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# Poor general health and lower levels of vitality are associated with persistent, high-intensity low back pain and disability in community-based women: A prospective cohort study

Sin Ki Ng[a,b,*], Flavia M. Cicuttini[a], Susan R. Davis[a], Robin Bell[a], Roslin Botlero[a], Bernadette M. Fitzgibbon[b], Donna M. Urquhart[a]

[a] Department of Epidemiology and Preventive Medicine, School of Public Health and Preventive Medicine, Monash University, Alfred Hospital, Melbourne, VIC 3004, Australia

[b] Monash Alfred Psychiatry Research Centre, Central Clinical School, Monash University, 4/607 St Kilda Road, Melbourne, VIC 3004, Australia

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ABSTRACT

While low back pain significantly impacts on an individual's well-being, our understanding of the role of well-being in the natural history of low back pain is limited. This cohort study aimed to investigate the association between psychological and general well-being and the development and progression of low back pain and disability in community-based women over a 2-year period. 506 women recruited from a research database were invited to participate. Overall psychological and general well-being and its subdomains were assessed at baseline using the Psychological General Well-Being Index (PGWB). The intensity of and degree of disability arising from low back pain were examined using the Chronic Pain Grade Questionnaire at baseline and at 2-year follow-up. Participants were categorized as having no, developing, resolving, or persistent high-intensity pain and disability. 444 participants (87.8%) completed the study. Women with persistent high-intensity pain had lower PGWB scores at baseline than those with no high-intensity pain at follow-up, after adjusting for confounders ($M$ ($SE$) = 69.9(2.55) vs 80.1(2.63), $p < 0.005$). Furthermore, women with persistent high disability scores had lower well-being scores than those without persistent high disability scores ($M$($SE$) = 69.1(3.49) vs. 81.2(0.802), $p = 0.001$). Moreover, lower scores in the well-being subdomains of general health and vitality were associated with persistent high pain intensity and disability (all $p < 0.007$). In summary, lower levels of general health and vitality were associated with persistent high-intensity low back pain and disability, suggesting that improving these aspects of well-being has the potential to reduce high levels of chronic low back pain and disability in community-based women.

## 1. Introduction

According to the 2010 Global Burden of Disease study, low back pain (LBP) is the leading cause of disability worldwide and has accounted for approximately 83 million years lived with disability [1]. It poses a significant economic burden due to medical treatment costs [2], as well as indirect costs resulting from work absenteeism and reduced work productivity [3]. LBP also impacts psychological and general well-being, which is defined as the quality of life experienced by each individual, based on numerous factors, from basic health, to the quality of primary and family relationships, to intellectual fulfilment and emotional satisfaction [4].

Previous studies have shown that individuals with chronic LBP report significantly poorer self-perceived psychological [5] and health-related quality of life [6–8] compared with pain-free groups. Moreover, our cross-sectional study showed that lower psychological and general well-being was associated with both low and high levels of pain intensity and disability in community-based individuals [9]. The association between well-being and disability in LBP has also been investigated, with inconsistencies in the results reported and at best, only weak associations observed [10,11]. Furthermore, the role of an individual's self-perception of their psychological and general well-being in the development and persistence of LBP is not well understood, highlighting the need for longitudinal studies that examine the contribution of well-being.

While cohort studies have investigated the role of psychological and

* Corresponding author at: Department of Epidemiology and Preventive Medicine, School of Public Health and Preventive Medicine, Monash University, 553 St Kilda Rd, Melbourne 3004, VIC, Australia.
*E-mail address:* sinki.ng@monash.edu (S.K. Ng).

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general well-being as a risk factor for development and recovery outcomes in LBP, these studies have predominantly focused on specific aspects of well-being. For example, there is evidence to suggest that psychological distress [12–14], depressed mood [15,16], as well as lower perceived health [15] and reduced health-related quality of life [17] contribute to the development of persistent LBP and disability. However, no cohort studies have comprehensively explored the role of both psychological and general well-being and in doing so, the contribution of both positive and negative aspects of well-being. Furthermore, previous studies have not used a validated measure to assess both psychological and general well-being and its subdomains, nor have they been examined longitudinally in community-based women, despite women being at a higher risk of developing LBP and experiencing a poorer prognosis compared to men [14,18,19]. Therefore, the aim of this study was to establish whether psychological and general well-being and its related subdomains, assessed by a validated measure, are associated with the development and/or progression of low back pain intensity and disability in community-based women over a 2-year period.

## 2. Methods

### 2.1. Study population

Participants were recruited from a previous cross-sectional study investigating androgen levels in 1423 community-based women [20]. These participants were initially recruited between April 2002 and August 2003 from a database derived from random sampling of the electoral roll of the Australian state of Victoria. Full details of the participant recruitment have been described in a previous study [20]. Of the 1423 participants, 754 agreed to being contacted for future research and were invited to participate in the current study in 2006. A total of 542 participants, who agreed to being involved in the present study, were sent the information sheet, consent form, and study questionnaires. 506 participants returned the questionnaire for the baseline study. Participants were invited to complete a follow-up study in 2008, with 444 (87.8%) participants returning the study questionnaire. All participants provided written informed consent. All procedures were conducted in accordance with the Declaration of Helsinki and the study was approved by the Monash University Human Research Ethics Committee.

### 2.2. Questionnaires

Demographic information, including age, gender, weight, and height, were obtained from participants at baseline and follow-up. Body mass index (BMI; kg/m$^2$) was calculated from self-reported weight and height.

The study questionnaires at both baseline and follow-up included the *Chronic Pain Grade Questionnaire (CPG)*, a seven item questionnaire, used to determine pain intensity and disability over the previous 6 months [21]. The CPG has been shown to be a reliable and valid questionnaire in both population-based low back pain studies [22] and detecting changes in chronic pain severity over time in longitudinal studies [23]. The CPG has 3 items that measure pain intensity and the sum of these items results in a pain intensity score between 0 and 100, with higher scores indicating higher pain intensity. There are 3 items that measure disability, which is used to produce a disability score between 0 and 100, with higher scores indicating higher levels of disability. There is also a single self-report item that indicates the number of days individuals were restricted due to their back pain. The disability score and the number of days is converted to points which are summed to produce an overall disability point score. According to the CPG scoring system, a score of 0 indicates no pain or disability, 1–49 indicates to low pain intensity or disability, while 50–100 indicates to high intensity pain or disability.

Participants were divided into groups based on whether they had no or low pain intensity (i.e., score of 0–49) or high pain intensity (i.e., score of 50–100) at baseline and follow-up. The following four groups were then formed: i) no, ii) developing, iii) resolving, and iv) persistent high intensity pain. Those who did not report high intensity pain at baseline and follow-up were in the “no pain” group. Participants who did not have high intensity pain at baseline but developed high intensity pain at follow-up were in the “developing pain” group, while those who initially had high intensity pain but did not experience high intensity pain at follow-up were in the “resolving pain” group. Finally, the participants that had reported high intensity pain at baseline and follow-up were in the “persistent pain” group. Similar to the pain intensity groups, participants were divided into no, developing, resolving, and persistent high disability groups based on their disability scores.

The *Psychological General Well-Being Index (PGWB)*, a validated measure of subjective psychological general well-being in the preceding 4 weeks [4,24], was measured at the baseline. The PGWB has 22 items, with each item rated on a six-point Likert scale, which assessed six subdomains, each defined with 3–5 items that include: anxiety (score of 0–25), depressed mood (0–15), positive well-being (0–20), self-control (0–15), general health (0–15), and vitality (0–20). The scores of the subdomains are summed to create a total PGWB score between 0 and 110. Higher scores indicate greater psychological and general well-being.

### 2.3. Statistical analyses

Descriptive statistics for age, BMI, psychological and general well-being, pain intensity and disability scores were tabulated for the different high intensity pain and disability groups. As the assumptions for one-way analysis of variance (ANOVA) were violated, the Kruskal-Wallis test was used to compare the differences in the demographic variables between the pain intensity and disability groups. Results were considered statistically significant when $p$ was less than 0.05. Estimated marginal means were calculated to determine the association between psychological and general well-being and both low back pain intensity and disability, after adjusting for age and BMI. In the analyses involving estimated marginal means, Bonferroni adjustments were performed to account for multiple comparisons so that a $p$-value of $< 0.007$ was considered statistically significant. The IBM SPSS Statistics (standard version 23.0) was used to perform all analyses.

## 3. Results

Of the 506 participants recruited at baseline, the cohort had a baseline mean (SD) age of 56.8 (12.5) years and BMI of 27.3 (5.67) kg/m$^2$. The baseline CPG pain intensity and disability mean (SD) scores were 25.5 (22.3) and 13.9 (20.5) respectively. There was a total of 444 (87.8%) participants who completed the 2-year follow-up study.

The 62 participants who were lost to follow-up were not significantly different to the participants that completed follow-up with respect to age ($p = 0.12$), BMI ($p = 0.25$), pain intensity ($p = 0.20$) or disability ($p = 0.14$) at baseline. In addition, they did not differ in terms of the median baseline PGWB total score ($p = 0.22$) or any of the subdomains ($p > 0.05$), although they had significantly lower vitality scores ($p = 0.037$).

Of the participants who completed the follow up study, 334 participants (75.2%) had no high intensity pain at baseline or follow-up, 33 (7.43%) developed high intensity pain, 38 (8.56%) had resolving high intensity pain, and 37 (8.34%) reported persistent high intensity pain (Table 1). There were no significant differences between the groups in age ($p = 0.069$). There were significant differences in BMI ($p = 0.002$), with the persistent high intensity pain group having a higher BMI compared with the no high intensity pain group (‘persistent’ group: $M$ ($SD$) = 30.4 (5.37) vs. ‘no pain’ group: $M$ ($SD$) = 27.0 (5.70), $p = 0.001$) (See Table 1).