Lessons from the Hockey Rink:
Sport and Self-Regulation in the Classroom

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Abstract
This thesis discusses the knowledge the author gained through her own lived autoethnographic experiences playing hockey, interpreted through research-based evidence, to show how sport and exercise can impact students’ self-regulation skill development. Self-regulation skills are predictable and vital components to being successful in the classroom and later in life. Many special needs students in classrooms today are being diagnosed with disorders that often include a description of poor self-regulation skills such as AD/HD. The earlier children are involved in sports and learn different types of self-regulatory skills, potentially the more success they will have in life. Looking at the aspects of fitness, mental health, habit formation, life lessons, and social skills the author suggests strategies that educators can use in their classrooms to foster the development of self-regulation and advocates for getting children involved in organized sports outside of the classroom.
# Table of Contents

Abstract......................................................................................................................... 2

Table of Contents........................................................................................................... 3

**CHAPTER 1** Introduction.............................................................................................. 5

**CHAPTER 2** Method and Purpose.............................................................................. 9
    Autoethnography as Method and Methodology.......................................................... 9
    Purpose.................................................................................................................. 13

**CHAPTER 3** First Period: Fitness and Mental Health .............................................. 14
    Self-Regulation Defined......................................................................................... 17
    Attention Deficit/Hyperactivity Disorder.............................................................. 20
    Exercise, Sport, and Learning.............................................................................. 25
    AD/HD and Exercise............................................................................................ 27

**CHAPTER 4** Second Period: Life Lessons and Social Skills ................................... 29
    Historical Roots of Self-Regulation..................................................................... 32
    Components of Self-Regulation.......................................................................... 33
    AD/HD and Social Skills..................................................................................... 39

**CHAPTER 5** Third Period: Habits and Failure.......................................................... 40
    Self-Regulation as a Predictor............................................................................ 46
    Self-Regulation Failure....................................................................................... 54
    AD/HD and Sport................................................................................................. 57

**CHAPTER 6** Bridging Gaps: The Rink to the Classroom.......................................... 58
    Discussion............................................................................................................ 58
    Self-Regulation in Schools................................................................................ 58
SPORT AND SELF-REGULATION

AD/HD and Exercise................................................................. 60

An Imagined Classroom.......................................................... 62

CHAPTER 7 Conclusion.............................................................. 65

References.................................................................................. 69
CHAPTER 1 Introduction

After all of these years, it's that smell, the bittersweet scent of the ice shrouded in early-morning practice fog that takes me away to another time, where stories have carved their edges into my memories...

I have been involved in organized sports my entire life, both as a participant and as a coach. As a young child at the age of three I was strapping on the ‘ol two planksers as a budding ski racer, I was tumbling around as an experimental gymnast, I was twirling my way across the ballet stage, I was doggy paddling around the swimming pool, and I was swinging my hardest at softball. In my middle years I took up competitive figure skating, pursued an elite ice hockey career, continued with various dance forms including tap, jazz, and hip-hop, I tried my hand at volleyball, moved on to baseball, started running, and traded in my skis for a snowboard. As an adult I have continued to pursue my love of ice hockey, snowboarding, and running, I participated in a brief stint of lacrosse, I take spin and TRX (total body resistance exercise) classes, I have done some yoga and pilates, and I started Taekwondo and boxing.

Early on, my parents instilled in me an appreciation for sport and exercise and I developed a respect for the significance they brought to my life. I knew they made me feel good. No matter how badly I wanted to stay curled up in my bunk bed during those dark and rainy January mornings, I always peeled myself awake when I heard the tennis ball bouncing off of my window to go to early-morning hockey practice (my parents were divorced and it was my dad’s form of a wake-up call when he came to pick me up) because of the way I knew I was going to feel afterwards - invigorated and calm. I loved the feeling of being “worked-out” mentally, feeling utterly exhausted, but in the most energetic kind of way. Knowing that I had cleared my
SPORT AND SELF-REGULATION

mind and had gotten my dose of endorphins, my natural happy pill, always put a smile on my rosy face as I headed off to school. I knew sports made me look good. I was proud to show off my defined arms and legs in gym class, even if muscles were for boys. I knew the hours of bag skates and line drills that had gone into developing and maintaining my toned physique. But it wasn’t until later in life that I started to wonder about the underlying reasons why sports are so beneficial for the mind and body. In conversations with friends and family I often cite my involvement in sports as a major contributor to such things as my sense of self-confidence, my healthy attitude toward food and body image, my leadership skills, my cooperation skills, and my ability to manage stress. I have always championed the value of sport to help children and adults maintain healthy physical and mental states.

During my undergrad degree in special education I was introduced to the idea of self-regulation and began to understand the underlying brain science behind executive functioning related to self-control. This resonated with me as a teacher because I was seeing many students struggling with self-regulation in the classroom: The grade 2 boy who broke down in uncontrollable sobs every time he didn’t get his way; the grade 5 girl who curled up in the fetal position under the table at the back of the room every time she was asked a question; the boys in a grade 7 class that would “RUN!” everywhere they went; the grade 12 students who would be late for every morning class and fall asleep in their last block. As I learned more about different disabilities in special education such as autism, fetal alcohol spectrum disorder, sensory integration processing disorder, and behavioural/emotional designations, it became clear that there was an underlying theme of poor self-regulation skills – “the ability to manage one’s own energy states, emotions, behaviours and attention, in ways that are socially acceptable and help achieve positive goals” (Shanker, n.d.a, Basic Concept – Self-regulation section, para. 1).
SPORT AND SELF-REGULATION

I had read about and was drawn to different strategies educators could use in the classroom to help students develop better self-regulation: the use of fidget tools for the student who needs to focus more; a wiggle seat for the student who just needs to move in order to learn; body breaks for the students that need to get up and move to stay awake; the stationary bike at the back of the class for the child that needs to expend some extra energy in order to pay attention to the lesson. These concepts, all of which involved movement, just made sense to me, especially realizing how many bodily-kinesthetic learners we have in our classrooms today. Hoerr, Boggeman, Wallach, & School (2010) refer to the bodily-kinesthetic learner as anyone who “demonstrates a tendency to use the body to communicate, respond, or understand in a given situation” (p. 77). Howard Gardner, a leading researcher in multiple intelligence, argues that these types of learners enjoy learning by doing as they can use their tactile senses and fine and gross motor movement as part of the learning process (Hoerr et al, 2010). Gardner also notes that he thinks bodily-kinesthetic intelligence seems to be the most underappreciated intelligence in our schools and that many teachers overlook the value of physical activity which is innate to most children. I implemented some of these ideas in my classroom and saw a noticeable increase in attention, motivation, and self-control, not only for the students with a diagnosis, but for all students. It seemed to me that there was an evident link between movement, self-regulation, and learning.

During my master degree in special education I saw a video of a presentation by Shanker on self-regulation (TVOParents.com, 2010). In the video he mentioned the recent research happening, notably by Ratey (Ratey & Hagerman, 2008), on the impacts of sport and exercise on self-regulation. I then realized that I had access to the science to explain what I had always known to be true through my own experiences with sport. I began to think back on the different
SPORT AND SELF-REGULATION

experiences I have had through sport and exercise and how they impacted the development of my own self-regulation skills and how that connected to my success as a student in the classroom. I wondered about the large scale implications: could improving self-regulation through sport help many of the special needs students in our schools to improve their performance academically, lessen their dependence on medication, build their capacity for self-determination, and foster better social relationships with teachers, friends, and parents? Through this thesis it is my aim to spread the word about the benefits of enrolling children in sports outside of school time as well as strategies that educators can use in the classroom to help foster good self-regulation skills for today’s learners, especially those students with a diagnosis involving poor self-regulation skills such as ADHD. Some of the benefits of sport and exercise for children as I see them include;

1. Fitness: Coordination, endurance, flexibility, strength, good nutrition, and sleep.
2. Mental health: Stress management, emotional control, focus, confidence, feeling accepted, good self-esteem, and healthy body image.
3. Habits: Time management, goal setting, planning, reflection, and balance of school and sports.
4. Life Lessons: Strong work ethic, discipline, persistence, seeing success through hard work, how to be a humble winner and gracious loser, dedication to a positive activity can keep you out of trouble, employability skills, courage, sense of purpose, sense of belonging, and performance under pressure.
5. Social Skills: Interpersonal skills, working with different types of people, accepting differences, respect for others, celebrating others success, team-work, trusting others, motivating others, leadership skills, and patience.
As I look at the list I compiled I feel grateful for all of the opportunities I have had to be involved in sports throughout my life. Looking back on my sporting history, I can attribute the list of characteristics named above most strongly to my experiences with ice hockey. My involvement with ice hockey has spanned the length of my lifetime and I am proud of the characteristics I have come to possess because of my involvement. I believe the sport helped me develop healthy self-regulatory skills and has contributed significantly to the successful person I am today. My experiences led me to wonder how similar activities in sport might be applied in education to support students with self-regulatory issues, particularly those arising in connection with disorders such as Attention Deficit Hyperactivity Disorder (ADHD). Thus, the research question I explore in this thesis is: How can my insights about self-regulation through my involvement in sports inform my understanding of the impact that sport can have on students’ self-regulation in the classroom?

I have embraced the process of reflective thinking during my Master of Education classes as an opportunity to empower my own voice through the invocation of autoethnography as a powerful research method. Using the culture of ice hockey as a template for my paper, I write from my arena of memories and use first person reflective stories to show a new way of knowing. In this thesis I will first provide an overview of autoethnography, the method I used to explore my question, and then tell stories from the rink that will be intertwined with literature on self-regulation, ADHD, and exercise to offer insights on the value of hockey and other sports in education.

CHAPTER 2 Method and Purpose

Autoethnography as Method and Methodology
SPORT AND SELF-REGULATION

This thesis shows how I, as a sport participant, have been shaped by my lived experiences, identifies the skills that I have gained from them, and provides an opportunity to write this knowledge into our scholarly space through the methodology of autoethnography. Rooted in the epistemological grounding of social constructionism, autoethnography is a self-reflexive genre of writing and research that unveils the multiple layers of consciousness and understanding through lived experiences.

According to Ellis, Adams, & Bochner (2010), the following is true of autoethnography: An autoethnography is an approach to research and writing that seeks to describe and systematically analyze personal experience in order to understand cultural experience. This approach challenges canonical ways of doing research and representing others and treats research as a political, socially-just and socially-conscious act. A researcher uses tenets of autobiography and ethnography to do and write autoethnography. Thus, as a method, autoethnography is both process and product. (p. 1).

Throughout this thesis I will describe and interpret my experiences with sports, in particular ice hockey, through the lens of research in the field of self-regulation.

Popovic (2010) offers the following comment on autoethnographies:

Stories of lived experience offer glimpses into the values, meanings, relationships, beliefs, and practices entailed in a particular culture, allowing the reader to witness an embodied, subjective interpretation with intimate details that touch readers where they live. They offer the opportunity to contribute to the ongoing scholarly conversation about the multiplicity of experiences in life by relating the personal to the cultural in ways that guide the reader through the process of understanding, wherein the process of the journey is the destination. (p. 5).
I believe that my lived experiences at the hockey rink serve as valuable knowledge sources and can offer insight to the field of special education with regards to self-regulation.

Autoethnography is a relatively new methodology within the field of education. As a research framework, autoethnography derives from numerous scholarly traditions including feminism, post-modernism, post-structuralism, post-colonialism, and indigenous knowledge. Autoethnographic researchers challenge traditional ways of knowledge transmission by placing themselves in the research, bridging the gap between academic and every day. Although this can be intimidating at times and one may call into question their own worthiness as a source of study, I feel as though I have personal value to contribute to the field of self-regulation and deserve to share my knowledge through story.

In my reading about autoethnographies (Ellis et al, 2010; Popovic, 2010; Ellis & Bochner, 2000; Frank, 1995; Chambers, 2004), it was revealed that there is a call to create more analytic autoethnographic works. The argument has been made, however, that to look at a story for analysis could alter the language that effectively transmits meaning and the essence of the story (Frank, 1995). I believe that a personal story must be told in an individual way that allows the storyteller’s voice to be heard and that because an autoethnographic researcher is interpreting their own story they can and should uphold the essence of the story. They have control to pull from it what they will without smothering the spirit of the story or allowing someone else to interpret their story in an incorrect or less meaningful way in the quest for rigor, generalization, or transferability.

Popovic (2010) found that those who are critical of autoethnographic research consider it narcissistic, navel-gazing, self-indulgent, and solipsistic. However, she also points out that many dismiss their claims of illegitimate or lesser-than research as unproductive, possessing limited
SPORT AND SELF-REGULATION

foresight into the potential for autoethnographic texts to expand understanding and knowledge. Ellis & Bochner (2000) suggest that it's self-absorbed to pretend that you are somehow outside of what you study and not impacted by the same forces as others. I have spent my entire life building intuitive knowledge about the benefits of sport and I want to take this opportunity to explore and extend my feelings through story and research.

The process of writing from my arena of memories was a challenging task. As I sat down to write I found I kept pressuring myself to tell the “right” story or think of a story that fit my research. It took time for me to allow myself to let go of that constraint and simply write what came to me. I had to give myself permission to be the research subject and value my own stories for the insight they held. For the purposes of maintaining confidentiality some parts of my stories are fictionalized or identifiable details have been left out. My frustration with fictionalizing stories, however, is echoed by Chambers (2004) in her comments about narratives that make use of fictional characters or events in the interest of maintaining confidentiality don’t honour the method of autoethnography. Eventually it became enjoyable to reminisce about my sporting experiences and I came to appreciate the insights they could bring. I found it difficult to separate my layered accounts from my analysis and research, however, and found myself wanting to interject my reasoning and insight into my stories before they were complete.

Once I was satisfied with the stories I had written I decided on a framework to present them. I divided the autoethnographic writing of this paper into three main sections that demonstrate the main benefits of sport as I see them. Section one, first period, looks at my experience with exercise and sport as well as relevant research involving the overarching themes of fitness and mental health. Section two, second period, deals with the themes of life lessons
and social skills, while section three, third period, looks at a fifth benefit, habits, as well as what can happens when self-regulation failure occurs.

As suggested by Chambers in her 2004 work, “Research That Matters: Finding a Path With Heart,” I believe that autoethnographic research has a place in scholarly research and that much understanding can be gained from hearing people’s experience and truth through story. In this thesis I am following my path with heart and sharing my experiential knowledge through stories with connections to research in the field. Although this nominalist, qualitative research method has limitations of being subjective and not generalizable, it also offers a resonating and confirmable look into one person’s actuality. The knowledge gained from my autoethnography and the findings from my research will serve me as an educator, my students, my colleagues, and the field of special education. I can personally use the inherent knowledge I have of sport and self-regulation combined with the research I found to plan lessons, help students, and offer suggestions to colleagues and parents. At the end of this paper I give examples of an imagined classroom and school where I suggest different ideas and strategies based on personal and research-based evidence that could be used within a classroom setting to foster good self-regulation skills for students of all ages.

Purpose

The purpose of autoethnographic methodology is to write meaningfully and evocatively on topics that contribute to an understanding of self and/or an aspect of life within a particular cultural context. The narrative approach embodies the assumption that people make sense of lived experiences and themselves through the stories they create. My reflexive narrative thesis is an embodied autoethnography of lived experiences in ice hockey and sport. I reflect back on moments of personal development and I discuss the complexities of participation in sport,
SPORT AND SELF-REGULATION

bringing voice to my experiences, interpretations, and perceptions within the dynamics of various hockey subcultures. I look at how those experiences contributed to the development of my self-regulation skills and use those reflections to consider how my experiences can contribute to the growing knowledge about the impact of sport on self-regulation in students with special needs.

We can talk about the self-regulation of a family, a classroom, a school, a community, even a society, but for the purposes of this paper I will look at the level of the child. I believe that knowledge about how sport can impact self-regulation is important because self-regulation skills are vital components to being successful in the classroom and later in life. Shanker (2010) suggests that self-control, an important element of self-regulation, is more important than IQ in determining school success. I believe that the earlier children are involved in sports and learn different types of self-regulatory skills, the more success they will have in the classroom and past their school years. Many special needs students in our classrooms are being diagnosed with disorders that often include a description of poor self-regulation skills. I hope that enhancing self-regulation skills through sport will help students with special needs stay in the regular classroom longer and with greater success.

CHAPTER 3 First Period: Fitness and Mental Health

Just like my fear of public speaking, I never liked being put on the spot in front of a crowd in hockey, but every now and then I would be called upon to take a penalty shot, be picked for a shootout, or have the opportunity for a breakaway. Even now as I think back on these times I get a flood of nerves and feel that crushing self-doubt setting in. I’ve just never felt comfortable having all the attention on me and everyone
relying on me to pull off a goal or a win. But, as a teammate, it’s just what you do. You swallow your fear, step up, and try your hardest not to embarrass yourself. “Fake it until you make,” it became my personal motto, not just in hockey, but in life too. Convince yourself and you just might convince others as well.

A million thoughts were running through my head as I crossed the red line and was streaming over their blue line. This chance comes maybe once a game, the chance to score on a breakaway. I crave it and loathe it at the same time. I’m supposed to want this chance to break free from the opposing team and have mere seconds to compose myself before taking my best shot unimpeded by defensemen. But the pressure makes it a terrifying proposition to me. I’m a strong skater so these chances come to me more often than some others, but they never get any more comfortable. Everyone else is always very excited about them and loves to recap the play by play afterwards.

I have to ignore the burning sensation mounting in my legs as I race faster and faster towards the other team’s goalie with five dark jerseys hot on my pursuit. Maybe it’s the primal fear of being chased that doesn’t sit well with me. You never quite know who’s behind you or how far behind. Are they going to catch up? Are they going to trip me? Should I veer left or right? Just don’t slow down. I have to drown out the
indecipherable yelling coming from players and coaches on both benches. I have to stifle the explosion of noise from the crowd when they realize what’s happening. I can hear my dad’s voice in my head telling me I need to get mad in order to play well. *Just focus.* I can hear blades chopping at the ice behind me. I have to ignore the hazy image of my mom standing behind the goalie, jumping up and down with excitement and yelling into the glass. My mom always mentioned how I looked like I needed to stick a firecracker up my butt when I skated because I always looked so nonchalant. It must be my long figure skating strides. *I’m busting my ass here, Mom, trust me.* I have to look through my black cage and past the goalie’s huge mound of hockey gear standing in my way of a goal and a celebration. I look down to make sure the puck is still on my stick. *That would be embarrassing.* Just look at the net. Picture the puck in the net, the mesh rippling. In the micro seconds that pass I have to forget about my pursuers and come up with a plan to get said puck into the net. *Should I shoot now? Should I wait until I’m closer? Should I attempt a deke, a fake, a slap shot? I’m no good at those. Just stick with a classic wrist shot.* *Should I use a forehand shot or try my backhand? No, my backhand is weak.* But then again, I could use it to pull the goalie across the net and open up some more space. *Will I have time for that? Stop thinking so much and just*
shoot. What is the goalie going to do? Will they stay standing or will they go down?

They’re left handed so maybe I should stay right. You’re running out of space. Aiming never was my strong suit. Just shoot!

As I blow past the net and slam on my brakes before I crash into the glass I watch the puck go sailing by the goalie in slow motion and get caught in the netting. It’s in. I scored! It always makes me laugh what a surprise and a relief it is to score. I haven’t let anyone down. I seized the opportunity. My teammates catch up and surround me with hugs and high fives that I meekly accept. The crowd lets out their joyous whoops and hollers. I can see my mom grinning from ear to ear, clapping her hardest. I am filled with a sense of pride and accomplishment, but I know to keep my excitement in check because this scenario doesn’t always end the same way. I quickly skate back to the bench without much celebration and receive a few pats on the back before grabbing a big gulp of water, taking a long calming breath, and settling in for my next shift.

Self-Regulation Defined

Stuart Shanker, a leading researcher in the field of self regulation and with The Canadian Self-Regulation Initiative, defines self-regulation as, “the ability to manage your own energy states, emotions, behaviours and attention, in ways that are socially acceptable and help achieve positive goals, such as maintaining good relationships, learning and maintaining wellbeing”
SPORT AND SELF-REGULATION

(Shanker, n.d.a, Basic Concept – Self-regulation section, para. 1). Shanker argues that the better a child can stay calmly focused and alert, the better he integrates the diverse information coming in from his different senses, assimilates it, and sequences his thoughts and actions (Shanker, 2010). Effortful control (e.g., being able to inhibit one’s impulses or ignore distractions) is a critical element of self-regulation. Throughout my hockey career I have encountered many instances that have tested my self-regulation abilities and effortful control while needing to perform under pressure. Reflecting on these times, such as seizing the opportunity for a breakaway, I can see how they all added up to help me deal with pressure and stress in healthy ways. Instead of letting my nerves get the best of me and freaking out, crying, or running from the situation, I learned to manage my emotions and focus on the task at hand. As seen in the previous story, sometimes it was a deep breathing technique that slowed my beating heart, or the use of a visualization strategy that let me walk myself through an intimidating situation. I used visualization to see the puck going in the net and self-talk to walk me through the decision making process to a positive end. Positive self-talk played a large role in my success in these types of stressful situations and it’s something I still do to this day whenever I start to doubt myself and feel a downpour of negative thoughts coming my way.

Shanker (n.d.a) proposes that the ability to self-regulate is a result of a combination of five factors:

1. Biology (Temperament)
2. Emotion-regulation
3. Cognitive factors: display of effortful control, ability to sustain attention, ability to not be easily distracted, attention switching, ability to transition between tasks, ability to inhibit impulses, ability to deal with frustration, ability to delay
SPORT AND SELF-REGULATION

4. Social: ability to develop and use socially-desirable behaviours

5. Moral: the development of empathy and values

Similarly, Baumeister and Vohs (2004), offer five distinct definitions of self-regulation as reflected in different disciplines:

1. Temperament: The ability to attain, maintain and change one’s level of arousal appropriately for a task or situation.

2. Emotion development: The ability to control one’s emotions.

3. Cognitive development: The ability to formulate a goal, monitor goal-progress, adjust one’s behaviors.

4. Social development: The ability to manage social interactions, to co-regulate.

5. Educational theory: To be aware of one’s academic strengths and weaknesses, and have a repertoire of strategies to tackle day-to-day challenges of academic tasks

As demonstrated in the preceding story, ice hockey is a complicated, fast-paced game that requires great focus and coordination. It demands that each player exhibit skills outlined by Shanker, Baumeister and Vohs listed above. Each player must keep track of the time, listen to the coach, coordinate with teammates, follow instructions, make their own decisions in micro seconds, watch for the referees arms, follow the rules, look for the puck, avoid other players, make a plan for when they get the puck, ignore the crowd, ignore uncomfortable equipment, look through their cage, skate on ½ a cm of steel, change directions at a moments notice, hold a stick, pass, shoot, stop, start, turn, go faster, slow down, read and react, hit, be hit, know where the other players are, get to open ice, predict where the puck will go, look for a certain player to follow, get away from a certain player, change positions, get out of the play, get into the play, hydrate, remember and review a play, plan a play ahead, and more. Players must display effortful
SPORT AND SELF-REGULATION

control, the ability to sustain attention, the ability to not be easily distracted, attention switching, the ability to transition between tasks, the ability to inhibit impulses, the ability to deal with frustration, and the ability to delay. As seen in my story I was able to demonstrate effortful control and maintain a state of being calmly alert by silencing the auditory, visual, and tactile noise surrounding me to get the job done. I was able to focus my nervous energy and harness my emotions despite the pressure and stress. Over the years I have developed these skills through ice hockey and have transferred them to other parts of my life as well including other sports, my schoolwork, my career in the classroom, and my social life. Students with special needs and poor self-regulation skills require a venue to be able to work on such effortful control. Perhaps the hockey rink, somewhere safe and fun, is the perfect location to develop and practice such skills that they can then transfer to the classroom.

Baumeister and Vohs (2004) argue that each of the elements listed above influences all of the others and therefore self-regulation should be viewed through the model of dynamic systems theory which holds that the effect of any level is dependent on the rest of the system, making all factors potentially interdependent and mutually constraining. Self-regulation is both a bottom up and top down process, the ability to take in and process information and to manage arousal states, emotions, behavior, and thinking skills (Shanker, 2010). As you can see, self-regulation is obviously a complex process, much like the game of ice hockey, and is certainly necessary to be successful in school and everyday life. Those who have poor self-regulation skills need strategies to help themselves develop or improve such skills in order to see success and I argue that sport can offer one such avenue.

**Attention Deficit/Hyperactivity Disorder**
SPORT AND SELF-REGULATION

According to the British Columbia Ministry of Education website (2013b), “Attention-Deficit Hyperactivity Disorder (AD/HD) is a neurological disorder requiring a clinical diagnosis based on criteria outlined in The Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM IV)” (What is AD/DH section, para. 1). Students with AD/HD demonstrate “significant impairment related to inattention and/or hyperactivity and impulsivity compared to average children of the same age” (British Columbia Ministry of Education, 2013b, What is AD/DH section, para. 1). Ratey and Hagerman (2008) add that AD/HD “stems from a dysfunction of the brain’s attention system, a diffuse linkage of neurons that hitches together areas controlling arousal, motivation, reward, executive function, and movement” (p. 142). They go on to suggest that “the glitch in the attention system isn’t strictly a deficit – it’s more of an inability to direct attention or to focus on command” (p. 143).

In the story above I was experiencing a flood of thoughts as my breakaway began. My mind raced with contemplations throughout the experience and it was necessary for me to demonstrate my ability to show focus and attend to a particular task, scoring a goal on a breakaway, through the appropriate combination of executive functioning skills and movement. I successfully controlled my arousal state, used appropriate motivation, maintained composure under pressure, and silenced the overwhelming stimuli around me to accomplish my goal. The game of hockey teaches people to direct attention and focus on command, a skill that is necessary in so many different aspects of life. If students with AD/HD had an opportunity to practice such skills in a sporting environment from a young age perhaps they would develop appropriate skills that could be transferred back to the classroom.

The prevalence of AD/HD is estimated to be 3 - 5 % of the school-aged population in British Columbia (British Columbia Ministry of Education, 2013b). This means that the chances
are a regular classroom teacher will have at least one student with AD/HD in their classroom, and that student is more likely to be a boy. “Clinicians typically report that boys are referred for AD/HD assessment nine times more often than girls, while studies using a general population base indicate that the ratio of boys to girls with the disorder is closer to 3:1” (British Columbia Ministry of Education, 2013b, What is AD/HD section, para. 1). A multi-disciplinary team helps to make a diagnosis of AD/HD and looks at the following; life history and background of family members, including medical and psychiatric history; developmental history of the student, including birth history, developmental milestones, records of classroom-based and individual assessments that may be included in the student's permanent record folder at school and medical history; current physical examination to rule out other health concerns; information about a student's learning abilities and academic skills; ratings of the student's behaviour using standardized behaviour rating scales completed by parents and teachers (British Columbia Ministry of Education, 2013b).

The DSM IV outlines three types of AD/HD: 1. AD/HD Combined Type (most children and adolescents with AD/HD have the combined type); 2. AD/HD Predominantly Inattentive Type; 3. AD/HD Predominantly Hyperactive - Impulsive Type (British Columbia Ministry of Education, 2013b). Inattention is always part of the diagnosis, but hyperactivity is only sometimes present, and more often in children and specifically boys (Ratey & Hagerman, 2008). Common symptoms shown by students with hyperactivity include fidgeting with hands or feet, squirming in seat, picking at themselves, shaking their legs, doodling, leaving seat in classroom or in other situations in which remaining seated is expected, running about or climbing excessively in situations in which it is inappropriate, feelings of restlessness, having difficulty playing or engaging in leisure activities quietly, often being on the go or acting as if
SPORT AND SELF-REGULATION

driven by a motor, and talking excessively and quickly (British Columbia Ministry of Education, 2013b; Ratey & Hagerman, 2008). Symptoms of impulsivity may include blurting out answers before questions have been completed, having difficulty waiting turn, and interrupting or intruding on others, e.g., butting into conversations or games, overreacting, being quick to anger, not liking playing alone, missing social cues, and distractibility (British Columbia Ministry of Education, 2013b; Ratey & Hagerman, 2008).

Teachers may recognize many of these behaviours in their students and recognize that these are the students that need physical stimulation more regularly than others in order to focus and be productive. As seen in the earlier story, the game of ice hockey offers a venue where children are required to complete certain physical tasks very quickly while paying attention to an abundance of stimuli. Players often don’t have the option of exhibiting the characteristics listed above because they are required to attend to and complete a certain task within a short time frame, thus minimizing the opportunity for off-task behaviours. Their fidgeting hands now have a stick and puck to focus on, their legs are busy pumping out strides, they have a focal point, the puck, to watch closely, they can be loud and call to their teammates, and their motor can run at full speed and be rewarded for it. Hockey is a fast paced, read and react game that gives the players reason to harness their hyperactivity and impulsivity in productive ways.

AD/HD is a life-long diagnosis that follows children into adulthood. While some self-control comes with maturity, adults with AD/HD still have to learn to manage their impulses to be appropriately productive in society. Adults with AD/HD often cite having hatred for authority, low self-esteem stemming from chronic failure, being driven by impulse, never having a chance to tap into positive aspects of their personalities, addiction to drugs as teenagers, and hair-trigger responses to frustration and violent episodes (Ratey & Hagerman, 2008). These symptoms are
very similar to the characteristics listed earlier in this paper for people with self-regulation difficulties. I advocate that sport be used as a life-long strategy to help children and adults manage their internal states effectively. Playing ice hockey requires that players demonstrate a respect for authority figures including referees and coaches. Players have an opportunity to develop good self-esteem through skill development that happens naturally and to experience positive rewards that come from hard work. Players can connect to others and develop positive common interests that keep them occupied and out of trouble. Players can manage their anger and frustrations through physical output that uses up excess energy. Players must utilize self-control and act in accordance with certain rules about violence and aggression or they will be punished by a clear set of rules.

Students with AD/HD often have other problems as well. Twenty to twenty-five percent of these students also have learning disabilities and the incidence of oppositional defiant disorder and conduct disorder is higher in students with AD/HD than in the general population (British Columbia Ministry of Education, 2013b). Some students with AD/HD have accompanying emotional disorders such as depression or anxiety and a small percentage of students with AD/HD also have Tourette's Syndrome (British Columbia Ministry of Education, 2013b). In addition, students with AD/HD often have difficulty with motor skills and coordination (British Columbia Ministry of Education, 2013b). Exercise and sport is good for the release of anger, dealing with anxiety and depression, and developing good motor skills and coordination. Students experiencing these symptoms can benefit greatly from being enrolled in sports from a young age.

Teachers and parents may recognize some or many of the symptoms of AD/HD in their students and children, but other conditions can also produce the same symptoms. Such
SPORT AND SELF-REGULATION

conditions can include some physical, some environmental, and some genetic (British Columbia Ministry of Education, 2013b). While it is possible for students with AD/HD to be affected by a number of other conditions, some children displaying these symptoms are doing so for reasons other than AD/HD, which is why a thorough screening must be done by a multi-disciplinary team including school staff, parents, and family doctor.

Exercise, Sport, and Learning

Of course exercise keeps us physically healthy, and that alone makes it worthy of our time, but my main interest in exercise as explored in this thesis lays in its benefits for the mind and the development of executive functioning skills or good self-regulation skills that can be utilized by students in the classroom. Recent advances in developmental neuroscience are dramatically altering attitudes towards the possibility of maximizing the educational potential of every child by focusing on how sport can impact self-regulation (Ratey & Hagerman, 2008). Most of us know that physical activity is a good way to let children “blow off steam” or “burn up excess energy,” but research shows that it goes much deeper than that. Ayan (2010) suggests that enrolling kids in exercise programs appears to help them excel academically and investigators are also revealing how exercise expands the mind by fostering the formation of new connections between brain cells.

My research on self-regulation pointed to processes involved in self-regulation that I view as processes involved in sports as well as those needed in the classroom: goal setting (Winne & Hadwin, 1998; Wolters, 1998), planning (Zimmerman, 2004; Zimmerman & Risemberg, 1997), self-motivation (Corno, 1993; Wolters, 2003; Zimmerman, 2004), attention control (Harnishferger, 1995; Kuhl, 1985; Winne, 1995), flexible use of learning strategies (van de Broek, Lorch, Linderholm, & Gustafson, 2001; Winne, 1995), self-monitoring (Butler & Winne, 1995; Carver & Scheier, 1990), appropriate help-seeking (Butler, 1998; Ryan, Pintrich, &
SPORT AND SELF-REGULATION

Midgley, 2001), and self-evaluation (Schraw & Moshman, 1995) (as cited in Roberts, Tadlock, & Zumbrunn, 2011). Many of these processes are seen in the above story where I had to set my goal to score, plan my shot, motivate myself to keep skating, focus my attention despite all of the distractions around me, and monitor my physical and mental actions. By thoughtfully constructing school programs involving daily sport and exercise programs perhaps these self-regulatory processes can be built deliberately into students’ learning experiences.

In his 2010 article, Ayan points to many studies that show a link between physical fitness and academic achievement. “Students who are fit—based on their high aerobic capacity and low body fat—also tend to perform well in school and on standardized tests” (Academic Athletes section, para. 1). I was able to maintain above average grades my entire school career throughout elementary school, high school, and university and am convinced that sports played a large role in that. I have always believed in the benefits of sport for learning because I experienced them and felt their absence when I wasn’t participating in sports, as you’ll read in a later story. Ayan (2010) further points out that “in addition to regular exercise, brief periods of movement such as jumping or stretching can help improve children’s concentration” (Academic Athletes section, para. 2), a main component of self-regulation. Different programs have been introduced to schools to capitalize on this, giving students brief interludes of movement breaks. I have used various programs with my own students as well as myself and can see the benefit they have immediately. After a quick 10 minute dance break or a couple of laps around the school the boy that was running around the room can sit still to finish his math and the girl who was staring into space can focus enough to complete her printing before the end of the lesson. When I’m in the middle of writing a long paper I consciously take breaks every couple of hours and go for a run or walk to stimulate my brain and find that I have much more focus afterwards.
To determine whether exercise has a direct effect on reasoning abilities, researchers have conducted intervention studies, in which they add athletics to children’s daily routines and assess the impact on learning, memory, and the ability to concentrate (Ayan, 2010). Many such studies reveal that additional athletic conditioning can boost test scores and school performance. Ayan (2010) suggests that “exercise may benefit academic performance primarily by sharpening a particular set of cognitive functions, many of which fall under the umbrella of executive function, the ability to plan and direct action” (Reading, Writing and Rugby section, para. 4). Such research offers hope to the idea that we can help students with poor self-regulation become better regulated through exercise and sport.

Tomporowski and Davis suggested in a 2007 study that “kids may have to cross a minimum threshold of exertion before they reap cognitive benefits from exercise,” and found that forty minutes of aerobic exercise, such as running and jumping rope, five days a week, was the minimum number (as cited in Ayan, 2010, Reading, Writing and Rugby section, para. 5). Ratey and Hagerman (2008) also suggest that getting your heart rate up and doing 30-40 minutes of exercise per day is the most beneficial. Ayan (2010) offers that “scientists do not yet know exactly how much or what kind of aerobic exercise—team sports, running or biking—most influences intellectual development,” but goes on to say that “in certain instances—those in which the exercise involved organized sports—practicing teamwork and game strategies might account for some of the effects of exercise on executive function” (Reading, Writing and Rugby section, para. 6). Ice hockey, which is an organized team sport with practices and games lasting an average of sixty minutes during which athletes work up a sweat exercising vigorously, fits the criteria above for the minimum threshold needed for duration and exertion.

**AD/HD and Exercise**
Children with ADHD are not lazy, stupid, or the products of bad parenting (Ratey & Hagerman, 2008). They will not grow out of it either, but they can learn to manage it. In 1990 Zametkin and colleagues from the National Institutes of Mental Health proved that AD/HD stems from a biological irregularity by using PET scans to measure brain activity (Ratey & Hagerman, 2008). They found that people with AD/HD showed 10% less brain activity than the control group in the prefrontal cortex, which is responsible for regulating behavior. “The prefrontal cortex organizes activity, both mental and physical, receiving input and issuing instructions” (Ratey & Hagerman, 2008, p. 41). The prefrontal cortex is responsible for working memory, inhibiting stimuli, initiating action, and all executive functions such as judging, planning, and predicting (Ratey & Hagerman, 2008). All of these skills are necessary to play the game of hockey and are skills that can be developed through practice and routine. From my detailed experience with breakaways it is clear that I had to access my prefrontal cortex in order to successfully score a goal. I had to demonstrate stimuli inhibition (the noise of the crowd, the feel of my equipment, the vision of my mom and the goalie), remember how to skate and shoot, remember my strengths and weaknesses, judge the other players and the situation around me, plan a shot, predict what the goalie was going to do, and carry out my plan. Sport is an exercise in the use of the prefrontal cortex and could greatly benefit those with AD/HD who exhibit limited functionality.

It turns out that the prefrontal cortex is also prone to positive reinforcement and exercise (Ratey & Hagerman, 2008). In patients with AD/HD part of the cerebellum, which is responsible for governing and refining movement, is smaller in volume and doesn’t function properly. There is a strong correlation between movement and attention so it makes sense that people with AD/HD perform better on attention tasks when they move at the same time and that they would
SPORT AND SELF-REGULATION

benefit from exercise and sport. When learning complex movements, like handling a puck, one must pay attention and learn the new movement at the same time, which engages and trains both the movement pathway and the attention pathway in the brain. Sport, in particular ice hockey, offers an appropriate venue for the development of self-regulation skills, skills that can be transferred back to the classroom.

CHAPTER 4 Second Period: Life Lessons and Social Skills

I’ve been involved in both individual and team sports my whole life. There’s some good character building that goes into having to rely on oneself and take full responsibility for whatever happens in an individual sport. But there’s something missing. The life lessons and social skills that can be developed playing a team sport cross over into so many different aspects of one’s life including family and work. I’m grateful that I was part of a bigger picture and always had a sense of belonging because of hockey. Part of my identity was my team name, my team jacket, and my team jersey. The logo on the front changed over the years as I progressed through elementary school, high school, university, and afterwards, but I was always able to adapt to my new situation, new teammates, new coaches, new rules, new environments, and new expectations because of the experiences I accumulated being involved in the game.

I would say that above all else the biggest challenge about joining a new team is navigating and understanding the social dynamics. You must quickly realize your place
SPORT AND SELF-REGULATION

and role, not step on any toes, but not sink into the background either. Some teams come with a long history of veterans and traditions to be learned while others are slapped together on a clean slate. When I was playing on any boys’ team I naturally took a back seat role and enjoyed the easygoing nature of my teammates. I appreciated their call-it-as-it-is nature and learned to take criticism with a grain of salt. I never liked to be the center of attention and was quite comfortable being a dutiful follower. When I played in a coed league I was amused with the relationship drama taking place around me. Girls were more worried about impressing their male teammates in the dressing room then actually learning the game. When I joined an all-women’s team for the first time I was a little taken aback by the seemingly non-stop drama that took place between teammates and teams. It appeared I had entered a world with a sordid past and had a lot of catching up to do in order to figure out whom my allegiances were supposed to lay with. For the most part I managed to steer clear of the social games being played around me no matter what team I was on. I’m a fairly laid back person and never wanted to get too involved.

This became a challenge for me every time I was voted captain or assistant captain of a team. The role seemed to come to me more often than not and sometimes it
SPORT AND SELF-REGULATION

was a blessing and sometimes a curse. The role comes with a great responsibility to manage people and personalities more so then to actually know anything about the game of hockey. Sure, I am a knowledgeable and capable player, something that added to my election, but it was usually my personality traits that got the votes. I was always the quiet type, leading by example rather than lengthy inspirational speeches. I reliably showed up on time, I responsibly performed my pre-game and on-ice duties, I played hard, and I dealt with problems rationally as they arose. I think my teammates and coaches appreciated my calm nature and respected the way I seemed to get along with everyone no matter what their age, gender, or background. I was a safe bet, never getting too excited or too angry. I had a way of managing my emotions that kept everyone else in check, hyping them up when they needed a boost or bringing them down if they were getting out of hand. I was able to effectively communicate with the referees or the other team’s coach if we had a disagreement or I had a question. I wasn’t afraid to call a teammate out when they deserved it or to mediate a situation between two arguing line mates. My coaches respected my opinion and often let me call the shots. I enjoyed celebrating others’ successes more than my own and never took all the credit for a goal or a win.
Being in a leadership role taught me humility, patience, and interpersonal skills. I wanted each person on the team to feel valued and heard. I was open to feedback and criticism without taking it personally. I welcomed change and progress if it made sense. I put my trust in others and tried to acknowledge the role that each person played on the team, big or small. Whoever brings the pucks to the game, washes the dirty jerseys, fills out the game sheets, or sends in the newspaper articles is just as important as the person who scores the goals. I have had doubters along the way who have tested my personal values and credentials as a team captain and I’ve certainly come across people I couldn’t seem to relate to at all. Having to apologize for their behavior every now and then was frustrating, but all part of the job. I’ve had to deal with these people patiently and with understanding. They haven’t always seen my ways or I theirs, but that’s ok. Just like in the real world the hockey rink is full of all kinds of different people who we have to learn to live with, work with, and give credit to in a respectful and kind way. We’re teammates after all and that’s a bond that means something. We have a common goal and a shared purpose, even if it doesn’t always seem so in the heat of the moment.

Historical Roots of Self-Regulation
Historically, social acceptance was crucial for survival. Zimmerman (2000) argues that self-regulation is important to human survival in that self-regulation is directly connected with the goal of social acceptance. Baumeister and Vohs (2007) point out that both survival and reproduction proved to be easier with social acceptance than when one faced social isolation. Humans, unlike other animals, get what they need from the social group more often than getting what they need directly from nature. Due to the heavy reliance on the social group, social acceptance, and therefore self-regulation, is crucial for success. Mental flexibility allows people to adjust to societal and situational demands that they encounter on a daily basis. Specifically, self-regulation places one’s social conscience over selfish impulses, allowing people to do what is right and not what they want to do (Baumeister & Bushman, 2008). As seen in the preceding story I learned to put my team’s best interests before my own through my involvement with team sports. Team sports require that teammates learn to demonstrate a kind of selflessness and learn to accept that they are part of a bigger picture, one piece of the puzzle, and that they cannot be the center of attention all the time. Each teammate has a role to play and is essential for the full functionality of the team. Just as I had to learn what my role was on each new team I joined so do students have to learn to navigate the social dynamics of their classrooms and the playground. For students with poor self-regulation skills this can be a very difficult task. As later suggested by Ratey and Hagerman (2008), team sports can offer these students a venue for learning interpersonal skills that can serve them in many areas of their lives.

Components of Self-Regulation

Self-regulation has typically been divided into three main components: standards, monitoring, and strength. However, recent research now recognizes a fourth component: motivation (Baumeister & Vohs, 2007). Baumeister & Bushman (2008) offer that the change
SPORT AND SELF-REGULATION

that the individual makes in one’s behavior is often based on some ideal, goal or demand that he or she interprets from society or from oneself and that change often occurs when people feel as though they do not measure up to these standards. Baumeister & Vohs (2007) suggest that effective self-regulation requires these standards to be clear and that when standards are conflicting or ambiguous self-regulation is proven to be very difficult.

In a team sport there is often one goal, to win the game. In order to reach that goal a set of smaller goals must be achieved along the way. In ice hockey each player has a specific position and must complete a specific task each shift and throughout the game in order to fulfill their role. These are clearly defined and usually agreed upon by the team as a whole. There is little room for conflicting ideas or ambiguous self-regulation since all players have agreed to a standard set of rules and expectations. In the story above I outline how I learned to navigate the social dynamics of my teams and learned to recognize what my role should be. I showed the ability to adapt to different situations depending on who I was playing with and what my relative strengths and weaknesses were compared to my teammates and opponents. I took more of a backseat on the boys’ teams knowing that my quiet personality and physical qualities lent themselves to a more discreet role. I often stepped-up as a leader on the girls’ teams where my playing skills shone and my personality fit with the teams’ needs. I played different roles on different teams and played different positions on the ice depending on the set of standards I was faced with.

____________________________________________________________________________

Growing up I was a big tomboy and generally got along with boys better than girls. I shared their passion for sport and play and appreciated their easygoing ways. For most of my childhood I was the only girl on the local hockey team and sometimes in the
SPORT AND SELF-REGULATION

When I first started playing ice hockey at the age of eight I was desperate to get my black leather Winter Hawks jacket with my last name stitched across the upper arm that all the boys in my class wore. I felt like I was a secret member in an exclusive club. I was so proud to show it off and have people know which team I belonged to. I remember getting a full set of hockey gear for Christmas and awkwardly trying to figure out how to put it on in the right order. I had to quickly learn the hidden curriculum of the change room and the rules of the on-ice game so I didn’t embarrass myself. I took the age-old oath of “what happens in the dressing room stays in the dressing room,” no matter how hard the girls at school pried for insider information on the boys.

As the years went on and the difference between girls and boys started to emerge more and more in the physical sense I had to devise plans for changing in private and choosing a seat in the change room without a view of the shower. It eventually became a game for the boys to try to “accidentally” have me catch them naked. There were some aspects of this male dominated club I just couldn’t buy into. My hockey family became my social family too and I developed brotherly bonds with the boys on my teams. They looked out for me like a sister and always had my back, both on and off the ice. We spent our on-ice hours attempting to out-race each other and pulling pranks.
when the coach wasn't looking. We spent our off-ice hours practicing slap shots against battle worn garage doors in the neighborhood and imitating our favourite NHL players during ball hockey games in the cul-de-sac.

It was during those parent-free and coach-free play sessions that the true leaders of the team emerged organizing sides, dictating rules, imposing penalties, and mediating quarrels. We learned to govern ourselves and respect the common values we had unintentionally settled on. I knew my place and was comfortable with my role. I was never the biggest or strongest, but my years of figure skating made me one of the best skaters on the ice. I needed this edge in order to gain and keep respect from both my teammates and my opponents.

I developed a thick skin hearing catcalls and insults being thrown from the other team during pre-game warm-ups. For the most part they didn’t think a girl belonged in the boys league and weren’t afraid to let their feelings be known. The insults usually stopped once the game began and they were left chasing after my figure skating strides. This was a guilty pleasure for both my mom and me. Over the years the verbal insults turned into physical threats as we moved into contact leagues, but my hockey family always came to my rescue, if I needed them to. They were also content to let me take a
SPORT AND SELF-REGULATION

hit and settle my own score since I did in fact have the skills to contend in the big leagues.

I’m proud of myself for never giving in to the pressure and doubts of parents, players, and coaches on both sides of the ice because of my gender. I displayed self-confidence and poise when I was told that girls had to change in the janitors closet because it was inappropriate to have me change with the boys in the dressing room and there was no girls change room anyways. I laughed it off whenever the ponytail under my helmet got sneers and jokes. I showed resilience when my own team had a revote after anonymously selecting me as their assistant captain. I took it in stride when I was called a dyke and a bitch, a slut and a whore by jealous girlfriends and ignorant rival fans. Playing on an all male team in an all male league was character building and contributed to my work ethic and self-esteem. I had to work my tail off to stay on par with the muscles of seventeen year-old boys. I had to learn to accept my shortcomings and play up my strengths. I learned to survive in the boys’ world and would do it all again for the values and skills I learned.

Monitoring, according to Baumeister & Bushman (2008), is necessary to keep track of behaviors in order to successfully self-regulate. Zimmerman (2000) describes self-regulation as a
cyclical process because “the feedback from prior performance is used to make adjustments during current efforts” (p.14). This type of adjustment is necessary because personal, behavioral and environmental factors are constantly changing over the course of performance. As each shift goes by in a hockey game an individual player must reflect upon their performance and make adjustments accordingly. Hockey is a game where one constantly learns from their prior play and needs to adapt to each changing situation. You might need to skate faster or slow down, move to an open spot on the ice or stay on an opponent, start a set play sooner the next time or change the play altogether. This offers a great opportunity for people with poor self-regulation skills to practice such monitoring. During my time playing on the boys’ team in particular I faced a lot of criticism and feedback from sources including parents, teammates, opponents, referees, coaches, and friends. I had to take in this information, assess its value, and act on it in an appropriate way. Instead of getting mad, being offended, or quitting in the face of resistance and criticism I had to stay true to myself and carry on with resilience and pride. When people made fun of me and called me names I used it as fuel to play harder. When my teammates questioned my authority as captain I showed I was open to change and growth without compromising my personal values. Despite certain set backs I had to keep going in the face of resistance and follow through on the goals and the standards I had agreed to.

Baumeister and Vohs (2007) argue that motivation, in terms of self-regulation, refers to the motivations that one has to meet the goal or standard. It is found that even if all three of the other components are present, (e.g.: the standards are evident, monitoring is taking place, and the individual has full strength), the lack of motivation could cause the failure to self-regulate. Put quite simply, one must care about the goal. The social nature of humans suggests that they want to be in an environment with other people who are working towards the same shared goal. A
SPORT AND SELF-REGULATION

team sport like ice hockey lends itself to the idea that people will be motivated to act in a socially
desirable way in order to please their teammates and fit in. In order to do this players must buy
into and be motivated by the shared goal. As seen in my story above I demonstrated a strong
desire to be part of the group and have something to belong to. I wanted that leather jacket more
than anything. I learned my role and played my part in order to be accepted and valued on my
team. I was motivated to buy into the shared values and goals of our team because, as suggested
by Baumeister and Vohs, I valued social acceptance.

Baumeister and Vohs (2007) state that it is necessary that some of each of the four
components be present in order for self-regulation to be successful. However, it is also suggested
that to some degree the components can substitute for each other. For example, motivation may
be effective at substituting for a lack of self-regulatory strength. Even though I was made fun of
when playing on boys’ teams and had to endure naming calling, physical threats, rejection, and
isolation, the motivation I had to belong helped me overcome the barriers I faced. Where my
self-regulation was challenged and I became angry or hurt my motivation carried me through the
conflicts, and in some cases even resulted in a stronger social bond.

AD/HD and Social Skills

Ratey and Hagerman (2008) point out the added benefits of group sports for students with
AD/HD. Often, students with AD/HD have poor social skills (Ratey & Hagerman, 2008). Group
sports give these students a time and place to talk to others about very specific things, so they
don’t have to judge a social situation as much or worry about embarrassing themselves in front
of peers. For example, teammates must discuss game strategies beforehand or they can reminisce
about the game afterwards. Personally, I came to learn the language of hockey and developed
friendships with teammates based on our common topic of conversation. I spent my on-ice and
off-ice hours with my teammates because I didn’t want to miss out on the experiences and conversations happening that were important in our world.

There is also evidence that social contact during exercise causes synapses to make more connections and those connections have thicker myelin sheaths which allow them to fire signals more efficiently (Ratey & Hagerman, 2008). Exercise can help us establish and maintain social connections and build confidence. During a hockey game each player must actively communicate with other players on their team, with the referees, and with the coaches. There are numerous opportunities within a game to navigate different social situations and learn from encounters with others. As seen in my story earlier I learned the appropriate difference between speaking to a line mate on the bench, having a conversation with my coach, and speaking with a parent after the game. In some instances resolved conflicts drew me closer and enhanced bonds. As I learned the game and my role on the team my confidence and pride grew because I had a place and belonged.

CHAPTER 5 Third Period: Habits and Failure

As is typical with many athletes in different sports, I’ve developed certain rituals and habits throughout my hockey career. I’ve formed some particular superstitious behaviours that I can’t really tell you why they started in the first place or when I became conscious of them, but I must do them in order to feel right before and after a game. I was helping a new teammate put on hockey gear for the first time once and she kept questioning why I was doing certain things the way I was. I hadn’t even thought about it until she pointed them out, but I had clearly developed ritualistic habits over the years.
Since my early teens my pre-game ritual has started with me eating something not too filling at least 1 hour before game time and arriving to the arena as close to thirty minutes before the game as possible. If I’m too early I get bored and sluggish trying to find something to do. I might re-tape my stick (always toe to heal with white tape of course) or hang out in the cold lobby waiting for someone else to show up. If I’m running late I feel rushed and inevitably forget to do something and end up running back to the change room to grab my water bottle or puffer before stepping on the ice. When I enter the dressing room I always choose the seat directly opposite the door and in the middle of the bench. I hate getting stuck with the undesirable seats in the corner, over the heaters, or beside the bathroom. Hopefully someone on the team has remembered to bring the stereo. I like to zone out listening to the latest hit and loosen up with a little dancing. After hanging up my coat and tucking my shoes under the bench I lay out my under gear which must include my designated black holey tights that I’ve had since the dawn of time, white knee-high Costco socks (the kind that don’t have ridges on the sides), and a short sleeved cotton t-shirt. The under layer must feel just right or it throws my whole game off. I dread the days I forget something at home in the dryer and have to make do with borrowed ankle socks in my skates or shorts under my hockey
SPORT AND SELF-REGULATION

pants. The way the air feels on my legs as I skate drives me crazy and monopolizes my attention.

As I put on my gear I have to put on the left side of each piece of equipment first. Don’t ask me why, I just do, I always have. Left sock, left kneepad, left skate, left elbow pad, left glove. My skate laces have to be perfect. Not too tight like my figure skates, but not so loose that my ankle wobbles. A slight loss of circulation lets me know I’ve hit the mark and they’ll loosen up just enough as the game goes on. A habit that my teammates love to tease me about is my need to pull my hockey socks over my skates and tape them down. It doesn’t serve a purpose, but it’s something I’ve always done and adds to my overall distinguishing look on the ice. Even though it’s against the rules to expose your equipment on the ice I have to roll up my jersey sleeves past my elbow pads so they don’t hang in my gloves. I get away with this most of the time, but every now and then a ref spots me in the faceoff circle and makes me pull my sleeves down which spoils my whole vibe. The back of my jersey has always donned the number 14 (my dad’s hockey number) or number 23 (my step dad’s hockey number). Everyone in my family wears these numbers and we always will. Sports numbers are one of those things that tend to follow you throughout your life and trickle into other areas of your life as well.
such as choosing lottery ticket numbers. My hair must be pulled back into two even ponytails fastened with the non-slip elastics I keep stocked in my bag. Over top I must wear a beanie cap to keep the sweat from pooling on my eyebrows and to fill out my helmet so it’s nice and snug. The last things I do before heading onto the ice is fill up my water bottle and grab my puffer. Many people pour Gatorade or some kind of energy drink into their water bottle, but I prefer plain old water. I don’t even actually drink much during a game, never have.

When I head out for the warm-up skate I always start with circles in a counterclockwise direction. I never stretch during the warm up because I’m sure the one time I do I’m going to pull a cold muscle. The same thought process compels me to always wear my seatbelt no matter how far or how fast I’m going because the one time I don’t will be the one time I get in a crash. Once the buzzer sounds to end the warm-up I turn to face the opposing end and visualize the net rippling as my puck sails over the goalie’s right shoulder. I never actually score this way, but growing up my dad always harped on the importance of visualization techniques and I still hear his words play in my head, “Don’t look at the goalie, picture the puck hitting the open net.” During the game
SPORT AND SELF-REGULATION

I hardly ever sit down on the bench. I prefer to stand at the gate, ready to pounce as soon as my teammate is tired.

After the game is over I take off my gear in the same order as I put it on, left side first, and lay it in my bag just so. Up until university I kept a tape ball of all my used sock tape to compete with my teammates, but eventually realized it weighed more than my gear and I needed to move on from such childish games. Now the sock tape gets balled up and stuck beside my seat until I’m done dressing and can walk it to the garbage can. People throwing sock tape on the floor is like nails on a chalk board to me. For the most part my pre-game and post game ritual has always been the same through high school, university and adulthood, and like most people mine is unique to me and I like it that way. Sometimes my routine would be supplemented with a pre-game run or a chalk talk with the coach, but the habits I formed along the way have stuck with me.

Growing up, every now and then, I would be part of a team whose coaches had a vision of a united team all taking part in their version of the perfect pre-game/post-game routine. These inevitably always revolved around some form of exercise, diet, and pep talk. One time sticks out in my mind when my routine was interrupted and I was forced to take part in a whole different set of habits.
SPORT AND SELF-REGULATION

I was playing on the BC Winter Games under 18 girls hockey team and our coaches were keen to build a strong team image that included everyone doing the same thing before each game. Equipped with the latest research, our coaches told us that we must eat a high-carb dinner the night before and then not eat within five hours of game time the next day. We were each given four liters of water and expected to down it within one hour of game time while on our bus ride to the arena so we’d be well hydrated for the duration of the game. The latest energy product to hit the shelves was a drink called Vespa, which contained wasp extract, a sure fire way to spice up our game. We were to consume one bottle of the sweet nectar twenty minutes before game time. Once we reached the arena we were expected to go for a twenty-minute warm-up run and be dressed and ready for a chalk talk twenty minutes before game time. This plan seemed good in theory, but in reality it was a disaster.

As dutiful players and wanting to be part of something bigger we all eagerly followed the directives given to us. The high-carb meal the night before was nothing new and easy to follow through on. An excuse to eat mounds of pasta is always a good thing. The four liters of water, however, was a feat our stomachs and bladders could not handle. I tried my hardest to chug it down, but the large amount of water made me feel
queasy, which only added to my car sickness on the bus, and made me have to pee really bad. I wasn’t the only one. When we arrived at the arena everyone on the team ran for the bathroom and proceeded to empty both their bladders and the reminder of their water bottles. It turned out that some girls were allergic to the Vespa drink and it gave most of us an upset stomach. The twenty-minute pre-game run got our blood flowing, but afterwards we were exhausted and our energy levels crashed during our twenty-minute chalk talk. Not to mention we were starving by game time having not eaten in five hours. By the time the game started we were a bunch of useless, hungry, bloated girls with stomachaches and tired legs. Coach made us do a particular warm-up skate followed by an on-ice stretch while we stared down the other team. Needless to say, our performance on the ice was less than stellar and we were not buying in. The coaches tried to repeat the same routine the next day, but there was a rebellion from the players and we were allowed to go back to our regular individual routines which suited each of us much better.

Self-Regulation as a Predictor

Shanker (2010) argues that there is a need to distinguish between self-regulation and compliance. He reasons that historically generations have used punishment and reward to keep
students quiet, but “the problem is that a child who is only quiet because of fear of the consequences, or because she is hoping to obtain some reward, isn’t developing the ability to cope with greater and greater challenges” (p. 5). Shanker adds that, “in fact, we know from abundant data that the overuse of punitive measures to elicit compliance is a predictor of externalizing problems, while the overuse of rewards can have a dampening effect on motivation (p. 5). Self-regulation operates properly when there is a balance of punishment and reward.

Ice hockey offers the balance between punishment and reward. A player faces intermittent rewards (getting a pass, completing a pass, stopping an opponent, scoring a goal, getting cheered on by fans, learning a new shot, etc.) as well as intermittent punishment (getting stripped of the puck, being tripped or slashed, getting a two, five, or ten minute penalty, sometimes deserved and sometimes not, getting scored on, falling down, being hit, etc.). In my story above I was rewarded by following my routines and habits and faced challenges when I was asked to change my routine if I had forgotten the right socks, was running late, had to follow a water intake plan, etc. While it’s admirable to routinely follow a plan that works, it’s also necessary to be flexible and open to change. In hockey there are often circumstances that a player must adapt to before, during, and after a game so they cannot become too reliant on what works best for them because situations are often outside of their control. This is part of demonstrating good self-regulation and adjusting when necessary.

Self-regulation can be a predictive factor in the development of mental health problems. Problems with self-regulation during early development can be a risk factor for the development of: developmental disorders, internalizing problems, externalizing problems, personality disorders, memory disorders, alcoholism, risky behaviours, obesity, diabetes, cancer, coronary heart disease, and immune system disorders such as: asthma, allergies, chronic fatigue syndrome,
and rheumatoid arthritis (Baumeister & Vohs, 2004, 2007). Teaching self-regulation at a young age and fostering it throughout a child’s life can be critical to limiting these problems. Sport and exercise offers a venue for developing good self-regulation skills to offset such problems in childhood and adulthood.

Shanker (2010) notes that of utmost importance for the development of self-regulation is the child’s motor planning and sequencing abilities and the child’s sense of his or her body in space. Many self-regulatory problems, including chronic hypo-reactivity or hyper-reactivity can be traced back to early deficits in motor control and sensory-motor integration. Participating in multi-dimensional partner or group sports such as squash, lacrosse, or hockey early in life could help children develop better motor control and sensory-motor integration.

Shanker (2010) suggests that the real goal of focusing on self-regulation is to help the child learn how to manage his internal states. Shanker offers six levels of self-regulation between activation and inhibition: 1. Asleep; 2. Drowsy; 3. Hypoalert; 4. Calmly focused and alert (optional learning); 5. Hyperalert; 6. Flooded. A child must manage their internal states and come up or down on the scale to reach the calmly alert and focused stage. A number of techniques taught within Sport Psychology may fall under the umbrella of 'self regulation' strategies. These could include: imagery, bio-feedback techniques, and autogenic training (relaxation training) (Hardcore Hockey, 2013). When we talk about getting 'up for a game' or 'coming down after a game' in organized sports, it’s similar to moving between the arousal states suggested by Shanker. A good example of this is my use of music during warm-up time to create a desired response. Similarly, using imagery and visualization to picture myself scoring on a breakaway. Athletes might use relaxation techniques the night before a big game to help them sleep or go for a pre-game jog to wake their body up.
In my pre-teen and teen years I was a dedicated rink rat through and through, spending around eighteen hours a week at the arena between figure skating and hockey. I had early morning practices before school, I left school early to get on the ice, I spent my evenings eating dinner in the change room between sessions, I crammed in homework time during ice floods, and I spent my weekends travelling hours in the family minivan to various arenas for away games. My figure skating life was consumed by solos, tests, performances, costumes, dance steps, and precision routines. My hockey life revolved around stick tape, skate sharpenings, game plays, bag skates, and Subway stops. These two sports came to represent my fitness life and my social life. I had my figure skating girl friends and my hockey playing guy friends. The conversations amongst the two groups were nothing to compare and I liked it that way. I juggled flip-flopping between the two worlds, transitioning smoothly from toe pick to rocker without much thought. The skills and techniques involved in the two sports complimented each other nicely on the ice and I was able to use my off-ice training for double duty. When I wasn’t on the ice or being chauffeured to a game by my dutiful mother I was working out at the gym with teammates or participating in a post skate dry-land training session. Between sports, travel, and schoolwork I had little time to spare, which probably kept
me out of trouble more than I know. My parents always encouraged my investment in sports and were willing to sacrifice their hard earned dollars and precious time to make sure my siblings and I were able to take part in every opportunity presented to us. We joined every special team and went to all the competitions around the province. I recognized the dedication I was putting in and sometimes felt like I was missing out on a regular childhood full of hangouts at 7-11 and late night movies, but knew it was all worth it, no matter how far the sports took me.

On one fateful winter night when I was twelve I was at a figure skating practice working on my spins. I had been circling the center dot doing routine, low-level camel spins for the better part of an hour. As any figure skater knows, spins are one of those things that the more effort and thought you put in, often the more you mess up and can’t seem to get anything right. I was too upright, too bent over, going too fast, going too slow, spinning in loops, or leaning over too much. Frustrated and ready to call it a night I wound up for one more. Apparently I attacked the entry a little too aggressively and couldn’t harness the speed I entered with. Someone later described what happened next as a flying starfish-like maneuver. My standing foot came off the ice and I whirled
spread-eagle through the air for a few rotations before crashing down against the frozen ground face first.

As happened from time to time after a big spill I remember laying on the ice motionless, slowly gathering my wits, and waiting for the onset of pain receptors from whatever injury I had just acquired to kick in. The crushing blow in my chest was nothing new, just the wind being knocked from me, my diaphragm spasming and making it impossible to breathe for what feels like hours but is really just the next few seconds. The panic from that almost captivated my attention until I started to realize there was an even worse pain coming from my right knee. In fact, there was a sharp stabbing pain shooting up and down my whole leg. I remember hearing someone scream, but I'm still not sure if it came from me or not. I'm not the screaming or crying type, even in the case of a serious injury. The next thing I knew I was being hauled up off the ice by my coach at the time who had hastily come to my rescue. I must have been in shock because I put my foot down to stand on as she helped me onto the bench. I nearly collapsed in agony. Something was definitely wrong.

That's when the water works started. My mom always said she knew I was really hurt when I cried because I never cried. I protested in pain as my coach leveled my leg
SPORT AND SELF-REGULATION

out on the bench and applied a pack of ice. She told me to sit there for a few minutes and she’d be back to check on me. When she did return I must have asked her ten times to call my parents to come pick me up and take me home because I didn’t want to go back on the ice. Strict as always, she kept insisting that I was fine and could wait until practice was over. I was not OK and I knew it. Eventually my father came to collect me after I had frozen my butt off for far too long. When he attempted to lift me up to carry me to his car a wall of white-hot pain knocked me back. Getting to the car seemed like an eternity, but getting into the car was the worst part. Getting into the front seat required me to bend my knee ever so slightly which brought another onslaught of tears and teeth grinding winces.

My dad drove me straight to the hospital where I waited for what seemed like forever to be taken to get x-rays before being told the prognosis. I had shattered my patella in sixteen places. Sixteen! I was actually kind of impressed before the reality of what that meant sunk in. I had had plenty of stitches and bruised bones before, but this was by far my most serious injury to date. It was at that point that my mom arrived from wherever she had been and looked all too unimpressed when we relayed the news to her. Two months in a full-leg cast, of which purple was the only option available, how
SPORT AND SELF-REGULATION

embarrassing for a hockey playing tomboy, and a few more months on crutches after that. There would also be plenty of costly physiotherapy during rehab to build my muscles back. I felt guilty thinking that my mom was probably tabulating all of the program fees that would be wasted during my recovery, but she was probably feeling bad for me and the fact that I would not be able to participate in my beloved sports for a good chunk of time. What was I going to do without the routine schedule, the exercise, the social time, and a purpose?

The months that followed were nothing short of boring. I had to complete paper packages on the sidelines in P.E. class and listen to my teammates recount tales from the weekend’s game I had missed. I missed out on competitions and tests where my friends skated to gold and moved up levels without me. I felt disconnected and lost without a practice to attend or a jump to learn. My world had come to a standstill and I was thoroughly under stimulated. For the first time in my life I felt lazy and unproductive. Even my grades took a hit because I had too much time to procrastinate. It was hard to get up in the morning and I was tired in the afternoon. I watched more TV in four months then I had in four years. I had to make new friends to hang out with after school and my mom was not keen to see the people I chose. They were unmotivated without any
practices to attend or games to prepare for. It was a long road to recovery and I had a lot of catching up to do before I was able to return to my treasured sports full time.

Self-Regulation Failure

Self-regulation has been found to be associated with success or failure in many different problems that impact society. When there is insufficient self-regulation the following issues can occur: abuse of drugs and alcohol, addiction, unwanted pregnancy, sexually transmitted diseases, gambling, violence, crime, eating disorders, anger control problems, underachievement in school, debt and bankruptcy, and more (Baumeister & Bushman, 2008). In addition, people who have poor self-regulatory skills generally do not succeed in relationships, cannot hold jobs, and may even become criminals. Conversely, Baumeister and Vohs (2007) found that those with good self-regulatory skills have success in school, work, and relationships and have more positive mental health in general. As you can see, it is important that educators give students with poor self-regulation skills the best chance they have to improve their skills as to avoid the problems listed above. I suggest that one way to do this is through participation in sport, in particular team sports.

Through participation in team sports children have the opportunity to develop good self-regulation skills and have less time to potentially fall captive to the negative issues listed above. Even during the short time that I was unable to participate in sports because of my knee injury I experienced what it was like to have a decreased opportunity for developing and practicing good self-regulation skills on a regular basis. I fell prey to such issues as boredom, lack of motivation, under stimulation, and absence of purpose, which contributed to my laziness, my procrastination, my decline in school, and my poor choice in friends. Sport brings with it an opportunity for
SPORT AND SELF-REGULATION

purpose, belonging, motivation and involvement, factors necessary to counter balance the negative impacts of poor self-regulation.

Heatherton and Wagner (2011) argue that self-regulatory failure is a core feature of many social and mental health problems in our society today. Self-regulation can be undermined by failures to transcend overwhelming temptations, negative moods and resource depletion, and when minor lapses in self-control snowball into self-regulatory collapse. Cognitive neuroscience research suggests that successful self-regulation is dependent on top-down control from the prefrontal cortex over subcortical regions involved in reward and emotion. In their research, Heatherton and Wagner (2011) found that self-regulatory failure occurs whenever the balance is tipped in favor of subcortical areas, either due to particularly strong impulses or when prefrontal function itself is impaired. Such a model is consistent with recent findings in the cognitive neuroscience of addictive behavior, emotion regulation and decision-making. This prefrontal–subcortical balance model emphasizes that self-regulatory collapse can occur because of both insufficient top-down control and overwhelming bottom-up impulses.

This research further explains what I was going through during my knee injury when I got a glimpse into what self-regulation failure felt like. After spending years developing and practicing good self-regulation skills I felt purposeless and was unmotivated, under stimulated, and bored. I wasn’t following my usual routines and habits and became lazy. My physical body suffered, my school grades suffered, and my emotional state suffered. I knew it was happening but had little control over it. I knew it didn’t feel good and missed my old regulated self.

Children suffering from poor self-regulation and even self-regulation failure must feel out of control and helpless. They need the routine and skill development that sport can offer.
SPORT AND SELF-REGULATION

Shanker (2010) suggests that we as educators need to reframe a child’s behavior in order to understand the reasons why a child might be having trouble paying attention, ignoring distractors, inhibiting his impulses, modulating his emotions, and overall, maintaining a state of being calmly focused and alert. He argues that in far too many cases the problem lies in the excessive levels of stress that the child is struggling with from the biological, emotional, cognitive, social and pro-social domains. Shanker adds that stressors can come from any or all of the domains and because of the connection between the domains stressors often exacerbate each other. As educators these days we have children in our classrooms that are experiencing all sorts of stressors at home and at school. Parents may be going through a divorce, there may be a new baby at home, finances may be tight, food might not be available, a loved one might be sick or dying, the child might have to look after siblings or work a job late a night, they might be being bullied at school, or they might be overwhelmed by their course load. Students could be sensitive to visual and auditory stimuli in their environment, they could be struggling to connect with peers, they could be suffering from an illness, or they could not be sleeping at night. These stressors can impact students from a biological, emotional, cognitive, or social domain. If these students don’t have a positive outlet and influence in their life, such as sport, they may succumb to the resulting negative impacts.

Many children are unable to participate in sport because of time constraints, money, parental consent, or transportation, which makes it even more important for teachers to embrace exercise and sport within the school setting to make sure that students are being exposed to the benefits which will transfer into the classroom. For these students, regular routine throughout the school day can have great value. Just like I followed a set routine during pre-game in order to set myself up to be calmly alter and focused, students need predictable and consistent routines in
SPORT AND SELF-REGULATION

school in order to feel balanced. Students need to know what to bring to math class versus how to prepare for social studies. Different environments within the school call for different set-ups as well. For example the reading corner should be quiet and softly lit, while the gym can be a place to be loud with bright lights. Manipulating environmental stimuli, materials, timing, and more can help students regulate their stressors and their learning state.

Shanker (2010) suggests that enhancing a child’s ability to regulate him or herself has a significant impact, not only on the child’s wellbeing and capacity to learn, but an equally noteworthy impact on the wellbeing of parents and educators. When I was experiencing self-regulation failure my parents and teachers were concerned about my overall well-being and were uncomfortable watching my personal life and academic life suffer. To us there was a clear link between my inability to be involved in my sports and what was going on with me physically, emotionally, and intellectually. Teachers should value the benefits that sport can bring to their students as it will make their jobs easier and enhance the positive aspects of school life for everyone.

AD/HD and Sport

It is often cited that people with AD/HD benefit from rigid structures, which can be seen in many different sports such as martial arts. In a study conducted at Hofstra University they found that boys with AD/HD who participated marital arts twice a week improved their behavior and performance on a number of measures compared to those on a typical aerobic exercise program including finishing more homework, being better prepared for class, improving their grades, breaking fewer rules, and jumping out of their seats less often (Ratey & Hagerman, 2008).

In a sport like ice hockey there are specific rules about the number of players, positions, times, penalties, lines on the ice, etc. Ice hockey activates a vast array of brain areas that control
SPORT AND SELF-REGULATION

balance, timing, sequencing, evaluating, consequences, switching, error correction, fine motor adjustments, inhibition, and intense focus and concentration. With the mind on high alert there is plenty of motivation to learn the skills necessary for these activities and to avoid being creamed at center ice with your head down. Children with AD/HD favor immediate gratification over long-term benefit because they can’t maintain focus on a long-term goal (Ratey & Hagerman, 2008). Ice hockey provides these children with an opportunity to plan short term, one game or one shift at a time. They have the chance to make something happen in two minutes, reflect on what went well or what they need to change, and go out the next shift and stop an opponent at one end or score a goal at the other.

Ratey and Hagerman (2008) point out that “cells spawned during exercise are better equipped to spark LTP” (p. 50). LTP, long term potentiation, is “the cellular mechanism for learning and memory that requires the strengthening of brain cells’ ability, or potential, to send a signal across the synaptic gap which is critical for communicating” (p. 279). Thus, exercise can contribute to communication and learning. “Learning and memory evolved in concert with the motor functions that allowed our ancestors to track down food, so as far as our brains are concerned, if we’re not moving, there’s no real need to learn anything” (p.53). This evidence offers great value to the idea of movement for increased learning and sports for increased self-regulation, especially the kinesthetic-learner boys with AH/HD in our classrooms.

CHAPTER 6 Bridging Gaps: The Rink to the Classroom

Discussion

Self-Regulation in Schools

I feel that there is a general understanding among teachers that self-regulation skills are necessary and different from the fundamental academic skills that have been emphasized in our schools in recent years and that there is a need to change our education system to support
students with poor self-regulation skills. Hyland and Springer (2011) write that education at all levels of the system has been “seriously impoverished over the last few decades through an obsession with standards, targets, skills and competencies, and this has resulted in a one-dimensional, economistic and bleakly utilitarian conception of the educational task” (p. xi). This one-dimensional concept certainly does not work for our special needs students, nor is it serving the best interest of any of our students. As education slowly shifts from a list of prescribed learning outcomes towards broader learning objectives and a stronger focus on learning how to learn, rather than what to learn, there is more room in the classroom to look at skills that will benefit children inside and outside of the academic world for their entire lives.

The British Columbia Ministry of Education is in the middle of transforming their curriculum to create a “more flexible curriculum that prescribes less and enables more, for both teachers and students and a system focused on the core competencies, skills and knowledge that students need to succeed in the 21st century” (British Columbia Ministry of Education, 2013a). The proposed new curriculum is divided under three broad cross-curricular themes: Thinking Competencies, Communication Competencies, and Social and Personal Competencies, all of which I would argue deal with self-regulation skills (British Columbia Ministry of Education, 2013a).

I believe that for today’s educator, knowledge of self-regulation and strategies to optimize self-regulation in all learners is pivotal for student success as well as teacher wellbeing. Teachers should be familiar with the factors that influence a learner’s ability to self-regulate and the strategies they can use to identify and promote self-regulated learning, including sport and exercise. There is strong evidence that “teachers fare better themselves in classrooms where students develop strong capacities for emotional, physical, and intellectual self-regulation,”
SPORT AND SELF-REGULATION

(Canadian Self-Regulation Initiative, n.d., para. 3). I would think that this resonates with most educators as it makes sense that teachers would respond more positively to children who are able to stay calmly focused.

Self-regulated learning (SLR) is recognized as an important predictor of student academic motivation and achievement. Shanker (2010) notes that students who self-regulate believe that they are responsible for their own learning and are more adept at dictating what, where, and how their learning occurs. These students often persist longer through academic tasks and display higher levels of motivation and achievement. The better a child can stay calmly focused and alert, the better her development of effortful control, emotion-regulation, executive functioning, pattern recognition, symbolic and language skills, logical and reflective thinking, and empathy. Shanker (2010) points to a growing awareness among developmental scientists that the better a child can self-regulate, the better she can rise to the challenge of mastering ever more complex skills and concepts. “Self-regulation nurtures the ability to cope with greater and greater challenges because it involves arousal states, emotions, behaviour, and – as the child grows older – thinking skills” (Shanker, n.d. b, para. 1).

Research is helping educators better understand the reasons why we are seeing certain behaviours in children that impair their ability to learn. In my teaching I have seen such difficulties as the inability to pay attention, to inhibit impulses, to modulate strong emotions, and to interact positively and constructively with classmates. I want to help all of my students, and especially those with special needs, to become better regulated to foster better learning and social interactions that will have larger implications down the road.

AD/HD and Exercise
SPORT AND SELF-REGULATION

Ratey and Hagerman (2008) found that when students go for a mile long run in gym class they are “more prepared to learn in their other classes: their senses are heightened; their focus and mood are improved; they’re less fidgety and tense; and they feel more motivated and invigorated” (p. 35). With reference to many studies, Ratey and Hagerman suggest that optimal learning happens up to one hour after moderate physical activity. This supports the reasoning for before school sports or having physical education classes in the morning, and some sort of movement break again each hour. In their 2008 work Ratey and Hagerman give examples of people with AD/HD who have had success by building regular rigorous activity into their lives, especially in the morning before they have to go to work and focus, knowing that they will become more scattered as the day goes on and the positive effects of exercise wear off.

Ratey and Hagerman also suggest that doing more complex physical exercise other than simple tasks such as running can have added benefits on the brain. Performing complex motor skills such as balancing, lateral movements, or manipulating objects while moving increases brain-derived neurotrophic factor (BDNF). BDNF is a protein produced inside nerve cells when they are active and it serves as the “Miracle-Gro” for the brain (p. 276). I suggest that ice hockey is a perfect example of a sport that combines both aerobic exercise to tax the cardiovascular system and complex physical skills to challenge the brain. Learning the skills of skating and manipulating a hockey stick and puck challenge the brain and are skills that can be improved upon which strengthens circuits in the brain. The fact that you must read and react to a changing situation and to other players puts further demands on your attention, judgment, and precision of movement, increasing the complexity of the situation.

Medication has become a common treatment for many children and adults with AD/HD, but exercise and sport may serve as a better intervention. Ratey and Hagerman (2008) call
SPORT AND SELF-REGULATION

serotonin “the policeman of the brain because it helps to keep brain activity under control. It influences mood, impulsivity, anger, and aggressiveness” (p. 37). Norepinephrine influence attention, perception, motivation and arousal. Dopamine is thought of as the “learning, reward (satisfaction), attention and movement neurotransmitter” (p. 38). The authors explain that the drug methylphenidate, or Ritalin, eases AD/HD symptoms by raising dopamine and thus calming the mind.

Perhaps we can lessen the dose of medication needed or rid AD/HD patients of meds altogether through a rigorous exercise program. Exercise increases neurotransmitters immediately, therefore tempering AD/HD symptoms, and baseline levels of dopamine and norepinephrine can be raised through regular exercise by spurring the growth of new receptors in certain brain areas (Ratey & Hagerman, 2008). Exercise also helps “regulate the amygdale, which in the context of ADHD blunts the hair-trigger responsiveness a lot of patients experience” (p. 159). Ratey and Hagerman suggest that children and adults with AD/HD need to do more exercise on a regular basis than their average peers and gives twenty to thirty minutes at seventy-five percent of maximum heart rate five to seven days a week as a recommended amount. They go on to suggest that focus-intensive, high-intensity, social and fun sports are necessary to engage the attention system and to keep kids interested. Ice hockey offers a great option.

An Imagined Classroom

Based on my sporting experiences, my autoethnographic research, and the evidence-based research presented above we can imagine a school and a classroom that would be appropriate for helping students suffering from poor self-regulation skills, perhaps with a diagnosis of AD/HD, to better improve their self-regulatory skills and therefore have more success at in the classroom and other aspects of their lives as well.
Imagine a school where the day starts with forty minutes of physical exercise for every student. Teachers could work together to offer their students the opportunity to get moderate to intense aerobic exercise to tax the cardiovascular system and to perform complex physical skills to challenge the brain. Teachers would focus on multidimensional partner or group sports and games that involved social interactions, balancing, lateral movements, and object manipulation to maximize the development of motor control and sensory motor integration to help with the hyper-reactivity and hypo-reactivity of their students. This would benefit girl in grade 5 who shows up to school half asleep, demonstrating her need to increase her internal state from drowsy to calmly alert, as well as the boy in grade 11 who enters his first class yelling at the top of his lungs to his friend across the room, demonstrating his need to regulate himself down from flooded to calmly focused. Based on grade level or ability level students could choose from a game of lacrosse in the field, a game of ball hockey in the gym, a game of tennis on the pavement, or a round of tag on the playground. Schools could offer various sports and games based on their facilities, student interest, and teacher expertise. Of importance would be the student’s opportunity to display choice and ownership over their involvement to increase motivation and longevity.

Imagine then that students make their way to their first morning class that lasts up to one hour maximum, the optimal time period for learning after physical exercise. After one hour of focused learning students would be given another forty-minute opportunity to participate in some game or sport before returning to the classroom for another hour of learning. Lunchtime would follow and students would be required to leave their classroom after they’d finished eating a nutritional meal and would be encouraged to participate in active play with others. Intermural sports and various clubs could be offered by student leaders, interested staff, or lunch time
SPORT AND SELF-REGULATION

monitors. Following lunch would be an hour of learning, forty minutes of exercise, and a final hour of learning. Although the overall time students spent in the classroom may be reduced, the time spent on-task and focused would increase and students would be more productive.

Students would begin to recognize these exercise times not as breaks from their learning, but in fact vital components of optimal learning. Teachers would educate their students on the benefits of such regular exercise and students would have the language to talk about the activation of their cerebellum and executive functioning skills through movement. They would be able to recognize the correlation between exercise and attention, knowing that by participating in their morning games they would be ready to concentrate in the classroom. Students would understand the need to activate their prefrontal cortex so that they could regulate their behaviour, organize activities, access their working memory, inhibit stimuli, initiate action, and perform executive functions such as judging, planning, and predicting needed for their school work.

Over time students would be able to think reflectively and communicate when they were feeling up or down, in or out of control of their emotions and behaviours. Students would be able to ask their teacher for a movement break such as spinning on the bike at the back of the classroom for five minutes if they were feeling restless, doing a set of wall squats if they were beginning to fade, running a couple of laps of the school when they noticed their concentration slipping, or completing a set of push-ups when they saw they were beginning to fidget more and more. Teachers would permit students to use their bodies to learn and would offer them wiggle seats or one legged stool to sit on to do their math, give them fidget tools to play with while completing their writing, or let them stand during art class.

Just like in the hockey change room, the classroom would be a place where environmental stimuli changed based on the needs of students. Quiet music might be playing in
In the background to soothe anxious nerves or loud music might be pumping from the speakers as students danced to get their blood flowing and ready for a science lesson. The lights might be low and clam to help students down regulate and focus during silent reading, or they might be on bright to help students wake up and pay attention during a teacher demonstration.

Like being on a hockey team, in this imagined school students would develop routines and habits that helped them cope with their needs and improve their self-regulation skills. Students would take responsibility for their actions and moods, doing what’s necessary to regulate in the appropriate direction. They would be supported by their teachers, see progress over time, and would be positively rewarded with improved school performance. They would be able to recognize the impact of exercise in other aspects of their life as well and learn to value its influence with pride and satisfaction.

There is a potential for the benefits of exercise for students to be recognized as benefits for the whole school and for parents as well. Throughout the school there may be noticeable improvements in student behaviour, an improvement in social interaction among students, less dependence on medication for students with special needs, increased productivity in the classrooms, and an increase in educator satisfaction. Parents may notice that their child was in a better mood throughout the day, was persisting on their homework more, had motivation to get up in the morning, and was proud of their achievements at school.

CHAPTER 7 Conclusion

Throughout this thesis I looked at how my insights about self-regulation through my involvement in sports could inform my understanding of the impact that sport can have on students’ self-regulation in the classroom. As is evident in my hockey experiences presented I developed life skills and maturity that some of my classmates who were not involved in sports
were clearly missing. I had to learn to manage my time and show up to each practice and game with just enough time to get settled. I had to learn to plan and pack my bag with all the necessary equipment and make sure everything was prepared ahead of time so nothing was missing. I had to learn what I needed to do in order to feel ready to play and how to monitor my internal states throughout a game to maintain my sense of balance whether it was sitting down, standing up, drinking water, visualizing, breathing, listening to music, going for a run, talking to someone, reviewing a play, making a plan, adjusting my equipment, etc. My concepts of time management, organization, preparation, sacrifice, discipline, and persistence were cultivated through sport and served me well in all other aspects of my life including school and work. I learned how to be a humble winner and a gracious loser, a respected leader and a valued teammate. I learned how to show courage under pressure and how to perform despite fear. I cultivated these skills through sport and received bursaries, scholarships, and jobs later in life because of them. I developed a respect for my body and my fitness level, and was too busy to get involved in risky behaviours such as drugs and alcohol. I had a sense of purpose and took my job as an athlete seriously.

The knowledge presented in this thesis through my lived experiences as well as the research-based evidence included effectively shows how sport impacted my self-regulation in valuable ways, and suggests it’s value for students. Parents and teachers should be aware of this important understanding and utilize sport at school and outside of school. Self-regulation skills are predictable and vital components to being successful in the classroom and later in life. The earlier children are involved in organized group sports and learn different types of self-regulatory skills, potentially the more success they will have in life. Many special needs students in our classrooms are being diagnosed with disorders that often include a description of poor self-
SPORT AND SELF-REGULATION

regulation skills and it is my hope that enhancing self-regulation skills through sport will help these students experience more and earlier success.

My personal stories presented in this thesis give voice to the lived knowledge I have about the benefits of exercise and group sports in the areas of fitness, mental health, social skills, life lessons, and habit formation, all of which involve the development of components of self-regulation. I believe I was able to cultivate my personal self-regulation skills and experience success in school and life because of my extensive involvement in sport.

I do not have AD/HD nor was ever diagnosed with a condition involving poor self-regulation skills. The conclusions I draw for such students are imagined outcomes derived through exploring my own experiences through the lens of self-regulation and an imagined application of these to the experiences of those who have self-regulatory difficulties. The reality of their experiences may be very different than my own and my findings may not be generalizable, but I believe that my experiences and knowledge, along with the research presented, provide a valuable contribution to the field of special education.

In my experience, getting children involved in team sports from a young age can greatly impact their development of good self-regulation skills, the ability to manage their energy states, emotions, behaviours and attention, in ways that are socially acceptable. This can help them achieve positive goals, such as learning, maintaining good relationships, and maintaining wellbeing throughout life. Improving self-regulation through sport could help many of the special needs students in our schools improve their performance academically, lessen their dependence on medication, build their capacity for self-determination, and foster positive social relationships with teachers, friends, and parents.
SPORT AND SELF-REGULATION

It is my hope that by sharing my stories I can help educators understand the value of exercise for today’s learners and that they will embrace some of the ideas presented in this thesis on ways to incorporate fitness into their daily classroom and school routines. Perhaps one day soon my imagined school will become a reality and everyone, including students, staff and parents, will buy into the idea of exercise positively and necessarily impacting learning. I am hopeful as education slowly shifts from a list of prescribed learning outcomes towards broader learning objectives and a stronger focus on learning how to learn, rather than what to learn, that there is more room in the classroom for teachers to develop skills that will benefit children inside and outside of the academic world for their entire lives.
SPORT AND SELF-REGULATION

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SPORT AND SELF-REGULATION


SPORT AND SELF-REGULATION


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