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**Editorial:**

**The role and function of Acceptance and Commitment Therapy and behavioral flexibility in pain management**

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Despite recent advances, the high prevalence and debilitating effects of chronic pain remains <sup>1</sup>. Pharmacological and surgical strategies are often insufficient in alleviating symptoms or increasing functioning <sup>2</sup>. Although pain tends to significantly interfere with activities across multiple domains (e.g. vocational, social, physical), traditional pain management has to an important extent focused on reducing pain and distress, leaving *pain interference* as a somewhat neglected dimension. However, pain interference has historically been a key target for behavioral interventions <sup>3</sup>, and recent research supports the notion that pain interference is critical for daily functioning and future health <sup>4</sup>.

### Acceptance and Commitment Therapy and behavioral flexibility

Acceptance and Commitment Therapy (ACT) is a relatively novel treatment approach developed within a contextual behavioral science framework. ACT has gained increased attention and empirical support particularly in the field of chronic pain during the past decade.

From an ACT perspective a narrow and inflexible behavior pattern characterized by avoidance of pain and distress plays a central role in the development and maintenance of disability and reduced quality of life <sup>5</sup>. Hence, the treatment objective in ACT is to increase *behavioral flexibility* (also referred to as psychological flexibility), defined as the ability to act in accordance with personally held values also in the presence of interfering pain and distress. This implies that ACT is not primarily about reducing pain intensity but rather its influence on behavior, i.e. pain interference.

*Exposure* to personally important situations and activities that have been previously avoided due to ongoing or anticipated pain and distress is considered the core intervention. In this process, *acceptance* (or willingness to experience) is promoted as a behavioral response to pain and distress that cannot be directly changed, to facilitate engagement in activities that are meaningful although possibly painful. Also, the patient is encouraged to disengage, or “step back” from, verbal processes (i.e. thoughts), to decrease their impact on behavior (denoted as *cognitive defusion*). Although exposure may be a central ingredient in other and more traditional variants of CBT, the objective, or function, in ACT is different. Rather than altering responses through extinction or habituation, the primary objective is to increase behavioral skills such as acceptance and defusion, to develop a wider and more flexible behavior repertoire in the presence of e.g. pain and distress for the express purpose of facilitating effective action - engagement in activities that bring meaning, quality, vitality, and the like into one's life.

### Relational Frame Theory

In ACT, as a contextual behavioral model, persistent pain can be seen as *interoceptive stimuli* (stimuli produced within an organism) that can influence the probability of behavioral responses. In this model, the *stimulus function* (or psychological function) of

pain is central for the analysis. This means that a behavioral response such as saying no to a social event is not directly related to the level of intensity but rather its function, or meaning, to the individual in that particular context <sup>6</sup>.

As described by Relational Frame Theory (RFT), the theoretical framework underlying ACT, stimulus functions are continuously acquired via direct experiences, but also through their relations with other stimuli <sup>5</sup>. This implies that a behavioral response is not due to just one stimuli but rather the relational network of stimuli. Pain as an interoceptive stimulus is associated with a large number of other stimuli, and the actions taken depend on the psychological function(s) of that relational network of stimuli. A seemingly trivial situation may therefore elicit very strong reactions due to the associations being made: A relatively modest pain sensation from the neck trigger thoughts like “pain in the neck is bad”, which in turn are related to ideas such as “it may be a fragile disc”, and “something is terribly wrong”, that eventually lead to fatalistic conclusions like “I’ll end up in a wheelchair”. Thus, even if the initial stimulus is modest, it may activate a relational network of stimuli with very aversive psychological functions.

Importantly, the derivation of such relational frameworks are often involuntary responses. In fact, efforts to control them (e.g. trying not to think about the fragile disc) may result in a paradoxical increase of both frequency and intensity of these thoughts, which further motivates an avoidance-oriented approach. Conversely, an acceptance-oriented approach would aim to reduce unsuccessful control efforts, such as those that paradoxically lead to further pain, distress, and disability, as well as broaden the behavioral repertoire of the pain sufferer, such that effective action can occur. In addition to a wider and more flexible behavior repertoire, acceptance oriented exposure may, over time, affect the psychological experience. Exposure to previously avoided situations and activities also facilitate new learning. New experiences will add information to existing relational networks, and new associations are made. The incorporation of other, and possibly contrasting, information may modify the relational network and, consequently, the stimulus functions. For example, an individual participating in a social event previously avoided may achieve several new experiences that result in important associations that contribute to the existing relational network. Even if subsequent situations still elicit thoughts like “I can’t do this”, such associations are part of a richer network of associations that now include “It feels like last time, and then I made it; it can be meaningful, even if it hurts; worst case I can leave early, they’ll understand”. And, the influence of such additional associations may alter the stimulus function of that pain sensation; not necessarily changing the intensity but possibly the “threat value” of it.

#### Empirical support for behavioral flexibility and ACT

The importance of behavioral flexibility is supported in a large number of studies <sup>7</sup>. For

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example, it has been shown that greater acceptance of chronic pain is associated with less avoidance of important activities, better emotional well being, and less health care utilization<sup>8</sup>. Also, behavioral flexibility has been shown to be a key factor in the relation between symptoms and disability<sup>9</sup> and between catastrophizing and pain-related distress<sup>10</sup>.

The empirical support for ACT has increased rapidly during the past decade, particularly in the area of chronic pain, and ACT is today listed by the American Psychological Association's Division of Clinical Psychology, as an empirically supported treatment for chronic or persistent pain in general<sup>11</sup>. In short, treatment evaluations have illustrated the utility of ACT with both adult<sup>12,13</sup> and pediatric<sup>14</sup> patients, in individual<sup>15</sup> and group<sup>13</sup> settings, in extensive residential multimodal rehabilitation settings<sup>12</sup> as well as in more brief outpatient interventions<sup>13</sup>. Data also suggest that effects are relatively stable through follow-ups of as long as three years<sup>16</sup>.

Also, a sizeable number of studies have evaluated the mediating function of behavioral flexibility in ACT for pain. In two studies, the importance of improvements in behavioral flexibility was shown to be a more important mediator than symptom alleviation, decreased catastrophizing, and improved self-efficacy (i.e. the specificity criteria)<sup>17,18</sup>. Also, studies have illustrated that changes in behavioral flexibility precede improvements in outcome, i.e. the temporality criteria (Kemani et al., under review). Furthermore, behavioral flexibility has been shown to function as a mediator across a wide range of outcome variables<sup>13 19</sup>.

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#### Future research and development

Importantly, ACT and behavioral flexibility is not a destination but rather a promising direction for future research and development. Particularly, although the utility and change processes of ACT are fairly well known, research thus far has failed to identify salient predictors or moderators of treatment outcome<sup>16</sup>, which implies that we do not know if there are certain patient characteristics or other factors that may influence the effects of treatment. While this limitation is certainly not restricted to ACT (e.g., see McCracken & Turk, 2002), successful prediction of treatment outcome is certainly a key area for future work to investigate.

Also, despite strong research evidence, the accessibility of ACT is low. As a consequence, a large number of patients suffering from chronic pain do not have access to this treatment. To meet the growing demand for ACT requires new treatment forms. Internet-based treatments have successfully been developed in several other domains, and recent research has shown that these interventions have effects comparable with standard face-to-face treatments<sup>20</sup>. There is still a scarcity of studies evaluating internet-delivered ACT for chronic pain, but a few studies with promising results exist<sup>21,22</sup>. This development may significantly increase the possibilities to make ACT as an evidence-based treatment widely available, but more research is clearly needed.

Furthermore, there is an urgent need to explore and evaluate the utility of ACT and behavioral flexibility in a number of different areas. First, although behavioral flexibility may be conceptualized as a *transdiagnostic factor* it is yet to be empirically evaluated if the importance of behavioral flexibility varies across e.g. pain types or diagnoses. Second, studies should explore if ACT-strategies can be used to improve the patients' ability to manage pain and distress that result from repeated procedures in e.g. cancer treatment. Third, no study has yet explored the role of behavioral flexibility in the transition from acute to chronic pain. For example, future research should investigate the utility of the ACT model in predicting and preventing the development of chronic postsurgical pain and disability. Fourth, little is yet known regarding the role and influence of biological processes involved in ACT-oriented interventions, and more research in this area is urgently called for. We recently used functional neuroimaging (fMRI) to investigate the role of brain activity patterns in the prefrontal cortex in a randomized controlled trial (RCT) on ACT treatment for females diagnosed with fibromyalgia. Although tentative, results illustrate that patients treated with ACT had increased activations in the ventrolateral prefrontal/lateral OBFC (vlPFC/OBFC) during pressure-evoked pain as compared with controls<sup>23</sup>. Notably, the vlPFC/OBFC has frequently been associated with executive cognitive control and recent studies suggest that this region is essential for changes or reappraisal of the emotional significance of pain. Thus, these effects are consistent with the theory underlying ACT and warrant more studies to further evaluate if changes in vlPFC/OBFC reflects improvements in behavioral flexibility.

In conclusion, an increasing amount of research suggests the utility of ACT and behavioral flexibility in pain management. Bearing that success in mind, more research is still needed to clarify for whom, in what circumstances, and how it should be used.

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