Overactivity in daily life: a crucial step in understanding how to tailor treatments

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Activity patterns are thought to play a major role in chronic pain development and maintenance. In the operant model, Fordyce (1976) described the activity pattern of “overactivity” in which there are consequences to “overdoing,” such as pain increases for hours after engaging in activity and recovery periods in which people are inactive. This yo-yo pattern, described by Fordyce³ and others,^{1,10,12} is thought to be maladaptive as overactivity can lead to activity avoidance and result in increased pain and disability over time. However, we know little about how this pattern manifests in daily lives of people with chronic pain. In the article “Overactivity in chronic pain: Is it a valid construct?”, Andrews et al. contribute to the understanding of overactivity by examining the association between pain and activity over a 5-day period. They used activity tracking and ecological momentary assessment of pain to quantify occurrences of overactivity in real-life situations. Some particular methodological strengths should be highlighted. First, the authors examined activity variability using a novel data-processing technique—quantifying activity in this way is likely necessary to better understand the yo-yo pattern of physical activity in the context of pain. Activity variability was measured across days (using SD) and within a day (activity fluctuations every 15 minutes during waking hours). Second, to determine an occurrence of overactivity, an individual threshold of significant pain increases was determined. Using the top 5% of all pain reports for a person, the overactive periods are individualized, which may contribute to our understanding of how these periods differ across people with various characteristics. Lastly, they used items that reflect overactivity on the Pain and Activity Relations Questionnaire, an important element in construct validation complementing objective measurement.

An important contribution of Andrews et al. was to consider prolonged periods of sedentary activity in addition to high activity periods in their examination of “overactivity.” The authors found that in addition to high activity periods, prolonged periods of little to no activity also preceded significant pain increases. This phenomenon has been described as “underactivity”¹⁰ and may be common given that 37% of US adults with some chronic pain condition report being completely inactive.¹¹ The distinction between overactive vs underactive patterns is an area for further study as it may help determine how to best tailor chronic pain treatments, specifically activity pacing.

Activity pacing is a widely used, but poorly characterized treatment^{2,4,10} in which the association between pain and activity

is a main focus. In operant theory, the goal of activity pacing is to reduce reinforcement of overactive patterns that lead to pain increases by uncoupling pain and activity. One way to do this is to practice alternating activity and rest according to a preset time schedule. Activity pacing has been defined as “...regulation of activity level and/or rate in the service of an adaptive goal or goals”.^{10(p.465)} Although this definition is sufficiently broad to accommodate people with underactive or overactive patterns, common aspects of pacing—slowing down and taking breaks and breaking up activities into smaller pieces—imply that people are doing excessive amounts of activity that need to be regulated downwards. These aspects have been included in items on the activity pacing subscale of the Chronic Pain Coping Inventory,⁹ but it is difficult to interpret the scores. Results of studies examining the relationship between pacing and disability or poor health are inconsistent; some studies show that pacing is associated with poor health,^{6,7} whereas others show the opposite.^{5,8,9} These findings support the idea that “appropriate,” health-promoting pacing for 1 subgroup of people with chronic pain may not be the same as for another. The quantification of overactive and underactive patterns should allow for opportunities to examine similarities in pain–activity relationships across people to identify key personal characteristics in which to tailor pacing. In addition, overactive and underactive patterns identified through these objective means may be the most direct outcome measure of pacing interventions. An additional advantage of this measurement is that reduction in patterns can be individualized in which significant pain increases are determined based on deviations from an individual’s average pain.

This initial work provides support for the objective quantification for overactive and underactive patterns in people with chronic pain. Larger studies are needed and some additional areas should be considered. To better understand overactivity as a construct, it is likely necessary to revisit the biomedical model. Disease process and underlying pain mechanisms should be taken into account in future studies. For example, conditions such as fibromyalgia may have different frequencies or characteristics of overactive patterns than those of people with osteoarthritis or back pain. Furthermore, mixed pain samples comprising people with lower extremity or upper extremity pain that may be commonly seen in pain clinics could be examined separately as activity engagement may differ depending on the site of pain. To examine avoidance behavior in relation to overactivity, the physical function of patients may help disentangle whether avoidance is due to behavior or inability. Avoidance behaviors within the context of activity performance may also be better explained by selecting samples that have the same condition. In future studies, researchers may consider different time frames for what is a “prolonged activity bout” that precedes pain increases. Future studies should also assess other psychosocial contexts, such as motivation for overactivity (eg, keeping up with

Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

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PAIN 156 (2015) 1831–1832

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<http://dx.doi.org/10.1097/j.pain.0000000000000291>

family members) or underactivity (eg, social communication of pain to elicit attention/support) to build a more complete picture of the function of these activity patterns in the context of pain. The authors chose a 2-hour time frame that may correspond to the pain-reporting frequency, but this selected time frame could be altered. In addition, to better attribute overactive or underactive periods as the cause of pain increases, reporting in the moment about specific activity periods may provide support for its validity. The ability to easily use technology somewhat unobtrusively in people's lives in studies such as this will likely yield rich information about people with chronic pain to provide better treatments.

Conflict of interest statement

The author has no conflicts of interest to declare.

Article history:

Received 28 June 2015

Accepted 2 July 2015

Available online 13 July 2015

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