

Avoidance or Incapacitation: A Discussion on Definition and  
Validity of Objective Measures of Avoidance, Persistence and  
Overactivity

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**To the Editor:**

In a recent publication, Van Damme and Kindermans<sup>1</sup> proposed a self-regulation perspective to help explain pain-related avoidance and persistence behaviours in individuals with chronic pain. During their narrative review, they noted that agreement on both the definition and measurement of avoidance and persistence is necessary to determine the (mal)adaptive nature of these behaviours. They imply that objective measures of avoidance and persistence should be utilised in empirical investigations stating that current findings largely rely on self-report while there are significant differences between self-reported and objectively assessed activity levels. In this letter, the validity of objective measures of activity as a measure of avoidance and persistence behaviour, based on commonly used definitions of these constructs, is discussed.

Advances in technology in the last decade have allowed for movement registration systems to become more affordable and accessible. Accelerometry-based activity registration has been employed by a number of research groups, including our own, to objectively measure physical activity in individuals with chronic pain.<sup>2-5</sup> These devices, which detect changes in acceleration, have been shown to be effective in differentiating between various physical and sedentary activities in healthy adults, correlate significantly with oxygen uptake and heart rate, and are easily utilised and well tolerated by research participants.<sup>6, 7</sup> Although these devices appear to be a valid and reliable measure of physical activity in chronic pain populations, their ability to measure avoidance and persistence behaviour is questionable.

In healthy populations, there is a large variation in objectively measured daytime physical activity.<sup>8, 9</sup> Age, gender and BMI explain some of this variance with females, older adults and individuals with a higher BMI being less physically active throughout the day.<sup>8, 9</sup> These results are not surprising as you would expect the physical capacity of these individuals to be lower. However, environmental

factors, such as time of year and neighbourhood walkability, have also been shown to impact on objective daytime physical activity.<sup>10, 11</sup>

*Avoid* is defined by the oxford dictionary<sup>12</sup> as: 'keep away from or stop oneself from doing (something).' In chronic pain literature, *activity avoidance* is commonly described as a reduction in physical or other daily activities as a means to avoid pain escalation.<sup>13-15</sup> These definitions imply that in order to avoid activity one must have the physical capacity to be able to engage in that activity and that the activity reduction is premeditated.

Given the large variability in objectively measured physical activity in healthy populations, are we able to compare people with chronic pain and say that one person is avoiding activity based on lower objective physical activity levels? This person may be an elderly female who has multiple co-morbidities. Low physical activity levels in this individual are likely to reflect a lower physical capacity as opposed to activity avoidance. One way to determine if this individual is avoiding activity using accelerometry-based activity registration would be to first determine the value that represents an individual's physical capacity and compare further readings to this value. A lower reading compared to the physical capacity value may indicate activity avoidance. However, in observational studies, can we really be sure that the decrease in this individual's engagement in activities is because they are avoiding activities? It could be that they couldn't go for their regular walk because of road works, poor weather, or a range of other reasons.

While one study has linked lower levels of objective physical activity to self-reported activity avoidance,<sup>16</sup> other studies investigating differences in objective physical activity levels based on an individual's self-reported activity pattern have found no significant differences in chronic pain samples.<sup>17, 18</sup> This is not surprising as everyone has a different physical capacity and in a chronic pain population this would not be exclusively determined by avoiding or persisting with activity. While low

levels of objective physical activity may be an indicator of activity avoidance, we do not believe that this should be used as a sole measure of activity avoidance in observational studies or in cross-sectional comparisons. In their narrative review, Van Damme and Kindermans<sup>1</sup> referred to a meta-analysis in which a moderate negative association was found between physical activity and disability in low back pain.<sup>19</sup> They reported that this association was, in fact, a moderate association between avoidance behaviour and disability, indicating that those patients with higher levels of activity avoidance also experienced more disability. Based on the earlier discussion, a more accurate interpretation of study results would be that lower physical activity levels were associated with higher levels of disability and that low levels of physical activity in the included studies may be due to various factors including lower physical capacity or higher activity avoidance.

In contrast to activity avoidance, *(task) persistence* or *endurance* behaviour is commonly defined as persisting with activities in spite of pain.<sup>20, 21</sup> As per the discussion on the measurement of avoidance, high levels of objective physical activity could indicate that an individual persists with activity in spite of pain. Alternatively, high levels of objective physical activity may be reflective of a higher level of physical capacity in that individual. As such, the use of accelerometry-based activity registration as a sole measure of persistence in observational and cross-sectional comparisons may be inadequate.

*Overactivity* or *overdoing* are terms that commonly mean persisting with activities to a point where pain is significantly exacerbated resulting in a period of inactivity.<sup>14, 22, 23</sup> Individuals are thought to resume daily tasks following inactive periods once their pain has subsided or frustration over inactivity stimulates new activity.<sup>3, 23</sup> This can cause a “yo-yo” activity pattern sometimes referred to as *overactivity-underactivity cycling* or *boom-bust behaviour*.<sup>15, 24</sup> Van Damme and Kindermans<sup>1</sup> briefly referred to overactivity behaviour in their narrative review. They stated that this activity pattern incorporates both avoidance and persistence characteristics. This brings up the question of whether

there is a point at which pain escalation causes incapacity or if individuals are always able to engage in activities in spite of pain and hence are able to avoid activity. Some of the first definitions of overactivity, written by clinicians, refer to the inactivity period as a period where individuals are *unable* to engage in activity due to high levels of pain as opposed to individuals *intentionally choosing* not to engage in activity.<sup>14, 23</sup> A combination of avoidance and persistence behaviour is explained by the individual persisting with some activities in spite of pain (e.g., household chores) and avoiding certain pain aggravating activities that are able to be ceased (e.g., leisure activities). Persistence is thought to precede activity avoidance, with avoidance of certain activities developing as pain exacerbations, secondary to overactivity, become more severe and prolonged overtime.<sup>14, 23, 25</sup> As pointed out by Van Damme and Kindermans<sup>1</sup> a group of individuals reporting a combination of avoidance and persistence/overactivity has been identified in two chronic pain samples.<sup>18, 26</sup> It is unclear, however, if these individuals' reports of avoidance relate to inactivity periods caused by severe pain exacerbations or the total cessation of certain activities that cause pain to escalate. It appears that further research is needed to answer this question.

It may be possible to incorporate objective measures of physical activity to measure overactivity behaviour in observational studies reducing the reliance on participants' self-report. As overactivity implies engagement in high levels of activity that significantly exacerbates pain, this could be determined by examining when objectively measured activity is 'a certain level' above a person's average level (e.g. two standard deviations) and is followed by an increase in pain that escalates to 'a point' that is above an individual's average pain intensity. The amount of times this is observed in an individual's data would be an indication of how often the individual engages in overactivity behaviour. However, without an individual's self-reported pain rating it would be difficult to determine if the high level of activity did in fact cause a pain aggravation and hence can be classified as overactivity behaviour. Use of this method would also be able to identify only those instances where overactivity

resulted from high levels of physical activity. Patients commonly report exacerbating their pain from spending too long on sedentary activities such as sitting at a computer which is accepted by clinicians as being a form of overactivity.<sup>24, 25</sup>

There is a temptation to favour objective measures over participants' self-reports. However, in this area of research, the sole reliance on objective measure could lead to a misinterpretation of the data. While we do agree with Van Damme and Kindermans<sup>1</sup> that their self-regulation perspective may help increase our understanding of avoidance and persistence behaviours, especially in explaining variations to an individual's "typical" behavioural pattern, well designed studies with valid measures are needed to continue to increase our knowledge in this area.

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