

Commentary

How understanding the function of behavior can improve physical therapy progress: The case for psychology

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Chronic pain in children and adolescents is common, with prevalence rates ranging between 4% and 83% (King et al., 2011). Most commonly associated with chronic pain is concern for deconditioning as a result of avoidance of physical activity, poor use of body mechanics, and unhealthy postures that result from guarding or minimizing use of the affected area. The effectiveness of a rehabilitation approach to managing chronic pain, of which physical and occupational therapy is an essential component, is well documented (Hechler et al., 2015). However, psychological constructs, such as perception of pain and fear of pain, can interfere with progress in physical and occupational therapy sessions, leading to poorer treatment outcomes (Simons & Kaczynski, 2012; Simons et al., 2012). In an attempt to manage the fear and perception of pain, children and adolescents often engage in a number of maladaptive behaviors and avoidance techniques, or *pain behaviors*.

These pain behaviors directly interfere with participation in therapies, and, as a result, can slow progress in rehabilitation. For this reason, our physical and occupational therapy colleagues regularly seek consultation with psychologists to address these behaviors. A critical role of the psychologist is to analyze these maladaptive behaviors and modify the environment or therapist-patient interaction. The goal is to decrease the frequency and severity of pain behaviors to support progress in rehabilitation therapy sessions (Slifer,

2014). As a result of the increased interest in behavioral consultation with therapy, the aim of the current paper is threefold: (1) to describe common behavioral problems therapists encounter in treating chronic pain; (2) to describe the various functions that pain behaviors serve; and (3) provide suggestions for managing common pain behaviors in physical and occupational therapy sessions. Our hope is that this information will enhance the care provided by rehabilitation therapists and highlight the value of psychological consultation in physical and occupational therapies.

Common pain behavior

In its simplest form, pain is an unpleasant sensory response to noxious or aversive stimuli. Children naturally learn to avoid situations or behaviors that elicit pain. They may avoid use of a specific body part, alter movements to protect the affected area, or guard themselves when anticipating pain. In the context of chronic pain children are continuously confronted with activities which may increase the immediate perception of pain. These children may also experience hypersensitivity to physical symptoms such as muscle soreness or fatigue. These children are driven to minimize, delay, or avoid any immediate perception of pain. As such, children respond by slowly and progressively limiting the use of the affected limb which presents additional challenges for intensive rehabilitation therapy. As this process is repeated over weeks and months, children may

develop significant fear of certain activities related to pain, less overall activity, and unhealthy (or unsafe) modifications to minimize the perception of pain.

While at first it may appear counterintuitive (and even paradoxical), rehabilitation for chronic pain involves increasing the frequency of these activities (Lotze & Moseley, 2015). With proper instruction of body mechanics, repeated sensory exercises, and increasing overall physical activity, children develop resilience to these pain signals. This allows them to return to life activities, leading to increased quality of life and eventually, reduced perception of pain. However, these repeated exercises are very physically and emotionally challenging – and the drive to avoid immediate perception of pain is strong. Thus, behavioral interventions are highly relevant in rehabilitation therapy.

Behavioral distress or behaviors that disrupt treatment, have previously been classified into various domains related to the level of interference with medical care (see Tucker et al., 2001; Slifer, 2014). For the purpose of this paper, four domains for pain behaviors will be discussed: *behavioral distress* (e.g. wincing, crying, screaming, verbalizations of distress); *aggression* (e.g. verbal refusal, yelling at therapist, hitting, kicking); *avoidance* (e.g. absence of any behavior/noncompliance, questioning or tangential conversation, moving or placing one's body in a position to delay a therapy task); and *indirect noncompliance* (intentionally modifying one's behavior to incompletely follow a task demand to reduce pain or distress). Escape/delay were split into behaviors related to directly avoid the task or complete the task but avoid the pain (guarding/modifications). For example, avoidance may include statements of "Wait, wait how do I do it? How many times?" in an effort to delay initiation of the tasks. Whereas, indirect non-compliance may include discreetly holding onto the wall or not putting the foot completely flat during the exercise.

Function of behavior

Operating from a behavioral perspective, understanding the factors that precede the behavior is valuable for understanding the function of the

pain behavior. Equally important are the factors that occur following the behavior that may reinforce and hence maintain the behavior. Based on operant learning principles, if a given behavior results in reinforcement or a rewarding experience, the frequency of the behavior will increase (Fordyce et al., 1973). Pain behaviors that interfere with therapy are often shaped or reinforced based on the specific function of the behavior; however, adaptive behaviors such as compliance and effort in therapy can also be learned and reinforced in patients. Below are some examples of behaviors and their functions:

Automatic reinforcement (the behavior itself is rewarding). Often signs of behavioral distress, such as crying, wincing, or screaming are maintained through automatic reinforcement. These behaviors allow ventilation of emotional upset. However, walking on an affected limb or completing a difficult therapy task may also have its own immediate reward (i.e. sense of self-efficacy/pride).

Escape/delay (the reward comes from avoiding an object/activity). Many pain behaviors observed within a physical and occupational therapy session such as limping or guarding are rewarded by immediately reducing or avoiding the perception of pain. Further, if a child is overwhelmed and anxious, he/she may repeatedly ask questions of the therapist and delay the onset of a painful therapy task (reducing/avoiding anxiety and pain). Alternatively, a child may work hard to complete a therapy task quickly and correctly if they know they will be finished for the day (i.e. compliance leads to escaping further painful activity).

Social attention (the reward comes from others attending to the child). Other behaviors serve the function to get attention or support from others. A child may display more tears, whining, and shaking (behavioral distress) to receive comfort from parents or other patients. In a more adaptive way, a child may try harder in therapy to earn positive attention from a therapist the child likes or praise from their peers.

Access to preferred item/activity. Finally, some pain behaviors are reinforced by access to a desired item or activity. The child who repeatedly complains of pain may be left alone on the couch with a tablet or video games and may even receive

treats from family members (avoidance, behavioral distress). To encourage more participation, a child who completes all his/her home exercises despite the presence of pain may earn time on the tablet or cell phone.

Behavioral intervention strategies

Behavioral interventions involve using environmental contingencies or consequences to modify the probability that certain behaviors occur (Slifer, 2014). Four common strategies to reduce pain behaviors and increase compliance in rehabilitation include differential reinforcement, planned ignoring, escape extinction, and antecedent management.

Differential reinforcement involves systematically providing a reward to shape a new behavior. The behavior to reward often depends upon the specific pain behavior and its function. For example, if a patient is overly talkative in delaying the tasks (avoidance), an alternative behavior (e.g. remaining on task) is differentially reinforced while the undesirable behavior (e.g. talking) is ignored (differential reinforcement of alternative behavior). Another common use of this strategy is to decrease aggressive behavior by identifying the baseline behavior and providing reinforcement (e.g. praise, reward) for amount of time spent without kicking or hitting (differential reinforcement of other behavior) to elicit a decrease in this behavior. Therapists can also reduce ongoing pain behaviors (behavioral distress) by rewarding an incompatible behavior. For example, during stretching exercises, the child can be rewarded for holding something in their hands, which replaces hitting or grabbing the therapist (differential reinforcement of incompatible behaviors). In every situation, it is important that the reward is meaningful to the child to motivate them toward the desired new behavior.

Planned ignoring involves refraining from providing any social attention the patient would typically receive for engaging in the pain behaviors. For example, a child may frequently wince and cry during therapy to increase gestures of concern or reassurance from the therapist. Using planned ignoring, the therapist will refrain from direct social interaction while the child is demonstrating behavioral distress. Planned ignoring is used most

for behaviors that serve the function of seeking social attention. Therefore, the therapist can give attention and praise for appropriate behavior such as talking in a big girl voice, using words, asking for help, etc.

Escape extinction involves structuring the task so that the pain behaviors do not lead to delay or avoidance of the activity. For example, if a patient demonstrates increasing pain behaviors towards the end of a therapy session to avoid the last few therapy tasks, that patient will not be allowed to end the session until performing a desired task (avoidance). The therapist should continue to require completion of the task even though the patient may still be wincing or crying in pain (behavioral distress). A therapist may also use physical prompts to prevent avoidance and help a child complete a task in a timely manner. As with planned ignoring, since the function of these pain behaviors are to avoid a task, they may be most effective when escape is used as a reward (e.g. child can escape therapy early and play after minimum required therapy tasks are complete).

While the above interventions involve contingencies to behaviors (both pain behaviors and desired therapy behaviors), *antecedent management* involves altering the environment prior to pain behaviors to prevent their occurrence and prompt compliant behaviors in therapy (Slifer, 2014). For example, if a patient engages in behavioral distress to increase attention from peers, having that patient complete physical therapy individually might reduce behavioral distress. Likewise, if a patient is trying to escape/delay therapy, a short list of therapy tasks he/she can cross off (as well as a desired game in plain sight) might increase compliance to complete therapy tasks quickly to play the game. The benefit of structuring the environment to decrease pain behaviors, allows for seamless use of the behavioral interventions detailed above.

Programmatically, it may make sense to offer a therapeutic environment that naturally reduces pain behaviors and encourages effort and compliance. This may include reviewing task demands at the start of the session, reviewing staff efforts to reduce escape/delay, and linking patient behaviors with a desired item or activity at the end

of the session. However, each patient brings a unique set of pain behaviors and challenges, and individualization of behavioral interventions is

expected. Below we offer a case example of a behavioral consultation completed in an intensive pediatric pain rehabilitation program.

Case example

Presenting problem: Jane is a 12-year-old female with Complex Regional Pain Syndrome with pain lasting 15 months. During rehabilitation therapy, Jane was repeatedly guarding/tensing during exercises (indirect noncompliance), verbally refusing participation (aggression), and engaging in excessive discussion (avoidance) to compromise the components of therapy sessions. Based upon behavioral observations, these behaviors are thought to be maintained by escape of non-preferred activity and pain and access to social attention (both for reassurance and continued delay of activity).

Behavioral plan: To increase compliance in therapy (placing foot on the ground) and reduce behavioral distress, the following will be used.

Accommodations to rehabilitation schedule:

- Physical therapy will immediately precede recreational therapy, since recreational therapy is a preferred activity (antecedent management).
- Physical therapist will use the first 3 minutes of sessions to offer Jane control to decide the order of therapy, but not allow direct refusal. If she does not choose within 30 seconds, then the physical therapist will choose the order (antecedent management and differential reinforcement of alternative behavior).

Accommodations to environment:

- Physical therapy will be performed in a private area to avoid additional social attention for pain behaviors (antecedent management).
- Jane's effort in therapy will be directly monitored and assessed by the physical therapist on a 0-4 scale after every session.

Behavioral procedure:

- If Jane places her foot on the ground within 5 seconds 80% of times asked, then the physical therapist will use the last 10 minutes of sessions for a preferred activity (differential reinforcement of alternative behavior).
- If Jane does not place her foot on the ground at least 50% of times asked, then the physical therapist will offer more therapy time in place of recreational therapy (escape extinction).
- Jane will earn points for demonstrating effort rated at 3 or 4 during each session. If Jane earns 5 points, then Jane will earn a special dessert (provided by a parent; token economy using differential reinforcement of alternative behavior).

Metrics to monitor progress on plan:

- Number (and %) of times placing foot on ground will be recorded by the physical therapist.
- Effort score and number of times earned will be recorded by the physical therapist.
- Plan will be reviewed at Staff Team meeting and revised/discontinued as needed.

Conclusion

Pain behaviors can greatly interfere with progress in pediatric pain rehabilitation. It is therefore critical to understand the function of pain behaviors to enhance the effectiveness of physical interventions. In an interdisciplinary team,

consultation between psychologist and therapist can be essential to develop physical interventions that sensitively address the child's pain behaviors (Maynard et al., 2012). However, if a close working relationship between the two disciplines is not feasible, it is recommended that the psychologist provide proper education to and/or consultation

with the physical and occupational therapist regarding analysis of function and the proper method to apply behavior principles in therapy. Three potential models of care are: (1) co-treatment with therapists to manage behavioral concerns within the context of the rehabilitation therapy session; (2) a brief consultation to and recommendation for therapy staff to implement; or (3) training in behaviorism for therapists on the antecedents and consequences of pain behaviors. The goal of the third option is that the therapist could intervene independently within the physical

and occupational therapy session. Further research is warranted to develop effective behaviorally-based consultation for chronic pain rehabilitation therapy.

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References

Fordyce WE, Fowler RS Jr, Lehmann JF, Delateur BJ, Sand PL, Trieschmann RB. Operant conditioning in the treatment of chronic pain. *Arch Phys Med Rehabil* 1973;54:399-408.

Hechler T, Kanstrup M, Holly AL, Simons LE, Wicksell R, Hirschfeld G, et al. Systematic review on intensive interdisciplinary pain treatment of children with chronic pain. *Pediatrics* 2015;136:115-127.
www.pubmed.gov/26101358

King S, Chambers CT, Huguet A, MacNevin R, McGrath PJ, Parker L, et al. The epidemiology of chronic pain in children and adolescents revisited: a systematic review. *Pain* 2011;152:2729-2738.
www.pubmed.gov/22078064

Lotze M, Moseley GL. Theoretical considerations for chronic pain rehabilitation. *Phys Ther* 2015;95:1316-1320. www.pubmed.gov/25882484

Maynard CS, Amari A, Wieszorek B, Christensen JR, Slifer KJ. Interdisciplinary behavioral rehabilitation of pediatric pain-associated disability: retrospective review of an inpatient treatment protocol. *J Pediatr Psychol* 2010;35:128-137. www.pubmed.gov/19465538

Simons LE, Kaczynski KJ. The fear avoidance model of chronic pain: examination for pediatric application. *J Pain* 2012;13:827-835. www.pubmed.gov/22832693

Simons LE, Kaczynski KJ, Conroy C, Logan DE. Fear of pain in the context of intensive pain rehabilitation among children and adolescents with neuropathic pain: associations with treatment response. *J Pain* 2012;13:1151-1161. www.pubmed.gov/23085089

Slifer K. A clinician's guide to helping children cope and cooperate with medical care: an applied behavioral approach. Baltimore, MD. The John Hopkins University Press, 2014. www.worldcat.org/oclc/887963380

Tucker CL, Slifer KJ, Dahlquist LM. Reliability and validity of the Brief Behavioral Distress Scale: a measure of children's distress during invasive medical procedures. *J Pediatr Psychol* 2001;26:513-523.
www.pubmed.gov/11700336