

## Commentary

# Teaching and applying activity pacing in pediatric chronic pain rehabilitation using practitioner feedback and pace breaks

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### Background

Worldwide 44% of adolescents report chronic pain, making it far more common than you may expect (Stanford et al., 2008; Gobina et al., 2019). Physical deconditioning, impaired physical functioning, mood impairments, internalized problems, poor school performance, fatigue, and poor sleep habits are associated with pediatric chronic pain (Wilson et al., 2010; Ferreira-Valente et al., 2014; Clauw et al., 2019; Kempert et al., 2019; Kichline et al., 2019). Pediatric chronic pain research has shown that avoidance of activity and overactivity is associated with worsened outcomes (Cane et al., 2004; Andrews et al., 2012). Specifically, the recommended biopsychosocial approach emphasizes function-based activities and improving self-management of symptoms and pain (Jamieson-Lega et al., 2013). Specific to chronic pain, Birkholtz et al. (2014) describe the *overactivity-underactivity cycle* that refers to a pattern of excess activity alternated with prolonged rest or downtime, this cycle may also be referred to as the *boom or bust cycle*. If these cycles become a habit they can continue to increase side effects and symptoms of pain including mood changes, fatigue, sleep disturbance, and concentration (Birkholtz et al., 2004). Because of these complex factors, it is important to focus on activity pacing as part of chronic pain treatment to promote a change in daily habits and improve long-term functioning.

**Keys themes in literature.** Research provides evidence for pacing, activity pacing, and energy

conservation as a common intervention for chronic fatigue (Shepherd, 2001; Nijs et al., 2009) and chronic pain treatment (Cane et al., 2004; Gill & Brown, 2009; Jamieson-Lega et al., 2013; Nielson et al., 2013). This includes the use of activity pacing as a treatment intervention (as a way to progress skills) and also as a coping intervention (i.e. problem-solving). One study found that practicing pacing by self-managing activity level can improve daily functioning in as little as three weeks (Nijs et al., 2009). Pacing can be defined in many ways with the ultimate goal of improving function.

Common keywords used to define pacing that appear in existing literature include but are not limited to: *reduce overactivity, balance activity, graded manner, tolerate activity, steady activity, taking breaks, and consistent activity*. Clinical application of activity pacing commonly refers to modified activity level, alternating activity and rest, changing positions, breaking down tasks, setting goals, and increasing activity gradually (Birkholtz et al., 2004; Cane et al., 2004; Nijs et al., 2009; Jamieson-Lega et al. 2013; Antcliff et al., 2018). Alternatively, McCracken and Samuel (2007) suggest that when an individual uses pacing to reduce pain it may, in turn, share features with avoidance behaviors. It is recommended that adolescents use pacing in a way that reduces the influence of pain on functioning. Therefore pacing should include training more steady activity levels without extreme fluctuations.

As presented, the definition and application of pacing according to leading research are not consistent. This could impact potential outcomes either positively or negatively depending on the use of pacing by a clinician or patient. For example, one patient might identify pacing as regulating an activity to meet goals and might demonstrate a lower activity level throughout the day in order to prevent increased pain or symptoms. Another patient might define pacing as breaking down tasks and alternating types of activity. This individual will most likely demonstrate improved tolerance and functioning based on their definition and interpretation of activity pacing compared to the other patient. Similarly, if a clinician teaches a patient that they should only complete activities that don't exacerbate symptoms then this could lead to further deconditioning by default. This points to a gap between what pacing is to a healthcare provider compared to a patient (Jamieson-Lega et al., 2013). It has been highlighted that, when and if providers or a program unknowingly apply different approaches to pacing, the outcome could be negative as poor conceptualization leads to misinterpretation or misuse of pacing as an intervention (Jamieson-Lega et al., 2013). Regardless of how one defines it, it seems that activity pacing is a complex domain, having multiple components, definitions, and meanings (Gill & Brown, 2009). This points to future areas of research that will be reviewed in this article including what providers mean when they say pacing and how to clinically teach and incorporate pacing concepts such as pace breaks and the use of metaphors.

**Aim.** It seems that there is an opportunity to explore and clarify activity pacing specific to chronic pain. Areas that could be improved upon include: (1) What is the definition we use for activity pacing specific to chronic pain among researchers and clinicians? (Gill & Brown, 2009; Jamieson-Lega et al., 2013) (2) Is the goal of pacing to limit or reduce pain? (Birkholtz et al., 2004; Cane et al., 2004) (3) Should goal setting be part of activity pacing? (Jeong & Cho, 2017; Antcliff et al., 2018) and (4) How should pacing be approached clinically? (i.e. how do we teach it, how do we implement pacing, how do we know if adolescents

understand how to use pacing; Birkholtz et al., 2004; Antcliff et al., 2018).

While research presents several different pacing strategies and concepts, it seems to be widely agreed upon that it is an important aspect of chronic pain functioning. As mentioned, if providers are unaware of discrepancies in how and what is being taught related to pacing, it may lead to negative outcomes. The goal of this article is to expand upon previous research by assessing if active pediatric chronic pain providers would be able to achieve a consensus agreement on unique aspects of care. Suggested aspects include: (1) the definition of pacing (2) key components of pacing, and (3) application of pacing as part of treatment. Additionally, we present the concept of a pace break using the step-by-step guide of S.T.A.R. (Stop, Think, Act, Resume), which we have developed as a potential clinical option for teaching pacing to patients, family members, and other providers.

## Methods

**Measure.** A survey was created using common themes and questions from both clinical discussions and research (primarily from Jamieson-Lega, et al., 2013 and Nielson et al., 2013). This survey was then sent out to a group of national and international physical therapists and occupational therapists that specialize in pediatric chronic pain treatment. All individuals on this electronic mailing list had previously identified that they were involved in pediatric chronic pain management and had an interest in collaboration among other providers. Out of the group the author received seven responses which are reviewed and detailed in this paper. No more than one response from any facility or group was utilized. All survey responses for questions 1-5 were *agree* or *disagree* with the option to also state they were unsure and elaborate. The questions focused on pacing concepts specific to the definition, how to teach pacing, and clinical application of concepts. Clinicians were allowed to provide additional information or opinions on specific topics or questions as well. Information about if they did or did not provide education on pacing was also included with four additional follow up questions for all providers who answered *yes* to "Do you teach pacing..." Clinicians were

then asked questions about methods of education and accountability, along with metaphors, analogies, or other techniques they find effective for pacing in an open-ended format.

**Procedure.** The survey was sent to the electronic mailing list participants along with two reminders. The time allotted for survey responses was 10 weeks. Survey responses were reviewed and inserted into tables as appropriate using survey feedback.

**Sample.** The responses from clinicians are detailed in Tables 1-4. Surveys included information about practice location, discipline, and experience level with chronic pain specifically. Survey responses were received from seven individuals all with a background in physical therapy. This included five physical therapists, one physical therapist assistant, and one research-based physical therapist. Clinicians had 3 to 10 years of experience specifically with pediatric chronic pain in various settings.

Table 1  
Clinician definition of pacing, key words, and main goal of pacing specific to chronic pain

Definition of pacing	Key concepts/words	Goal of pacing
One’s ability to manage both psychological and physical states in order to conserve energy and participate.	<ul style="list-style-type: none"> <li>• Take breaks</li> <li>• Mindful</li> <li>• Alternating types of activity</li> <li>• Continue despite pain when safe</li> </ul>	<ul style="list-style-type: none"> <li>• Participation</li> <li>• Function</li> </ul>
Ability to tune into signs and symptoms to make choices, modify, and facilitate more consistent engagement in life. This includes a structured approach to activities.	<ul style="list-style-type: none"> <li>• Boom or bust</li> <li>• Structured</li> </ul>	<ul style="list-style-type: none"> <li>• Consistent engagement in life</li> </ul>
Balancing out activity throughout the week to address boom or bust behavior. It can be described in terms of energy and pain tolerance.	<ul style="list-style-type: none"> <li>• Energy bucket</li> <li>• Gradual</li> </ul>	<ul style="list-style-type: none"> <li>• Not specified</li> </ul>
Specific to activity, pacing means doing physical activity in a way that can be reproduced the next day without increasing pain with focus on increasing intensity and duration gradually.	<ul style="list-style-type: none"> <li>• Taking breaks</li> <li>• Alternating types of activity</li> <li>• Planning ahead</li> <li>• Gradual</li> <li>• Continue despite pain</li> </ul>	<ul style="list-style-type: none"> <li>• To avoid increasing pain</li> </ul>
Pacing can be used to get out of the cycle of overdoing it on good days and doing very little on tough days in order to improve participation in everyday life. It’s about how you do activity.	<ul style="list-style-type: none"> <li>• Continue despite pain</li> </ul>	<ul style="list-style-type: none"> <li>• Improve participation in everyday life</li> </ul>
Divide energy over the day so that you can do all the activities that you need to do. Complete them with a certain level of energy for a certain amount of time to limit pain.	<ul style="list-style-type: none"> <li>• Monitor energy</li> </ul>	<ul style="list-style-type: none"> <li>• Do all activities with limited pain if possible</li> </ul>
Gradually increasing activity to obtain more consistent activity level. Being mindful about which activities you need to do and focusing on those values and goals.	<ul style="list-style-type: none"> <li>• Boom or bust</li> </ul>	<ul style="list-style-type: none"> <li>• Consistent activity level</li> </ul>

**Results**

*Key themes from the survey.* Survey results demonstrated that clinicians who regularly treat adolescents with chronic pain similarly agreed that pacing concepts are important to incorporate throughout treatment. Keywords, concepts, and goals of pacing are outlined in Table 1. Providing patients with feedback specific to taking breaks appropriately and being more aware/mindful were common responses. While many clinicians agreed upon many points, none of the survey questions had a unanimous response that resulted in a consensus agreement. Clinicians similarly seemed to focus on physical comfort and improved function as goals. There was 85% agreement among clinicians in five of six questions as seen in Table 2. This emphasizes the multidimensional nature of pacing in the context of chronic pain. Clinicians similarly agreed that activity pacing can be both taught as energy conservation strategies and also a behavioral model (Q1). This is supported by a general agreement that

pacing involves management of physical and psychological states in order to function consistently (Q2) and also support the statement that pacing can be taught as a coping skill (i.e. problem-solving, goal setting) and also a physical therapy education component (spreading out activities, identifying the type of activity, modifying exercise; Q4). The concept that pacing is multidimensional (to increase activity level, conserve energy for necessary tasks, and to manage barriers such as pain or stress) was widely agreed upon as well (Q3).

The only item that clinicians did not similarly agree/disagree with was if pacing should include slowing down, stopping activities, and avoiding activities that cause pain even if they are safe to continue (Q5). From the surveys, only 1 participant agreed, 57% disagreed, and 28% leaned towards disagreeing but reported they were unsure. Those that were unsure provided helpful detail about their responses. One added, “Activity should be quota-

Table 2  
Survey responses to agree/disagree questions

*option to agree or disagree with the presented statement	Clinician response (n = 7)	Percent of consensus agreement
Q1: When teaching pacing it must be either based on “energy conservation” or a “behavioral model” with focus on pacing behaviors being part of a specific purpose or goal; not a combination.	6 of 7 disagree	85%
Q2: Pacing is one’s ability to manage both psychological and physical states in order to conserve energy and participate as anticipated.	6 of 7 agree	85%
Q3: The purpose of pacing is to 1) increase activity and functioning, 2) conserve energy expenditure, and 3) manage pain and/or stress.	6 of 7 agree	85%
Q4: Pacing can be both a coping skill and a physical therapy based education component.	6 of 7 agree	85%
Q5: Pacing should include slowing down, stopping activities, and avoiding activities that cause pain even if they are safe to continue.	4 disagree 1 agree 2 unsure but disagree	57% disagree 28% unsure but generally disagree

based versus based on pain levels but that clinicians should try to limit pain flares as you prescribe activity”. Another added that “it depends on the context and situation as doing more despite pain is important but sometimes there are things that should be avoided” (i.e. children with hypermobility may need to avoid sports that may exacerbate pain such as gymnastics or children with headaches and history of concussion should avoid contact sports often). All additional points seemed to focus on physical safety vs. pain-specific limitations therefore they still seem to support concepts of Q5.

*Application of pacing.* Survey respondents suggested methods of teaching pacing to those with chronic conditions include more widely utilized concepts such as spoon theory and rate of perceived exertion (RPE; Borg, 1998; Barker et al., 2003). Other analogies and metaphors include the tortoise and the hare, the traffic light, energy bucket, Winnie the Pooh, energy bowl, team sport, and boom or bust (each detailed in Table 3). Since concepts of pacing are foreign to many adolescents, metaphors can be used to add application skills, help one to

conceptualize what is being asked of them, and to enhance understanding. Metaphors can also engage adolescents, are often used in teaching and learning (Low, 2008) and can help decrease the communication gap between a healthcare provider and a patient (Tompkins, 2002). All examples aim to teach adolescents how to identify when they are overdoing it and underdoing it to better manage or spread out energy.

From the survey, all clinical providers reported that they teach pacing and/or energy conservation as part of their chronic pain rehabilitation services. Some incorporate these skills daily, while others may incorporate them only as needed. There are many different and unique ways that clinicians incorporate and teach pacing as highlighted in Table 4. Some examples are the use of handouts, education sessions (parent and child), checklists or plans, and in vivo practice. In addition to different ways to incorporate and teach pacing, many providers acknowledged the importance of patient/client accountability. Some ideas to hold adolescents accountable for understanding and use

Table 3  
Suggested metaphors and analogies to explain or teach pacing specific to chronic pain

Spoons	You start each day with a certain amount of spoons (each day can be different), each activity you do can take away or add to your spoons, you need to be aware of what you have and what you are about to get/give to have enough to last through the day.
Tortoise and the Hare	The hare raced ahead, ended up getting tired, took a nap, and ended up losing the race...however the tortoise took his time, working at an efficient pace, listened to his body, and finished the race!
Traffic Light	Tune into the activity to facilitate understanding that tuning in to warning signs (thoughts, feelings, sensations) during activities can facilitate making choices and parental responses.
Energy Bucket	You want to have a great lift every day not have one great day and then be run off your feet.
Winnie the Pooh	Some kids are Eeyores and others are Tiggers. Eeyores have very low levels of physical activity, sedentary lifestyles, and need a lot of encouragement to be motivated and take initiative. Others are Tiggers who have too much motivation, over-do it often, and crash after activity. The goal is to be somewhere between a Tigger and an Eeyore.
Energy Bowl	Maintaining a balance of fuel and deletion during activities in order to balance activities that take energy and give energy back (similar to spoons).
Team Sport	Sometimes a few team members try to pull the weight of the entire team, eventually they will get tired and have to rest but no one else was trained to do what they do, so no one can effectively lead the team to victory. In the same way, you need to work on making all of your muscles strong and your body aligned so that your body can do more, with less effort, for longer periods of time instead of allowing only a few muscles to do all of the work.
Boom or Bust	This is when you are able to fully participate in something like a sport but then end up not functioning directly after. Discuss the expectation that over time with pacing, children should return to all activities more equally. Their activity level changes from day to day, overdo it on good days and crash, do very little on bad days.

Table 4

Clinician information about education materials, frequency, accountability, and techniques specific to pacing education

Types of educational materials	Handouts <ul style="list-style-type: none"> <li>• Pacing</li> <li>• Pace break plan</li> <li>• Activity progression s</li> <li>• Coping tool kit</li> <li>• Patient timetables</li> </ul>	Individual Education <ul style="list-style-type: none"> <li>• Practice skills</li> <li>• Problem solving</li> <li>• Learning activities</li> <li>• Written education</li> <li>• In vivo practice</li> </ul>	Parent Education <ul style="list-style-type: none"> <li>• Handouts</li> <li>• Learning activities</li> <li>• Problem solving</li> </ul>	Group Education <ul style="list-style-type: none"> <li>• Just kids</li> <li>• Just parents</li> <li>• Both parents and kids</li> </ul>			
Frequency of education	Daily	Routinely during education	Discharge /long term planning	Review as needed	Initial evaluations	Weekly	Activity specific
How do you hold patients accountable?	Practice in sessions <ul style="list-style-type: none"> <li>• Going through pace break out loud</li> <li>• Practical activities</li> <li>• Examples for use</li> </ul>	Homework <ul style="list-style-type: none"> <li>• Activity diary</li> <li>• Pacing plan</li> <li>• Daily check list</li> </ul>	Accountability <ul style="list-style-type: none"> <li>• Contracts</li> <li>• Family</li> <li>• Friends</li> <li>• Tracking log</li> </ul>	Analysis of implementation of pacing on evenings and weekends	Teach back method	Goal setting	Repeat back method
Specific pacing techniques	Pace Breaks	Rate of Perceived Exertion (RPE scale)	Metaphors (see Table 3)	Activity planning sheet	Danger in Me and Safety in Me (DIMS and SIMS; Moseley & Butler, 2017)	Twin peaks model (Moseley & Butler, 2017)	

of pacing education included having them write down or take notes regarding activity level using a diary, activity list, or checklist in addition to the routine practice of pacing as part of treatment.

**Discussion**

*What the literature suggests.* With chronic pain, it is important to teach adolescents how to use pacing in a way to reduce pain’s influence on functioning (McCracken & Samuel, 2007) by listening to their bodies (psychological and physical

components) to determine if they should or should not continue (e.g. muscle fatigue, changes in alignment, improper activation of musculature, increased stress, inability to cope with pain). Pacing behaviors should encourage or facilitate functioning (Nielson et al., 2013). Examples include modifying the type of activity or how an activity is completed, switching tasks, or subdividing tasks to better pace the activity. Literature suggests that recommendations for pacing should move away from symptom-related strategies and closer to the

amount or type of activity to reduce symptom-led behaviors (Antcliff et al., 2018).

**What the survey responses suggest.** Survey respondents defined pacing similarly and clinically focus on similar concepts such as finding a balance between activities, addressing habits and behaviors that influence pacing, and understanding signs and symptoms to make appropriate choices about activity level and need for modification. All clinicians seem to agree that the goal of activity pacing is to help children and adolescents with chronic pain do more each day in a gradual way to build consistency and confidence in functional abilities. Clinicians had responses and suggestions for metaphors and analogies to better explain or rationalize activity pacing. This is important to meet the needs of adolescents who may be of different ages or have various levels of insight. They also provided possible suggestions for educational materials, frequency of education, accountability techniques, and specific pacing techniques. This suggests that all clinicians have found techniques that are useful and that clinicians could utilize many different techniques to individualize for patients in the best way possible. For example, an older adolescent may do better with verbal learning and application-based practice while a younger adolescent may need handouts, bullet point education, and a consistent checklist.

Many providers reported that they felt pacing could be treated as both an energy conservation technique and a behavioral intervention which is supported by research as well (Jamieson-Lega et al., 2013; Antcliff et al., 2018). This supports that pacing can be a strategy discussed by many disciplines, not just psychology or just physical therapy and highlights the importance of the parent role in rehabilitation. Clinicians agreed that pacing can help individuals become more aware of how physical, mental, and emotional aspects (e.g. feelings, states of being) can and will impact function. Mindfulness can be achieved by being more aware of how one's body typically responds to certain events or types of activities, adjusting or modifying as needed, and continuing with expected or necessary tasks.

Providers agreed that when referencing pain management, or reduction of pain, as a goal it is

important to discuss that the goal of chronic pain treatment should first be to improve function before expecting pain to reduce or go away. If pain can be limited or if tasks can avoid exacerbation of pain unnecessarily they should (Tseng et al., 2014; Cane et al., 2016). For example, if a clinician knows that jumping typically increases headache pain then there should be a balance between not having an adolescent jump at all and making them jump until their headache is worse to desensitize them. An example of pacing would be to work on short intervals or smaller jumping tasks to build tolerance and stamina but while also allowing an adolescent to appropriately use coping strategies. Similar to what research shows (Birkholtz et al., 2004; Nielson et al., 2013; Antcliff et al., 2018), clinicians agreed that pacing can be both an intervention (e.g. planning ahead for activity, modifying, alternating type of activity) and a coping skill (e.g. problem-solving, assertive speaking, acceptance) simultaneously. This supports the interdisciplinary or multidisciplinary nature of many chronic pain programs nationally and internationally. If pacing is not a combination then an adolescent may plan ahead however if they aren't assertive and let family or friends know then they may be less successful with their attempted pacing. Similarly, if an adolescent uses problem-solving (i.e. writes down some ideas) but does not physically apply potential solutions (modifications) they will be less successful with pacing.

The survey received varied responses about the concept that pacing should include slowing down, stopping, or avoiding activities that cause pain even if they are safe to continue. This might be because of clinician training, background, or cultural beliefs; program or personal pain philosophy; or their definition of pain (acute vs. chronic vs. musculoskeletal). It has similarly been found that some researchers, providers, families, and children also feel that pacing is solely listening to or responding to pain by stopping activities and not returning to them. In Nielson et al. (2013), they reported that observed pacing behaviors often included slowing down, stopping activity, or avoiding activity. Research has shown that pacing solely done to reduce pain may obtain the same results as avoidance behavior, therefore, advocating

for a more functional approach of pacing which would include variables that can influence pain (McCracken & Samuel, 2007; Cane et al., 2016; Cane et al., 2018). Recommendations for pacing should move away from symptom-related strategies and closer to the amount or type of activity to reduce symptom-led behaviors (Antcliff et al., 2018). For the amount of activity, you could change the total time or amount of repetitions being completed before taking a break. Specific to the type of activity this could take account of positioning (e.g. sitting vs. standing, laying on belly vs. back), environment (school vs. home or with friends vs. without friends), or intensity of activity type (low impact vs. high impact). For example, if laying prone increases abdominal pain then avoidance of prone positioning altogether is not as appropriate of a recommendation compared to having the individual modify with a pillow under their abdomen or completing tasks for shorter intervals. Similarly, if weight bearing through a leg with pain is avoided then function cannot improve, and pain and deconditioning will increase. Therefore, it is better to work on lower-impact tasks, short intervals of weight-bearing, and the use of modified positions to improve function. Pacing with a focus on reducing activity level has been associated with worsened outcomes whereas pacing to achieve a more consistent activity level was associated with more positive outcomes (Antcliff et al., 2017) and those that effectively utilize activity pacing proactively tend to have lower levels of activity avoidance and improved functioning (Cane et al., 2016; Cane et al., 2018).

***Tying it together with pace breaks.*** One of the goals of this article is in part to inform and educate clinicians on other ways to clinically apply activity-pacing concepts in a way that is supported by research. A pace break using the step-by-step guide of S.T.A.R (Stop, Think, Act, Resume) aids in helping adolescents to be more mindful during downtime to plan for current and future activities. This concept can be used by adolescents, their families, support system, and other providers. Pace breaks were created based on clinical discussions regarding consistent ways to incorporate multidisciplinary concepts and improve patient functioning despite pain. While clinicians often use

different terms and strategies they can all be incorporated as part of a pace break to streamline clinical care and improve patient understanding. Providers have similar aims for patients to be more proactive and mindful about functional activities. It is clinically supported by observations and reports that an adolescent can equally overdo it from prolonged time spent completing both active (exercise, walking, standing) and passive (reading, crafts, homework) activities. Pace breaks using the S.T.A.R step-by-step guide can be viewed in Table 5 and incorporate concepts from evidence-based practice as described here. Although to date there is no evidence for this approach, the purpose of this article is to introduce it as a potential clinical tool that incorporates key concepts from evidence-based practice such as the importance of mindfulness and self-management (Shepherd, 2001; Nijs et al. 2009).

In a systematic review by Jamieson-Lega et al. (2013) regarding pacing with chronic pain, it was consistently found that an individual must be actively involved in the process of pacing. Pacing requires attention over time and requires one to learn how to balance activities (passive and active) to self-manage. Additionally, theoretical agreement from survey respondents is similarly reflected by using pace breaks. This includes that clinicians agreed pacing is multidimensional and should include both physical and psychological components to improve functioning, conserve energy, and manage pain. As previous research has proposed, at times attempts at pacing can be more reflective of behavior. Pace breaks using the S.T.A.R method help individuals to make choices that will facilitate less avoidant behavior and more proactive pacing behavior (Cane et al., 2004; Cane et al., 2018).

The concept of taking a pace break helps to develop an improved understanding and awareness of one's body, identify the fear that might be present regarding continued activity, and in theory reduce tension or guarding when completing physical activities as they will have planned and paced appropriately (Birkholtz et al., 2004). Previous research has also found that activity avoidance is associated with low levels of physical activity and higher levels of physical disability (McCracken & Samuel, 2007). The concept of pace

Table 5

## Detailed outline to teach pace breaks using the S.T.A.R Method

<i>S</i> = Stop	<i>S</i> is a reminder to stop what they are doing. If they are doing an active skill then they should sit down to take a break and if they have been doing a more passive activity then they should stand up, adjust posture, or change positioning if possible.
<i>T</i> = Think	<i>T</i> is to think about physical, mental, and/or emotional feelings that might be occurring and how they might impact functioning. Many of our patients struggle to simply identify how they are feeling however this is an important step. Then they can begin to think about how, for example, pain, soreness, muscle fatigue, anxiety, frustration, and depression might impact their next activity or plan for the day. For example, they may identify they are sore, experiencing an unfamiliar discomfort, and feeling frustrated. They also need to be able to choose how soreness might impact their ability to complete the rest of their exercises or how this unfamiliar pain might increase anxiety and cause them to decrease physical activity.
<i>A</i> = Act or Ask	<i>A</i> is to act or ask. In this step they should use learned skills and apply them in order to neutralize or impact the aspects they identified during the <i>T</i> step. For example, they need to know that hydration and stretching can help relieve muscle soreness or that coping thoughts are a helpful skill to deal with feeling frustrated. If they don't know what to do, then they should identify individuals they can ask for help. In the program it may be staff they are working with, in the evenings it may be looking to peers or family members, and at school maybe it's a specific teacher or counselor.
<i>R</i> = Resume	<i>R</i> is to resume or return to activity. We often discuss that this can be a return to the same activity they had previously been doing, a modified version of the same activity, or transitioning to a different type of activity (passive to active or active to passive). We focus on return to functioning and what that does or doesn't look like. For example, transitioning from working on math homework to going for a walk is appropriate however transitioning from math homework to a nap or lying in bed is not necessarily appropriate.

break and the use of the S.T.A.R method may improve mindfulness with breaks and encourage one to stop, think about barriers, attempt to resolve barriers and return to activity. This over time, even with activity modification, should result in improved functioning. The anticipated clinical impact of using pace breaks includes adolescents being able to complete activities they did not anticipate they would be able to do, being active for longer intervals than anticipated, and/or being more comfortable with physical activity and age-appropriate functional mobility.

**Limitations.** There are a few limitations to this study to report. The first is that the response level from the surveys was relatively low and the responses received may not represent the opinion of all pediatric pain specific physical therapists. There were no responses received from occupational therapists or associated disciplines. Also, pace breaks and the S.T.A.R method were not proposed

to the survey respondents to gain feedback at this time. While the survey did allow for some open-ended responses it cannot be used to complete qualitative analysis, only categorization of responses as appropriate.

**Future research.** This article points to several areas for future research. Future research should include a larger group of responses from clinicians and may benefit if structured as qualitative research. This would allow researchers to capture how well providers felt specific strategies worked and how effective or ineffective they were. Due to the varied responses specific to pacing including stopping or avoiding activities that cause pain, it would be beneficial and interesting to gain more information specific to this from clinicians. This might include more open-ended responses or rationale, sharing of literature, or collecting examples of pacing concepts from other providers that regularly treat chronic pain conditions. Additionally, responses or

feedback from adolescents specific to pacing intervention, would help providers gain insight regarding the impact of strategies and recall from different strategies. It may also be beneficial to capture more objective data on an adolescent's response to pacing intervention and education to further validate suggested strategies. Lastly, research on the usefulness of suggested or recommended pacing concepts outlined in this paper (such as pace breaks or the S.T.A.R method) would help future providers and patients.

### Clinical relevance

The primary goal of this article was to explore and clarify activity pacing specific to pediatric chronic pain. This included looking at how clinicians define pacing, key concepts of pacing, and explore potential applications of pacing concepts in treatment. In part, this article did meet the aims and hopes to guide future treatment and clinical application of pacing. Pacing seems to be an important aspect of chronic pain rehabilitation as it allows adolescents and their family members to gain insight about improving function and better managing daily activities. Clinicians should identify potential strategies and application techniques outlined from research and survey responses to trial with future patients to improve day-to-day

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functioning. The use of metaphors serves to explain the importance of being more mindful and consistent with activity in different ways. Clinicians should be encouraged to generate other metaphors or analogies that might work well to explain activity pacing to their client base. The survey responses highlight that clinicians can have different methods of defining, applying, teaching, and utilizing pacing while still finding success and promoting improved functioning. For example, the Butler and Moseley twin peaks model may just been introduced to a clinician as a possible metaphor or technique to explain activity pacing and pain (Moseley & Butler, 2017). This article, and future research that stems from it, is aimed to allow clinicians to share and provide feedback with one another to promote better patient care.

This article highlights key information regarding how we clinically define and apply activity pacing and energy conservation specific to chronic pain. It also provides other clinicians with new and different educational concepts, methods, and metaphors that they may try in their treatment setting that have been found useful by experienced chronic pain providers. Lastly, this information points to future, valuable areas of research specific to chronic pain treatment and activity pacing.

### Acknowledgements

The author would like to thank Rebecca Fechner, Andrew Gorrie, Guilia Mesaroli, Julie Shulman, Emma Rheel, and Thomas Young for participating in the survey and sharing their amazing knowledge and experience included in this article.

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