between control beliefs and disability for those with low pain intensity (Wells, 1994) could have been due to the fact that these individuals have not had their perceptions disproved by past experience. It is notable that perceived control in Wells' (1994) study referred to domain-specific control, not to general control for which results might differ.

Another study of 75 arthritis patients (average age = 52.7, 71% female) conducted by Affleck and colleagues (1992) illustrated the positive control – well-being relationship for low-intensity pain sufferers. Like Wells (1994), Affleck et al. (1992) studied domain-specific control examining strategies aimed at controlling pain, but not at controlling other aspects of life. Affleck et al. (1992) found that pain intensity moderated the relation between control-enhancing strategy use and daily mood. At low levels of pain intensity, greater strategy use was associated with positive mood. At high levels of pain intensity, greater strategy use was associated with negative mood. In attempting to understand these findings Affleck et al. (1992) suggested that the adaptive value of control should depend on whether or not the domain being considered is actually subject to personal control. Those with high levels of pain may not have been able to influence their pain regardless of their strategy use, and so increased strategy use may have been associated with negative mood because it translated into increased frustration when strategies were unsuccessful. It is clear that individuals' actual ability to influence the outcome must be considered when interpreting the benefits of perceived control.

In the previously described studies reporting beneficial effects of perceived control for those experiencing less, relative to more intense pain, control measures were domain-specific over the pain experience. These findings form the basis for prediction in the present study when examining domain-specific control. If a certain amount of actual control over physical health is available, as may be the case for individuals experiencing less intense pain, perceptions of *domain-specific control* may be realistic and thus adaptive for these *low-intensity* pain sufferers. Previous research supports the notion that greater pain intensity is associated with poorer health (Mantyselka et al., 2003). This may be because individuals suffering from more intense pain have little opportunity to effectively control their health condition and thus do not benefit from greater perceptions of unrealistic domain-specific control.

The Present Study: Perceived Control Among Individuals With Chronic Pain

The present 5-year longitudinal study addresses the critical need to determine which types of control are adaptive in terms of better future physical, psychological, and social well-being when coping with chronic pain, particularly for older individuals who experience many age-related changes that may involve increased probability of the experience of pain (Haythornthwaite, Menefee, Heinberg, & Clark, 1998; Menec et al., 1999) and decreased opportunity for control (Heckhausen & Schulz, 1995; Rodin, 1986). Data obtained during interviews with older people living with chronic pain are used to tease apart the construct of control, distinguishing between control over health, which is referred to as *domain-specific control*, and control over life in general or *general control*. Previous research has found that chronic pain is independently related to poor health, meaning that the relationship between chronic pain and low self-rated health becomes stronger as the frequency of chronic pain increases and as self-rated health worsens even when controlling for chronic diseases and age (Mantyselka et al., 2003). Thus, in the current study, perceived control over health is employed as a measure of perceived domain-specific control. This study seeks to clarify the control – well-being relationship and proposes that pain intensity may differentially influence this association for domain-specific versus general perceived control.

The current study has several hypotheses. First, it is expected that individuals suffering with chronic pain will report greater perceptions of general control than of domain-specific control (Hypothesis 1) because there may be more abundant and more realistic avenues to maintaining a high level of general control than there are to maintaining control in the health domain (Thompson et al., 1994). Second, it is expected that general control will be more positively associated with well-being than will perceptions of domain-specific control (Hypothesis 2) because high perceived general control is more likely to reflect the potential for actual control that exists. This congruence between subjective and objective levels of control has been suggested to influence the adaptive value of perceived control (Affleck et al., 1987; Thompson et al., 1993). That is to say, perceived control is regarded as most adaptive when it is realistic.

Next, the moderating role of pain intensity in the perceived-control – well-being relationship will be considered among individuals experiencing chronic pain at Time 1. Although higher levels of perceived control at Time 1 are expected to predict better physical health (higher self-rated health, decreased likelihood of persistence of pain, greater functional independence), better psychological well-being (higher life satisfaction, lower depression), and better social well-being (lower levels of loneliness) five years later, pain intensity is expected to play a moderating role in the control – well-being relationship. These relationships are examined through longitudinal analyses that test for significant interactions between perceived control (both domain-specific and general control) and pain intensity on well-being five years later. Though the findings regarding the control – well-being relationship for high-and low-intensity pain sufferers do not necessarily agree on who benefits more from perceived control, they do have one common undercurrent. All of the results (Affleck et al., 1987; 1992; Wells, 1994) support the notion that perceptions of control are most adaptive when they are reality-based, that is, when control is relatively attainable. This may imply that the type of control that is most beneficial differs for those with higher or lower pain intensity. The subsequent predictions are based on this premise.

Since greater pain is associated with worse health, perceptions of domain-specific control over health may be unrealistic for individuals with high pain intensity. In contrast, general control may be a realistic and thus a viable option for this group (Mantyselka et al., 2003). Therefore, an interaction between general control and pain-intensity is predicted (Hypothesis 3) such that *high-intensity* pain sufferers are expected to benefit from *perceived general control* more so than those with low pain intensity for whom general control may not be as important. High pain intensity individuals should benefit from perceived general control as reflected by reports of higher levels of independence and self-rated health, less pain, greater life satisfaction, lower levels of depression, and lower levels of loneliness.

In contrast, for individuals with less, relative to more intense pain, perceptions of *domain-specific control* over health may be adaptive because these individuals are more capable of exercising f influence over their physical health. That is, for those with more intense pain, perceptions of control over health would be less realistic and thus less adaptive. Based on this logic, an interaction between control and pain intensity is predicted (Hypothesis 4). Compared to individuals with high-intensity pain those with *low pain intensity* should benefit more from perceived *domain-specific* control because controlling their health is more realistically within their control.

Individuals living in the community wrestle with different control issues than those living in institutions (Williamson & Schulz, 1992). For this reason only community dwelling participants will be included in this study. Several covariates will be considered, age, because it has been negatively related to perceptions of control in previous research (Heckhausen & Baltes, 1991) and gender, because control-related variables have been found to differ and have varying consequences for males and females (Chipperfield & Perry, 2004; Chipperfield, Perry, Bailis, & Chuchmach, 2004). Socio-demographics such as income, education, and marital status may better position individuals to actively control their circumstances. Each of these potential covariates that are found to relate to perceived control, pain intensity, and/or the dependent well-being measures assessed five years later will be statistically controlled for when testing the hypotheses.

To summarize, the following hypotheses are proposed:

1) Participants will report greater perceptions of general control (GC) than of domain-specific control (DSC). (GC > DSC)
2) Perceived general control will be more strongly associated with positive well-being (WB) than will perceived domain-specific control. (GC ↔ WB > DSC ↔ WB)
3) An interaction between perceived control and pain intensity (PI) is predicted, such that perceived *general control* will be more positively associated with

well-being for those with *high pain intensity* than those with low pain intensity. ($GC \leftrightarrow WB_{\text{high PI}} > GC \leftrightarrow WB_{\text{low PI}}$)

4) An interaction between perceived control and pain intensity is predicted, such that perceived *domain-specific control* will be more positively associated with well-being for those with *low pain intensity* than those with high pain intensity. ($DSC \leftrightarrow WB_{\text{low PI}} > DSC \leftrightarrow WB_{\text{high PI}}$)

This study is unique in several ways. First, while Thompson and her colleagues (Thompson et al., 1993; 1994) have discussed the benefits of consequence-related control even in the absence of central control, this study goes beyond control beliefs related to the illness and its symptoms and examines control in the broader realm of life in general. Thus, in considering perceived general control among those with chronic pain the current study examines the benefits that may accrue from a sense of control much broader than perceived control in the health domain where the control threat is felt. Secondly, unlike previous research that has contrasted domain-specific and general control among those with chronic pain, the present study systematically considers the moderating effects of pain intensity (Tan et al., 2002). The current study seeks to clarify the mixed findings of previous researchers regarding the role of pain intensity (Affleck et al., 1987; 1992) in the control – well-being relationship, proposing that pain intensity may affect the control – well-being relationships differentially for domain-specific versus general perceived control.

Finally, methodologically this study also has several strengths. The design is longitudinal in nature. Access to the 1996-2001 AIM database permits 5-year longitudinal analyses, which allow for causal inferences between Time 1 control measures and Time 2 dependent measures (self-rated health, independence, persistence of pain, life satisfaction, depression, and loneliness). In addition, the participants comprise a large, representative, stratified random sample of older individuals who have reported pain, as opposed to previous studies, which have used purposive sampling methods, recruiting small groups of participants from specific health clinics (Affleck et al., 1987; 1992; Lachman & Weaver, 1998; Tan et al., 2002; Thompson, et al., 1993; 1994; Wells, 1994). Thus, results should be generalizable to a wider population than previous studies have allowed for.

Method

Database

The Aging in Manitoba (AIM) study. The current study involves the analysis of data collected from individuals who participated in the Aging in Manitoba (AIM) study. The AIM study began in 1971 with additional independent waves of participants being added in 1976 and 1983. The 1971 and 1976 waves were re-interviewed in 1983. All three waves were re-interviewed in 1990, 1996, and 2001. The AIM study is one of the largest and longest running continuous studies of older individuals to date (Chipperfield, Havens, & Doig, 1997). A stratified random selection procedure was used to recruit individuals from all parts of Manitoba including remote locations. The sample is representative as can be seen from its similarity to the Manitoba population, and the modest level of non-response has not eroded the representativeness of the surviving AIM sample (Chipperfield et al., 1997). In total, nearly 9000 older individuals have been interviewed and follow-up rates are outstanding, exceeding 95% for survivors (Hall et al., 1996). Data for the current study were taken from the 1996 and 2001 waves of AIM because the key perceived control measures employed in the current study were obtained at these two points in time. Ethical approval for the original 1996 and 2001 data collections were obtained from the University of Manitoba Faculty Committee on the Use of Human Subjects in Research (Reference # E96:01) and the University of Manitoba Health Research Ethics Board (Protocol # H2000:022). Approval of the use of the AIM data for this study was obtained from the Psychology/Sociology Research Ethics Board (PSREB) at the University of Manitoba (Protocol # P2003:081; see Appendix for approval certificates).

The AIM project involves one-on-one interviews with older Manitobans in their homes. For the current study, inclusion required that individuals must have reported experiencing chronic pain in the 1996 interview ($n = 546$) and that they resided in the community and not in personal care homes in 1996 ($n = 485$) and remained as such in 2001 ($n = 214$). The community dwelling criterion was included because many institutionalized individuals failed to provide self-reports on the key variables and because previous research has shown that the relationship between pain and well-being differs for those residing in the community and those residing in institutions (Williamson & Schulz, 1992).

Analysis Samples

Sample sizes differ for some of the analyses conducted in this study. Cross-sectional analyses involving only 1996 data, subsequently referred to as Time 1 measures (see Hypothesis 1 concerning mean levels of general versus domain-specific control), include 485 participants in chronic pain and living in the community in 1996 who have valid values on the other key variables being examined (485/1868 = 25.96 % of the complete AIM 1996 sample). The longitudinal analyses that involves both 1996 and 2001 data, subsequently referred to as Time 2 dependent measures (life satisfaction, depression, self-rated health, independence, persistence of pain, and loneliness), involve only those participants who survived, remained living in the community, and responded to the Time 2 interview in 2001. Thus sample sizes are smaller for the 5-year longitudinal analyses of Hypotheses 2 through 4, which concern the relationship between perceived control and well-being (*n* = 214, or 214/1100 = 19.45 % of the complete AIM 2001 sample). Sample sizes for these longitudinal analyses vary due to missing responses on some of the measures. Although 214 of the individuals included in the Time 1 sample were still alive, still residing in the community, and participated in the Time 2 interview, not all of these participants responded to all of the interview questions. For example, longitudinal analyses involving the depression measure are based on a sample of 174 individuals for whom complete responses to the depression measure were available.

Design

This design is longitudinal in nature. The Time 1 measures include the variables used for the inclusion criteria (presence of chronic pain, community dwelling vs. institutionalized), the potential covariates to be statistically controlled (age, gender, education, income, marital status), the independent variables (perceived domain-specific and general control), and the moderating variable (pain intensity). Time 2 measures obtained five years later in 2001 include the dependent measures (self-rated health, independence, persistence of pain, life satisfaction, depression, and loneliness).

Measures

Inclusion criteria. At Time 1 participants were asked, "Are you usually free of pain and discomfort?" (*yes/no*), and only those indicating that they experience pain on a regular basis were included in the sample for this study (*n* = 564; 564/1868 = 30.19 % of the total AIM sample). Type of dwelling was assessed by asking, "What type of housing are you living in?" for which responses were dichotomized (0 = *community dwelling*, 1 = *institutionalized*). Only those living in the community in 1996 (*n* = 485/564 = 85.99 % of those reporting chronic pain) and remaining there in 2001 (*n* = 214/485 = 44.12 % of the Time 1 sample) were included.

Demographics. The demographic information used in this study was obtained at the beginning of the Time 1 1996 AIM interview. The demographic similarity of the sample at Time 1 (cross sectional, *n* = 485) and those who were retained at Time 2 (longitudinal, *n* = 214) versus those who were lost due to not longer living in the community at Time 2 (*n* = 271) can be seen in Table 1. Respondents were asked, "How old are you?" which was used as a self-report measure of age. Of the group of 214 individuals who responded to all of the measures, including the Time 2 dependent measures the average age was 79.14 years (*SD* = 5.01, range = 72 – 94). Education level was obtained by asking, "How many years or grades did you complete in school? (*Specify number of years*)". Individuals had an average of 8.11 years of education (*SD* = 3.16, range = 0 – 15).

Income was calculated based on responses to, "How much do you earn in an average month...?" from their own resources, pensions or allowances, and other sources. These responses were summed to create a measure of total monthly income. This variable was skewed, had outliers, and had a large number of missing values due to non-response (*n* =187/485) thus requiring some modifications. First extreme outliers (*n* = 3) were identified and set to the highest income score while retaining their respective rank order. Next, rather than excluding participants for whom income was not reported and losing valuable information, a regression-based substitution for missing values approach was employed as proposed by Tabachnick and Fidell (2001). Specifically, because stepwise regression analyses revealed that participants' education and age significantly predicted income, the income of each participant who had missing income information was estimated using the regression equation (i.e., intercept and regression coefficients) and the individual predictor data (i.e., education and gender). Finally, in order to correct for the skewness of this variable the natural log was computed, and these values were used in the regression analyses. Average monthly income was $1160.87 (*SD* = $578.62, range = $385 - $3600).

The longitudinal group consisted of 90 (42.1 %) males and 124 (57.9 %) females. Marital status was assessed by asking, "What is your current marital status? (single, married, widowed, divorced/separated)" for which a dichotomized variable was created (0 = *married*, 1 = *not married*). Half of the sample (*n* = 107) were married while the other half (*n* = 107) were not. Of note, the only apparent demographic difference between the group of 214 individuals who remained in the community at Time 2 and the 271 who were no longer in the community at this point was in their marital status. Those who were no longer in the community were more likely to be un-married. A spouse may act as a caregiver, providing essential assistance with daily tasks, and as a social support providing companionship and decreasing the potential for loneliness. Without a spouse to provide for these needs it may be more likely that a person will end up residing in a care home rather than in the community as seems to be the case for the sample in this study.

Table 1

Demographic comparison of cross-sectional and longitudinal samples at Time 1.

Variable	Cross Sectional (*n* = 485)			Longitudinal – Retained at Time 2 (*n* = 214)		
	M	*SD*	Range	*M*	*SD*	Range
Age	81.67	6.07	72-101	79.14	5.01	72-94
Education (years)	8.00	3.45	0-16+	8.11	3.16	0-15
Income ($/month)	1107.65	515.70	385-3600	1160.87	578.62	385-3600
	Frequency	%		Frequency	%	
Gender						
Male	200	41.2		90	42.1	
Female	285	58.8		124	57.9	
Marital Status						
Married	209	43.1		107	50.0	
Not Married	276	56.9		107	50.0	

Note. Table continued on the next page.

Table 1 continued.

Variable	Longitudinal – Not Retained at Time 2 (*n* = 271)		
	M	*SD*	Range
Age	83.67	6.10	73-101
Education (years)	7.92	3.66	0-16+
Income ($/month)	1065	465	394-3400
	Frequency	%	
Gender			
Male	110	40.6	
Female	161	59.4	
Marital Status			
Married	102	37.6	
Not Married	169	62.4	

Independent variables. The independent variables in this study are the perceived control measures (see Table 2). These measures have been used in previous research (Chipperfield, Campbell, et al., 2004) and read as follows: Participants were told, "We would like to know about the influence or control you have over certain aspects of your life. In other words, we want to know whether you can personally influence things by what you say or do." Participants were then shown a card with the number 1 being anchored by "*almost no control*", and 10 anchored by "*almost total* *control*". They were asked "Using this scale where 1 indicates almost no control and 10 indicates almost total control, indicate the amount of control you feel you have over your physical health." This is the measure of *domain-specific control.* The measure of *general control* consisted of the same question but with "your physical health" being replaced by "your life in general". Of note in Table 2, the mean value for general control is relatively higher than the mean for domain-specific control.

The domain-specific and general control measures are moderately correlated ($r = .40, p < .05$). However, because these measures have been found to relate differently to well-being, these two one-item measures will be considered representative of conceptually distinct constructs. As well, the same one-item domain-specific (health) and general perceived control measures have been used and validated in previous research (Lachman & Weaver, 1998) where convergent correlations between domain-specific control measures and the domain related outcome measures were significantly higher than the discriminant validity correlations. This confirms that although control measures may be correlated with one another, they relate differentially to outcome measures and should as such be considered separately.

Moderating variable. Pain intensity was assessed by asking, "How would you describe the usual intensity of your pain or discomfort?" Possible responses were 1 (*mild*), 2 (*moderate*), or 3 (*severe*), with a mean of 1.82 (Table 2).

Dependent variables. Dependent variables were measured five years later. They include self-rated health, independence, persistence of pain, life satisfaction, depression, and loneliness. Descriptive details for the continuous dependent measure can be found in Table 2.

Life satisfaction was assessed using a one-item measure, which reads, "How would you describe your satisfaction with life, in general, at present?" Response options were 1 (*excellent*), 2 (*good*), 3 (*fair*), 4 (*poor*), or 5 (*bad*). This item was reverse coded so that higher values indicate greater life satisfaction. The use of one-item life satisfaction measures has been successful in the past (Cantril, 1965; Davis, 1974; Rose, 1955; Streib, 1956) and has been shown to correlate with Neugarten, Havighurst, and Tobin's (1961) well established multi-item Life Satisfaction Indices (Chuchmach, 2002).

Depression was assessed using the mean of responses to the short form 10-item Centre for Epidemiological Studies Depression scale (CESD-10; Andresen, Malmgren, Carter, & Patrick, 1994). Included are items such as "I felt depressed" and "I could not get going" with a four-point response scale ranging from 0 = *rarely or none of the time* to 3 = *most or all of the time*. The CESD 10-item measure of depression was completed by 174 of the participants with a reliability coefficient of $\alpha = .76$.

Independence was assessed by summing scores for independence in *basic* activities of daily living (BADLs) and independence in *instrumental* activities of daily living (IADLs). BADLs were assessed using responses to an 11 item measure created by combining items from previously established measures of BADLs (Katz et al., 1963; Loomis, 1971; Shanas et al.,1968; Torrance et al., 1992). Participants were asked "Does anyone usually help you with ________?" including tasks such as going up and down the stairs, dressing, and taking medication. Response options (*yes/no*) were coded dichotomously (0 = *dependent*, 1 = *independent*). Independence in instrumental activities of daily living (IADLs) was assessed using a 12-item measure of the same format as the previously described measure of BADLs. IADL tasks are distinct from BADLs in that they are more complex tasks, which generally require objects or people external to the individual in order to complete them (Lawton & Brody, 1969). These tasks include, for example, doing light housework, preparing a hot meal, and laundry. Because the BADL and IADL measures correlated significantly ($r = .728, p < .000, n = 213$), these 23 dichotomized items (11 BADLs and 12 IADLs) were summed to represent level of independence with higher scores indicating greater independence.

Self-rated health was assessed using responses to a one-item measure which reads, "For your age, would you say, in general, your health is good, fair, or poor?" Respondents then rated their health on a five-point scale; 1 = *bad, health troubles or infirmity all the time prevents most activities or requires confinement in bed*; 2 = *poor, very often prevents many activities*; 3 = *fair, occasionally prevents some activities;* 4 = *good, rarely prevents activities;* 5 = *excellent, never prevents activities.* This item was reverse-coded so that high scores indicate excellent health.

Loneliness was assessed in the AIM using a scale derived from de Jong-Gierveld and van Tilburg's (1990) Loneliness Scale. The scale is comprised of 11 items measuring feelings of belonging, for example, "There is always someone I can talk to about my day to day problems" and items measuring missing relationships, for example: "I miss having people around." Respondents were asked if they agreed with each statement on a three point scale: 1 = *no*, 2 = *more or less*, or 3 = *yes*. After reverse coding the appropriate items the mean score was calculated for an overall measure of loneliness. The 11-item loneliness scale was completed by 180 participants and had good reliability ($\alpha = .77$).

The persistence vs. alleviation of *chronic pain* at Time 2 was assessed with the same measure used to establish the presence of pain at Time 1. By comparing reports of the presence of chronic pain at Time 1 and Time 2, a dichotomous variable, 0 = *still in pain*, 1 = *no longer in pain* was created to indicate whether individuals' experience of chronic pain had changed over the 5-year period. The majority, 60.3 % (129/214) of the remaining sample were still in pain at Time 2, while 39.7 % (85/214) were no longer in pain.

Table 2

Mean values for independent, moderating, and dependent variables.

Variable	*M*	*SD*	Possible Range	Actual Range
Independent (Time 1)				
Domain-specific control	6.47	2.70	1-10	1-10
General control	8.33	1.87	1-10	1-10
Moderator (Time 1)				
Pain intensity	1.82	0.67	1-3	1-3
Dependent (Time 2)				
Self-rated health	3.32	0.74	1-5	1-5
Independence	16.29	4.48	0-23	0-22
Life satisfaction	2.94	0.66	1-5	1-4
Depression	0.68	0.50	0-3	1-2.5
Loneliness	1.44	0.44	0-3	1-3

Results

The following description begins with analyses concerning the reporting of domain-specific and general perceived control are addressed. Next, a comparison is made as to how the two types of control relate to well-being. Finally, the main focus of the analyses is on the relationships between perceived control and well-being, considering the moderating effects of pain intensity.

Domain-Specific vs. General Perceived Control: Hypothesis One GC > DSC

A simple dependent one tailed *t*-test was used to assess the first hypothesis, that participants would report greater *general* control (GC) than *domain-specific* control (DSC). All 485 individuals from Time 1 (1996) were asked these questions with responses given by 361 of them. As predicted, the mean level of general control ($M = 7.87$, $SD = 2.31$) was significantly higher than the mean level of domain-specific control ($M = 6.27$, $SD = 2.85$), indicating that individuals do report more control over their lives in general than over their health specifically [$t(360) = - 10.63$, $p < .000$].

Perceived Control and Well-Being: Hypothesis Two

The remaining hypotheses concern the perceived control – well-being relationship and include only those individuals who continued to live in the community at Time 2. Before describing these results it is important to note that the community dwelling selection criteria has implications for the characteristics of the sample, particularly regarding their levels of pain intensity and perceived control. Excluding those who had moved into a personal care home by Time 2 may have eliminated the portion of the Time 1 group who had the greatest pain intensity or the lowest perceptions of control. Examination of Time 1 mean values indicates that those who continued to reside in the community at Time 2 reported relatively similar levels of pain intensity ($M = 1.82$, $SD = .67$) to those who moved into personal care homes by Time 2 ($M = 1.93$, $SD = .72$). Those who remained in the community at Time 2 did report higher levels of general and domain-specific control (*M*s = 8.33 and 6.47 respectively) than did those who had moved into personal care homes (*M*s = 7.41

and 6.01 respectively). Subsequent analyses excluded the institutionalized individuals *because* they face different concerns with regards to control than do their community dwelling counterparts. The comparison of Time 2 perceived control among the community dwelling versus the institutionalized individuals is not possible in this study due to the number of proxy responses and missing data in the institutionalized group. It is however, important to be aware that the exclusion of these individuals alters the characteristics of the group from Time 1 to Time 2. The results of the remaining analyses should be interpreted with this in mind.

Hypothesis Two GC ↔ WB > DSC ↔ WB. Hypothesis Two which stated that *general* control would be more strongly associated with well-being than would *domain-specific* control, was tested by comparing the correlations between each type of control (*domain-specific* and *general*) and each dependent variable (i.e. self-rated health, independence, persistence of pain, life satisfaction, depression, and loneliness) five years later. Adopting the approach used by Thompson et al. (1994) to test their analogous hypothesis regarding central versus consequence-related control, *Z*-tests were used to test the significance of the difference between *r*'s. As illustrated in Table 3 this hypothesis was not supported. Z values must be greater than 1.96 or less than –1.96 in order for the difference between correlation coefficients to be considered significant. As Table 3 indicates, Z values ranged from -.840 – 1.075 and thus were not significant indicating that *general* control is not more highly correlated with the dependent variables than is *domain-specific* control over health.

Table 3

Comparison of correlations between domain-specific and general control and dependent measures.

	Domain-specific control (*r*)	General control (*r*)	*Z* value
Depression	-.097	-.077	-.175
Life satisfaction	.140	.111	.270
Loneliness	.008	-.103	.991
Self-rated health	.194*	.138	.514
Independence	.271**	.163	1.075
Persistence of pain	-.126	-.038	-.840

Note. $1.96 < Z > -1.96$ indicate that the difference between r values is *not significant.*
* $p < .05$, ** $p < .01$

Several points can be noted from the correlations in Table 3. Recall that outcomes are best predicted by relevant domain-specific measures. Thus, it is not surprising that domain-specific control over health is significantly correlated with the dependent measures of physical well-being (self-rated health and independence) but not with those assessing psychological (depression, life satisfaction) or social (loneliness) well-being. This supports previous findings (Lachman & Weaver, 1998;

Tan et al., 2002) indicating that perceptions of control in distinct domains best predict related domain-specific control measures.

Moderating Role of Pain Intensity: Hypotheses Three and Four

Regression analyses were used to examine the moderating role of pain intensity in the perceived control – well-being relationship. Prior to these regression analyses, preliminary correlational analyses were conducted to identify socio-demographic measures that were associated with the key independent and dependent variables. This was done in order to identify covariates to be included in the subsequent regression analyses. As has been done in previous research (Keppel & Zedeck, 1989), a pre-defined cut-off value of $r = .20$ was employed. According to this criterion, the only significant correlation was between age and independence ($r = -.297$, $p < .05$) where older individuals were significantly less independent. For this reason, age was included as a covariate in the subsequent regression analyses involving the independence measure. The overall absence of significant demographic predictors is consistent with past control – well-being research among those living with chronic pain (Lachman & Weaver 1998; Tan et al., 1986).

Rationale for analyses. Separate models were tested for each of the dependent variables, using hierarchical sequential multiple linear regression for continuous variables and hierarchical sequential logistic regression for pain, the dichotomous dependent variable where 0 = *no longer in pain* and 1 = *still in pain*. Sequential logistic regression allows for a specified order for the entry of predictors into the model by importance and is the appropriate method for predicting dichotomous dependent variables (Tabachnick & Fidell, 2001). Hierarchical sequential regression was chosen to test these hypotheses because in addition to the interaction term, the main effects are also included in the equation and these terms are entered in a predetermined order (i.e. main effects followed by interaction term). Although the main hypotheses (Hypotheses Three and Four) are concerned with interaction effects, Steinberg and Colla (1991) advise against examining interactions without including their main effects in the model, thus the main effects were included in the equation.

The appropriate demographics were entered in *Step 1* in order to adjust for their influence on perceived control and well-being. Because none of the demographics were significantly associated with any of the key variables, with the exception of the relationship between age and independence, demographic variables were not included in the analyses of self-rated health, persistence of pain, life satisfaction, depression, and loneliness five years later. Time 1 well-being measures were also included in Step 1. For example, when self-rated health in 2001 was the dependent variable, self-rated health in 1996 was included as a predictor in Step 1. Including the corresponding Time 1 well-being measure creates a conservative test because well-being at Time 1 is likely to account for a very large percentage of the variance in well-being at Time 2. Thus, the importance of a significant interaction can be discussed with greater confidence after having accounted for well-being at Time 1. *Step 2* involved entering the moderator (pain intensity) and control (domain-specific or general control) variables. In order to test the predicted *moderator X control* (e.g. pain intensity X general control) interaction, a product term was created from the scores for each main effect variable. This interaction term was entered in *Step 3* of the regression analyses.

Hypothesis Three: $GC \leftrightarrow WB_{high\,PI} > GC \leftrightarrow WB_{low\,PI}$. To test Hypothesis Three, hierarchical sequential regressions were employed. Controlling for the appropriate covariates, *general control (GC)*, *pain intensity (PI)*, and the *GC x PI* interaction were regressed on the dependent measures (self-rated health, independence, persistence of pain, life satisfaction, depression, and loneliness). A significant GC x PI interaction was predicted because general control was expected to be associated more positively with well-being for those with high-intensity pain than for those with low pain intensity. Before describing the interaction findings, several other effects are highlighted from Table 4, which summarizes the findings for the dependent self-rated health in 2001 measure. As shown in Step 1, self-rated health at Time 1 is a significant predictor of self-rated health at Time 2 accounting for 10.8% of the variance. Step 2 shows that general control and pain intensity were not significant predictors of self-rated health at Time 2. Most importantly, the introduction of the GC x PI interaction in Step 3 was significant. This model accounted for 16.3% of the variance, and the change in R^2 from Step 2 to Step 3 was significant (R^2 *change* = .043, $p = .005$), illustrating the unique contribution of the GC x PI interaction.

Table 4

Betas for regression analysis of general control and pain intensity on Time 2 self-rated health.

	Step 1	Step 2	Step 3
Self-rated health (Time 1)	.328**	.332**	.317**
General control (GC)		.108	-.567*
Pain intensity (PI)		.035	-.989**
GC x PI			1.209**
R^2	.108	.120	.163
Change in R^2	.108**	.012	.043**

* $p < .05$, ** $p < .01$

When the interaction term was significant, as is the case for self-rated health, the interaction was plotted in order to explore its meaning. This was accomplished by dividing participants into "high-intensity" and "low-intensity" pain groups and "high control" and "low control" groups. The high pain intensity group included individuals whose pain intensity ratings at Time 1 were higher than the mean pain intensity rating plus one standard deviation; that is scores higher than 2.48. With possible responses of 1 (*mild*), 2 (*moderate*), or 3 (*severe*) this meant that the high pain intensity group were those who responded that their pain intensity was severe ($n = 31$). The low pain intensity group included individuals whose pain intensity ratings were lower than the mean pain intensity rating minus one standard deviation; that is scores lower than

1.15. This meant that the low pain intensity group included individuals who reported that their pain intensity was mild ($n = 69$). In keeping with the graphing procedure outlined here, the high control group should have included individuals whose perceived general control rating was higher than the mean general control rating (range = 1-10) plus one standard deviation. This score, however, was 10.20 which exceeds the possible range of responses to this item. For this reason, the high control group included individuals who rated their perceived general control at Time 1 as 10 (*almost total control*) which was the highest possible control rating ($n = 33$). The low control group included individuals whose scores at Time 1 were lower than the mean general control rating minus one standard deviation; that is scores below 6.46 ($n = 85$). The results in Figure 1 show that, for those with high pain intensity, indicated by the solid line, higher general control corresponded to better self-rated health.

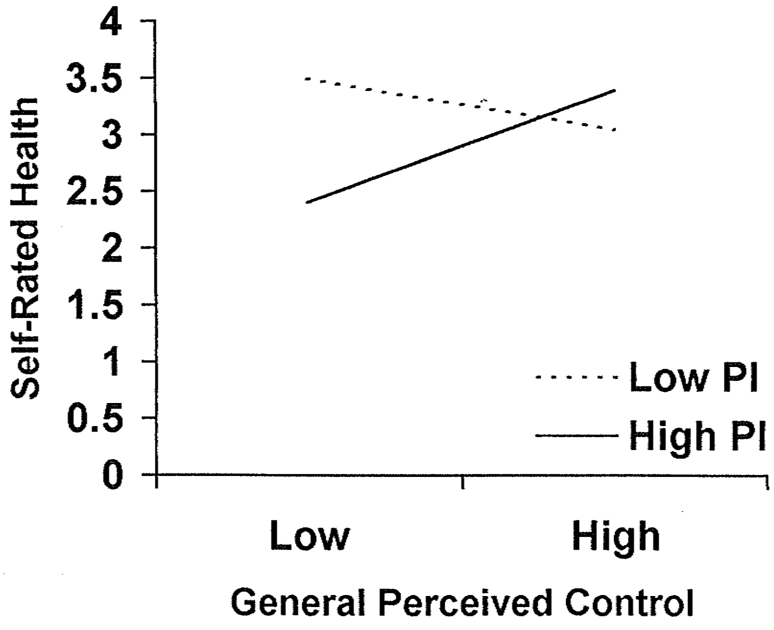

Figure 1. Moderating effect of pain intensity on the relationship between perceived general control and self-rated health (Time 2)

In the analyses of independence (Table 5), Time 1 independence, age, and general control (Step 2) were positively associated with independence (βs = .457, -.204, and .133 respectively, $p < .05$). Even when controlling for level of pain intensity individuals who had higher perceived general control also reported being more functionally independent. In addition, the GC x PI (Step 3) interaction was also significant ($\beta = .838, p < .05$).

Table 5

Betas for regression analysis of general control and pain intensity on Time 2 independence.

	Step 1	Step 2	Step 3
Independence (Time 1)	.471**	.457**	.450**
Age	-.193**	-.204**	-.206**
General control (GC)		.133*	-.329
Pain intensity (PI)		-.002	-.712*
GC x PI			.838*
R^2	.303	.321	.342
Change in R^2	.303**	.017	.022**

* $p < .05$, ** $p < .01$

The analyses of the subsequent dependent variables provide consistent evidence of an interaction between general control and pain intensity. In each instance the addition of the interaction term in Step 3 produced a significant change in R^2 as it did for self-rated health (Table 4) and independence (R^2 *change* = .022, p = .02; see Table 5). This was the case for life satisfaction (marginally significant: R^2 *change* = .019, p = .08; see Table 6), depression (R^2 *change* = .025, p = .04; see Table 7), and loneliness (R^2 *change* = .044, p = .004; see Table 8).

Table 6

Betas for regression analysis of general control and pain intensity on Time 2 life satisfaction.

	Step 1	Step 2	Step 3
Life satisfaction (Time 1)	.252**	.239**	.222**
General control (GC)		.053	-.391
Pain intensity (PI)		-.049	-.725
GC x PI			.799†
R^2	.064	.069	.088
Change in R^2	.064**	.005	.019‡

‡p = .08, † p = .06, * $p < .05$, ** $p < .01$

Table 7

Betas for regression analysis of general control and pain intensity on Time 2 depression.

	Step 1	Step 2	Step 3
Life satisfaction[a] (Time 1)	-.297**	-.278**	-.258**
General control (GC)		.006	.514*
Pain intensity (PI)		.146	.910*
GC x PI			.039*
R^2	.088	.109	.134
Change in R^2	.088**	.021	.025*

Note. [a] Life satisfaction is used as a Time 1 control for psychological well being because there was no measure of depression at time one available.
* $p < .05$, ** $p < .01$

Table 8

Betas for regression analysis of general control and pain intensity on Time 2 loneliness.

	Step 1	Step 2	Step 3
Loneliness (Time 1)	.426**	.435**	.422**
General control (GC)		.042	.725**
Pain intensity (PI)		.016	1.040**
GC x PI			-1.208**
R^2	.181	.183	.227
Change in R^2	.181**	.002	.044**

* $p < .05$, ** $p < .01$

The patterns of each of these interactions conform to the one previously shown for self-rated health (Figure 1) such that for those with high pain intensity, as represented by the solid lines, perceived control over life in general is positively associated with independence (Figure 2), and life satisfaction (Figure 3), and negatively associated with depression (Figure 4), and loneliness (Figure 5). In contrast, for those with low pain intensity, represented in each figure by the broken line, perceived general control appeared to have little relationship to the measures of well-being. That is, among people who reported low pain intensity, increasing general perceived control did not correspond to better self-rated health, independence, and life satisfaction or to worse depression or loneliness. Examining the graphed interactions in Figures 1 through 5 it appears that those with low perceived general control and high pain intensity were worst off as indicated by poorer ratings of physical, psychological, and social well-being.

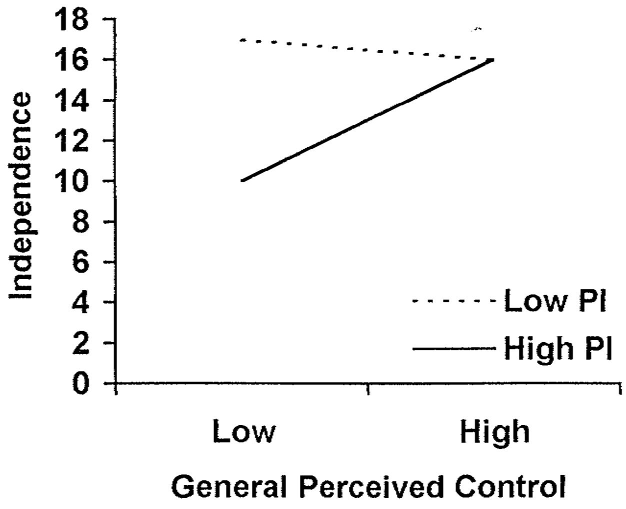

Figure 2. Moderating effect of pain intensity on the relationship between perceived general control and independence (Time 2).

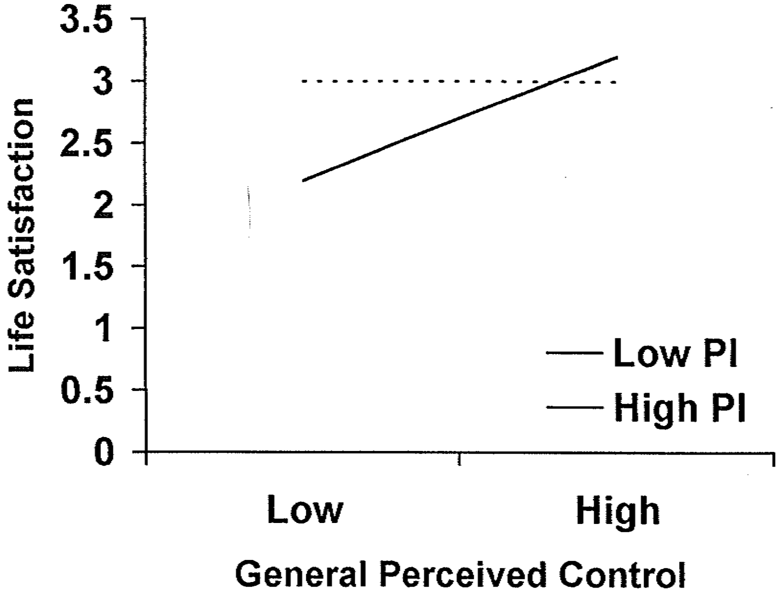

Figure 3. Moderating effect of pain intensity on the relationship between perceived general control and life satisfaction (Time 2).

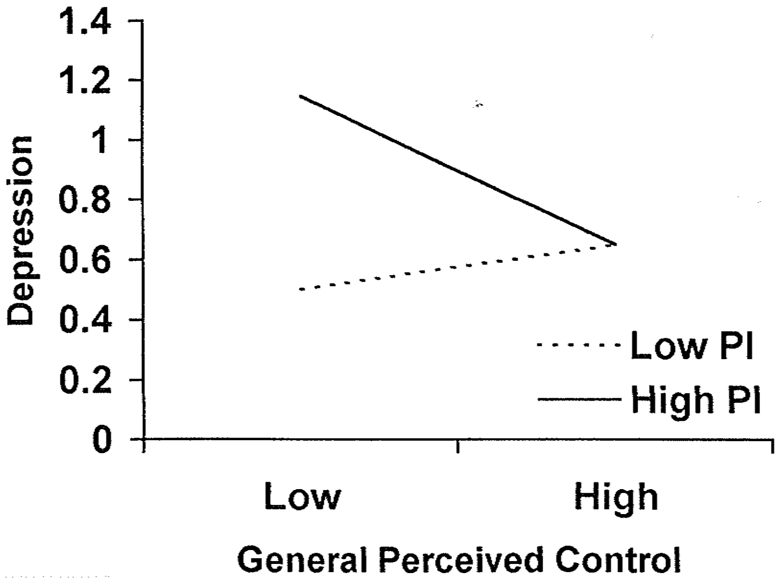

Figure 4. Moderating effect of pain intensity on the relationship between perceived general control and depression (Time 2).

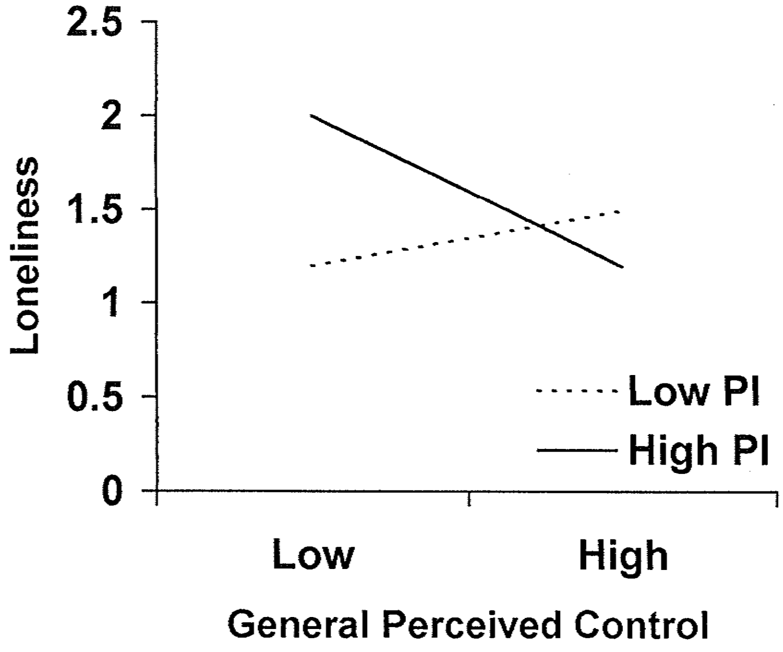

Figure 5. Moderating effect of pain intensity on the relationship between perceived general control and loneliness (Time 2).

Hypothesis Four: DSC $\leftrightarrow$ *WB* $_{low\,PI} >$ *DSC* $\leftrightarrow$ *WB* $_{high\,PI}$. Regression analyses (Tabachnick & Fidell, 2001) were conducted separately to test Hypothesis Four for the predicted interaction between *domain-specific* control and pain intensity on each of the dependent variables: self-rated health, independence, persistence of pain, life satisfaction, depression, and loneliness. Based on the logic that *domain-specific* control is more adaptive as indicated by better well-being for those with *lower*, compared to higher, levels of pain, because they are relatively more able to actually control their health, it was expected that domain-specific control would be associated more positively with well-being for those with low-intensity pain.

After controlling for the relevant demographic predictors and the relevant Time 1 well-being measure, *domain-specific control (DSC)*, then *pain intensity (PI)*, and finally the *DSC x PI* interaction were regressed on the dependent measures in order to determine if this interaction added explanatory power after the main effects of each variable had been accounted for. This hypothesis was not supported. Regression analyses showed that there were no significant interactions between domain-specific control and pain intensity in predicting any of the dependent variables.

Though none of the interaction terms were significant some significant effects did emerge. Pain intensity at Time 1 was positively associated with the persistence of chronic pain at Time 2 (*Odds Ratio* = 2.030, $p < .01$). That is to say, chronic pain sufferers who reported being in more intense pain in 1996 were more likely to report still suffering from chronic pain five years later, in 2001, than their low pain intensity counterparts. Results also showed that domain-specific control (control over health) positively predicted Time 2 independence ($\beta = .148, p < .05$). In other words, individuals who reported higher perceived control over their health in 1996 also reported greater functional independence five years later in 2001. This finding is consistent with the Table 3 correlations showing that domain-specific control was more strongly correlated with independence than any of the other measures of well-being.

Discussion

This study confirms that perceived control is not a homogeneous construct. Individuals report different levels of perceived control depending on the domainspecificity that is assessed. Contrary to prediction, the two types of control considered in this study did not relate differently to well-being. The moderator analyses that examined the role of pain intensity, however, showed that it did play a different role for each type of control. In particular, domain-specific control did not interact with pain intensity in its influence on well-being. On the contrary and most importantly, general control was consistently found to interact with pain intensity such that for individuals with high-intensity pain, higher perceptions of general control corresponded to better self-rated health, greater independence, greater life satisfaction, less depression, and less loneliness all of which were measured five years later.

Pain Intensity as a Moderator in the Perceived Control – Well-being Relationship

General perceived control. Having high perceptions of control over life in general at Time 1 appears to be more strongly related to positive well-being for individuals with high levels of pain intensity than for those with low pain intensity. This finding is consistent with the work of Chipperfield and Greenslade (1999) who found that among arthritis sufferers, perceived control was related to health outcomes, but only among *highly restricted* individuals who were likely also experiencing relatively intense pain. The current findings also support Affleck et al.'s (1987) finding that for individuals with symptoms such as pain, a positive relationship between perceived control and well-being exists for individuals with *severe* symptoms, but not for those with *mild* symptoms.

The results in this study are consistent with the underlying premise that perceived control should be most beneficial when it is most realistic. There are other possible interpretations such as the presence of a "ceiling" effect. It could be that those with low-intensity pain did not show the same variation in well-being not because it was absent, but because the measurement instruments employed did not allow for detection of this variability. For example, those with low pain intensity all reported high independence scores on the 22-item inventory regardless of their level of perceived general control. The clustering of responses at the high end of this scale is an example of the ceiling effect where participants in the low-intensity pain group are all functioning at the maximum level of independence measured by the scale, and while there may be differences in their independence beyond this point, the range of the measure does not extend far enough to detect this variability.

The findings in this study also show that those with high pain intensity and low perceived general control consistently report relatively worse well-being than their low pain intensity counterparts or than those with high perceived general control (Figures 1-5). The combination of high pain intensity and low perceived general control corresponded to a reliable pattern of worse physical (self-rated health, independence), psychological (life satisfaction, depression), and social (loneliness) well-being five years later. This suggests that health and well-being are most compromised under conditions of intense pain, when perceptions of control are not available. Since those with high pain intensity and high general control appear to report better well-being than their low control counterparts, it is possible that interventions aimed at increasing perceptions of control and thus improving well-being would be most useful for the high pain intensity, low general control group.

Domain-specific control. Although support was found for the moderating role of pain intensity on the general control – well-being relationship, domain-specific control did not interact with pain intensity to predict outcomes. There are several possibilities for why domain-specific control over health was not found to have the expected salutary effect for individuals with less intense pain. First, the underlying assumption that perceived control over health is more realistic when pain intensity is low may be inaccurate. This assumption was based on the premise that perceived control in the health domain would reflect individuals' actual ability to control their health, and that since pain is independently related to health status (Mantyselka et al., 2003) those with more intense pain would have less control over their health.

Secondly, it is important to note that field studies such as this one are less than 20% as efficient at finding moderator effects than are experimental tests where measurement error can be minimized. It may thus be the case that an interaction between domain-specific control over health and pain intensity exists but did not reach significance due to the design of the study (McClelland & Judd, 1993). This would imply the need to further examine this relationship in a larger sample, or in a design involving the experimental manipulation of perceptions of control over health.

Perceived control over health did not interact with pain intensity to predict outcomes. Surprisingly, domain-specific control over health also failed to predict future ratings of self-rated health in the regression analyses. This is discrepant with previous findings, which have consistently indicated that domain-specific control measures predict domain-specific outcomes. Possible reasons for this anomaly include the conservative nature of the regression analyses, which controlled for self-rated health at Time 1. It is possible that a more liberal test would have detected a significant control – health relationship. It is also possible that significant changes can occur in the health of older individuals with chronic pain over a five-year period and that these changes have the potential to overpower the beneficial effects of perceptions of control over health at Time 1. If Time 1 and Time 2 measures had been taken over a shorter interval a significant relationship may have been found between perceived control over health and future self-rated health reports.

Perceived control over health *was* a significant predictor of functional independence, another indicator of future physical health. This demonstration that perceived control over health can predict a related health outcome five years later is inconsistent with the findings in this study for self-rated health. It is however, congruent with past research finding that domain-specific measure of perceived control predict related domain-specific outcomes.

One possible reason for the differential general control – well-being relationship for high and low pain intensity individuals is that different types of control are most *salient* for each of these groups. It is possible that low pain intensity individuals focus more consciously on perceived control in specific domains where control may be threatened, but still possible. The absence of the general control – well-being relationship for the low-intensity pain group may thus be a reflection of the relatively lower *importance* of perceptions of general control as compared to control within a specific domain such as physical health. High pain intensity individuals, on the other hand, may have accepted their compromised ability to control specific domains such as their physical health and might thus be more *concerned* with maintaining control over their lives in general. The significant general control – well-being relationship for the high pain intensity group could be a result of the greater *importance* of perceived control in this general domain than of domain-specific control over their health.

It is likely that there are other variables that influence the control – well-being relationship. In an attempt to test for this possibility *restriction due to pain* was also considered as a moderator. The sequence of tests that was conducted to test for interaction effects between control and pain intensity was also conducted to test for an interaction between control and restriction. The measure of restriction asked "How many activities does your pain or discomfort prevent?" where 1 = *none*, 2 = *a few*, 3 = *some*, 4 = *most*. Responses ranged from 1 (*none*) to 3 (*some*), with a mean of 1.8 (SD = .72). This measure did not correlate with any of the independent or dependent measures and none of the regression analyses produced significant results. It is possible that this variable was not of significance because participants reported, on average, restriction in only a few of their activities. If this same models were tested on a sample of individuals with a higher level of restriction, or if a more detailed measure of restriction were employed the results may have been significant.

The Relation of General Control and Domain-Specific Control to Well-Being

The hypothesis that general control would be more positively correlated with well-being than would domain-specific control over health was not supported. The results suggested that it is no more adaptive for individuals living with chronic pain to maintain high perceptions of control over life in general than it is to maintain perceptions of control over their physical health. One might conclude that domain-specific control and general control are equally adaptive, or that they measure the same thing and that it is therefore not important to distinguish between the two when examining the control – well-being relationship. The results of the moderator analyses inform us that despite the lack of significant differences found in this correlational analysis it is not the case that domain-specific control and general control are interchangeable concepts. As previously discussed, the moderating role of pain intensity in the control – well-being relationship highlights the importance of examining these control domains separately despite their common relationship to well-being in this simple correlational analysis.

This finding highlights one difficulty that researchers encounter in the study of control. One could conclude, based on this comparison of correlations, that support has been provided for the assertion that domain-specific control and general control measures are identically related to well-being and thus need not be considered as distinct facets of the heterogeneous control construct. This is a tempting argument to make, as a unidimensional concept of control would be much easier to explore and interpret. Recall however the findings of Tan et al. (2002) which substantiate the need to distinguish between general and domain-specific perceptions of control and further state that domain-specific perceptions of control over pain are multi-dimensional and must be examined as such. Tan et al. found that perceptions of control over life in general were more strongly associated with well-being than were domain-specific perceptions of control which is congruent with the predictions of the current study, but counter to the results of the correlational analyses. It is important to note that Tan et al. examined domain-specific control over the pain itself and it is possible that the current study would have confirmed the stronger relationship between general control and well-being as compared to domain-specific control and well-being if the domain examined had been control over the pain itself, and not control over physical health, as was the case.

General Control versus Domain-Specific Control

Support was found for the hypothesis that individuals would have higher perceived control over their lives in general than they did over their health. This is consistent with the findings of Lachman and Weaver (1998) who found that even when domain-specific control was compromised, individuals continued to report high levels of perceived control over their lives in general. Lachman and Weaver also found that people reported higher levels of control over life in general than over their health regardless of age, gender, or education level. This finding is also consistent with the related work of Affleck et al. (1987) and Thompson et al. (1993), who found that even when perceptions of control over a specific disease were compromised perceptions of control in other areas such as control over treatment and care, or control over the consequences of the disease remained high. Lachman and Weaver (1998) also found that older individuals maintained high perceived general control in the face of increased physical limitations. This suggests that the domain-specific constraints associated with aging do not necessarily translate into loss of perceived control over life in general.

Recalling that there is generally a positive relationship between perceptions of control and well-being, it is reassuring that even when domain-specific control is compromised, general control can remain quite high. Even when domain-specific perceived control is compromised, maintaining this sense of general perceived control may allow individuals to continue to reap the benefits of high perceived control, specifically, positive physical, psychological, and social well-being. High perceived control over life in general may be sufficient to buffer the negative impact of low perceived control in a specific domain.

Also of interest is the relationship between domain-specific control and each of the outcome variables in this study. The correlations from Table 3 show that domain-specific control over physical health is positively correlated with measures of physical well-being (self-rated health, independence) but not significantly correlated with the measures of psychological and social well-being. This is evidence that domain-specific control measures are associated with their related domain-specific outcomes but not with outcomes in other domains. These results may suggest that for well-being outcomes in domains *other than* physical health, perceived control over health is *not* associated with well-being for those in chronic pain. However for the *physical health* outcomes (self-rated health, functional independence) domain-specific perceived control over health *is* associated with well-being confirming that domain-specific control measures predict domain-specific outcomes.

Strengths and Limitations

This study has several strengths. First a methodological strong point is the longitudinal design, which enhances the ability to make causal inferences between Time 1 and Time 2 measures. Most of the previous work in this area has been cross-sectional (Affleck et al., 1987; Thompson et al., 1993; 1994), which has made statements of cause and effect impossible. Second, previous research in this area has examined relatively small select groups of individuals from specialized health clinics. The Time 1 sample in this study is a large, representative, stratified random sample of 485 older individuals who reported pain due to various conditions. This allows for generalization to a wider population. Third, in comparison to other studies that included broad age ranges (Affleck et al., 1987; Lachman & Weaver, 1998; Thompson et al., 1993; 1994) this study examined only very old individuals who comprise the group most dependent on the health care system (Chipperfield & Greenslade, 1999; Dalziel, 2002, McKeen, Chipperfield, & Campbell, 2004) and thus the prime group for intervention in that setting. Fourth, this study is unique in the structure and combination of variables considered. Included in the model for the current study are distinct types of control (domain-specific and general), multiple facets of well-being (physical, psychological, and social) and the moderating effect of pain intensity. While previous researchers have examined various combinations of these constructs, to the best knowledge of the author, this particular model has not been tested to date.

Limitations to this study could include the use of one item self-report measures. Though there may be some concern that one-item measures lack reliability, similar measures have been employed and validated repeatedly. Chipperfield and Greenslade (1999) for example, used a one-item measure of domain-specific control in their study of arthritis patients and found that results using this one-item measure were consistent with results employing an established multi-item perceived control measure. Lachman and Weaver (1998) employed one-item measures of perceived control in their study and showed that these measures were highly correlated with their related outcomes, but not with outcomes in other domains. Consider also, the good face validity of the one-item pain intensity measure used in the current study. Future researchers however, could replicate the tests conducted here using multi-item measures with established reliability and validity in order to determine whether these results could be replicated. Research that included both the one-item measures and the multi-item measures would be useful in further validating the use of these one-item measures.

Of particular interest would be a multi-item pain measure as there is a lack of detailed information on the pain experienced by the individuals in this study. Information such as the location of the pain, and particularly the duration of the pain experience are important in considering the effects that pain has on other aspects of an individual's life (Leventhal, 1984). Concerning the physiological experience of pain there are many types of pain sensations that can be described, such as aching, stabbing, burning, throbbing, or stinging. These sensations may be differentially tolerable and each one could be experienced alone or in combination with other types of pain. These various experiences of pain could relate uniquely to other aspects of well-being.

The cause of an individual's pain would also be of interest. Different causes of pain may have different implications for the individual's experience and avenues for coping. For example, pain that is the result of a work related injury may allow the person financial compensation that would otherwise be absent. This may affect the extent to which the person can afford to treat the pain, as well as affecting their quality of life and thus their emotional well-being. Also, with regards to the cause of pain, it has been established that individuals who suffer from disorders that are believed to be caused by something beyond their control are shown more compassion by others and experience less guilt and shame than those who are judged to be responsible for the cause of their condition (Litva & Eyles, 1994; Weiner, 1995).

It is possible that certain *aspects* of pain, such as location, duration, type, or cause are related to control and well-being even if the *presence* of pain is not. Future research would benefit from a more complex examination of the pain experience than was available in the current study. Segall and Chappell (1991) provide an example the sort of open-ended questioning that would suit the current topic. Participants in their study were given a list of chronic conditions and asked to indicate which ones they had and which they considered the most serious. They were then asked the following three open-ended questions: What do you believe caused this illness? What do you think should be done about it? What do you think will be the outcome of this illness? These same questions could be asked replacing the word "illness" with "pain" and would provide valuable information that would aid in understanding the complexities of individuals' pain experiences.

Regarding the measurement of domain-specific control, perceived control over health may not be the most important domain for individuals experiencing chronic pain. While domain-specific control over health did not interact with pain intensity in the expected manner in this study, it is possible that the expected interaction would have emerged if the measure of domain-specific control was more closely related to the pain experience. Pain is a multi-faceted construct and control over the different aspects of pain have been found to relate differently to well-being

(Tan et al., 2002). It stands to reason then, that even if domain-specific control over health is not related to well-being for individuals in chronic pain, domain-specific control over some aspect of pain might be. Future research should examine other domains of control such as control over the consequences of pain, over medical care and treatment, or over managing daily tasks as these domains might be relevant to the older population experiencing chronic pain and could alter the control – well-being relationship.

One other potential limitation of this study, and a suggestion for future research concerns the definition of chronicity, which is not always agreed upon (Baszanger, 1989). The current study examined individuals who reported chronic pain at Time 1. If the definition of "chronic" requires that the condition is not curable, it is possible that reporting chronic pain at Time 2 should also be an inclusion criterion. This would mean that individuals would only be included in the study if they reported persistent pain over the five year period being studied, thus meeting the "incurable" definition of chronic pain. The question in the current study referred to how the experience of chronic pain affects individuals five years later with regards to measures of physical, psychological, and social well-being and thus reporting chronic pain at Time 1 was sufficient for inclusion. The results may differ however, if only those reporting persistent pain five years later were included in the analyses.

The differences between those who continue to report pain and those who no longer report pain might be a particularly interesting topic for future research. It could be that this "pain free at Time 2" group has actually found a way to alleviate their pain. Alternatively they may have adapted to their pain and redefined their experience, thus no longer considering themselves to be in chronic pain. Another possibility is that these individuals have found that admitting to being in pain has disadvantages, such as judgement from others or feelings of guilt and shame. They may thus fail to report their pain at Time 2 despite its persistence. It is likely that individuals stop reporting pain for a number of reasons and future research would benefit from a more specific definition of chronic pain as well as probing questions at Time 2 to better inform researchers as to what has "happened" to chronic pain that was once reported and is now denied.

Conclusions

This study confirms the importance of examining domain-specific and general perceptions of control as separate constructs. Results suggest that levels of general control are higher than levels of domain-specific control among this population. Most importantly, the finding that pain intensity moderates the general control – well-being relationship but not the domain-specific control – well-being relationship, underscores the complexity of the relationship between general control and well-being. These results help to illuminate the role of pain intensity as a moderator, for which previous research has produced inconsistent findings.

Taken together, the present findings have implications given the evidence that programs aimed at increasing perceived control are successful and are associated with increases in well-being (Barlow et al., 1998; 1999). In particular, the finding that domain-specific control (control over health) is associated with domain-specific outcomes (self-rated health and functional independence) but not with outcomes from other domains has treatment implications. This suggests that treatment programs should aim for a correspondence between the domain of perceived control they are encouraging and the outcome domain in which they wish to see improvement.

Most importantly, by suggesting that the benefit derived from general control differs for individuals with varying levels of pain intensity, the present findings imply that when working with older individuals in chronic pain clinicians should focus their efforts on increasing perceptions of control over life in general among those with high-intensity pain. While greater perceived control is generally related to better well-being, individuals in this study who had low-intensity pain did not show more positive well-being with higher levels of perceived general control than did their high-intensity pain counterparts. Considering the overwhelming effects that chronic pain can have on every aspect of an older individual's life this study makes an important contribution documenting the circumstances under which the benefits of perceived control can be maximized for this population.

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Appendix: Ethical Approval Certificates