EXERCISE, DEPRESSION, AND LEARNING IN YOUNG ADOLESCENT BOYS:
A DESCRIPTIVE STUDY

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Abstract

The symptoms of adolescent depression are often dismissed as quirks of the age—increased irritability or agitation, lack of concentration, frequent complaints, sleep disturbances, eating disturbances, decrease in grades or missed assignments. The impact of these symptoms reaches deeply into the both the academic and social lives of these adolescents.

Exercise is beginning to emerge as a potential alternative to standard drug treatment for depression; however, very little research has been conducted with adolescents. The purpose of this case study is to describe the experiences (thoughts, feelings and actions) of four adolescent males with symptoms of depression from multiple perspectives, while they were participating in a daily aerobic exercise program.

Throughout an eight-week program of daily three-on-three basketball scrimmages led by the researcher, four “at risk” boys aged 10-13 were invited to describe their experiences: their thoughts, feelings, attitudes and their beliefs about their social and academic life. Their parents and teachers also shared their perspectives through questionnaires, interviews and informal conversations. Researcher observations and field notes made by the researcher throughout the school day, in addition to the other data were used in a cross-case analysis to develop an understanding of exercise and its effects on the social, emotional, and academic lives of these boys.
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To the participants who entrusted me with their hopes and fears, I appreciate their willingness to talk openly about personal and sensitive information, in the hopes that their stories might help others. I truly believe they will.

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CHAPTER 1
INTRODUCTION

This thesis is a descriptive report of an intervention, consisting of daily exercise with adolescent boys who have demonstrated symptoms of depression. Clinical depression is a whole body illness that involves the mood, thoughts, and behaviour of an individual and affects about five to eight percent of Canadian youth (Canadian Psychiatric Research Foundation, 2005). The affective symptoms of depression usually develop during adolescence, and are often associated with feelings of guilt, low self-esteem and worthlessness, and high anxiety. Cognitive symptoms of alterations in memory and concentration (American Psychiatric Association, Diagnostic and Statistical Manual-IV [DSM-IV], 2000) may also be present. The effects of both cognitive and affective symptoms can seep deeply into the social, emotional, and academic lives of these adolescents, sometimes with devastating results. Often unrecognized and untreated, depression is the most common cause of teen suicide (Canadian Psychiatric Research Foundation, 2005). Adolescent depression touches us all—friends, families, schools, and communities.

This thesis is written in five chapters: introduction, review of the literature, method, results, and discussion (cross-case analysis, reflections, and conclusion). The introduction outlines the rationale, and defines both the purpose of this study and the terminology used. The literature review briefly describes pertinent studies that support the rationale for using exercise as an intervention for depression in adolescent boys. The method details the procedures for participant
selection and data collection. The results chapter recounts the stories of two focal participants from the perspectives of the two participants, their teachers, and their mothers and includes supporting commentary from two additional focal participants. No data were included about the two participants not at-risk for depression who took part in the daily exercise program. The discussion chapter includes the cross-case analysis, the researcher’s reflections, and the conclusion. The cross-case analysis with open coding and inductive analysis to allow common themes to emerge from the multiple narrative perspective accounts as well as themes that were unique to individual participants. The researcher’s reflection emphasizes the rationale for studies examining adolescent depression, and how effective interventions for adolescent depression may also support the Ontario Ministry of Education focus on enabling all students to achieve success. This chapter includes limitations of the current study and directions for future research. Finally, the conclusion summarizes the findings and emphasizes the need for continued research into effective and sustainable interventions for adolescent depression.

Rationale

The symptoms of adolescent depression are often dismissed as quirks of the age—increased irritability or agitation, lack of concentration, frequent complaints, sleep disturbances, eating disturbances, decrease in grades or missed assignments (Canadian Psychiatric Research Foundation, 2005). As parents or teachers, what can we do? If there was a treatment that was simple, well tolerated, cost effective, and invisible, would we use it?
Exercise has been recommended as a potential alternative to standard pharmacological interventions for depression (Babyak et al., 2000). Adult studies provide some promising potential for positive outcomes using exercise interventions (Blumenthal et al., 1999). However, very little research has been conducted with adolescents (Field, Diego, & Saunders, 2001). Yet, this is an issue that clearly warrants further research. The side effects of drug treatment, cost, social stigma, and potential for abuse are all reasons to be concerned about whether the benefits outweigh the risks of using the drug treatment (Thase, 2003). Further, with the knowledge that as yet, no class of antidepressant leads to sustained remission of symptoms in the majority of depressed patients (Thase, 2003), the need to find alternate forms of treatment is obvious.

From an educational perspective, any strategy that supports the affective and academic growth of students is worth investigation. Exercise poses only a minimal risk, equal to participation in the existing Ontario physical education curriculum. The potential benefits of exercise as a strategy to increase student learning and well-being clearly outweigh the risks.

The central belief of the Ontario Ministry of Education is that all students can succeed and achieve high standards given the appropriate supports (Education for All, 2005). Moreover, the Ministry of Education has a target of 75% of students meeting provincial standards by 2008. Consequently, it is essential for educators to implement effective strategies for increasing student achievement. For students with symptoms of depression, exercise may have the potential to be one strategy of support for increased learning.
Purpose of Study

The purpose of this study is to describe the experiences (thoughts, feelings, and actions) of adolescent boys who have exhibited depression, before, during, and after their participation in a structured program of regular exercise that I provided within the context of the school day. I collected data from four focal participants, all of whom had exhibited symptoms of depression prior to the study, as well as from a parent (mother) and the classroom teacher of each of the four focal participants. Each day, two other boys (aged 11-13) who were determined to be not at-risk also joined to make a three-on-three scrimmage. No data were collected on these participants. I also maintained a journal and collected field notes while conducting this research. Based on analyses of these data, I described the experiences, through the thoughts, feelings and actions, from multiple perspectives, for three periods—prior to, during, and following the participation in the exercise program. I focused primarily on two aspects of the lives of these adolescent males: (a) the social and emotional aspects; (b) the aspects concerned with academics and learning. Using multiple perspective data from three periods of time, the focus of this study was to answer the question, does aerobic exercise have an impact on the mood and well-being, and the learning and academic achievement of adolescent boys who have displayed symptoms of depression?

Definitions

In this thesis, the terms exercise and physical or aerobic activity refer to cardio-vascular activity (increased heart rate and rate of breathing) as measured
by both physiological signs and the rate of perceived exertion (Borg, 1982). The physiological signs that can be observed by the researcher and felt by the participant are: (a) increased, labored breathing to the point where talking is possible but not easy; and (b) evidence of perspiration. Both of these signs indicate increased heart rate. The ability to talk is a measure of breathing rate. The more rapid the rate of breathing, the more difficult it becomes to talk.

The Rate of Perceived Exertion (RPE) is measured on a scale from one to ten (modified Borg Scale), one being the lowest and ten representing the highest. Sitting or lying down and talking would be considered at an exertion level of one; exhaustion to the point of not being able to move would be considered an exertion level of ten. Participants rate their level of perceived exertion using ease of breathing and the ability to talk in addition to muscle fatigue and the amount of sweat generated. At a low level of perceived exercise exertion (RPE 4-5), the participant would likely be walking. At a moderate level of exertion, the participant would likely be jogging, breaking a sweat, able to talk but with some degree of breathlessness (RPE 6-7). At a high level of exertion, the participant would be running hard, sweating heavily and unable to talk without some interruption to catch his breath (RPE 8-9). Both researcher observations and student comments were used to ascertain the rate of perceived exertion.

Adolescent, as it is used in this paper, is a specific term and refers to individuals aged 10 to 15. Youth, on the other hand, is a more general term, describing individuals from the ages of 10 through 21.

Depression as a general term is defined by the Diagnostic and Statistical
Manual IV (American Psychiatric Association, 2000) as a mood associated with feelings of guilt, low self-esteem, worthlessness, and high anxiety and often accompanied by alterations in memory and concentration. Within this thesis, participants considered to be “at-risk” for depression are observed by teachers as displaying three or more of the symptoms outlined in When Something’s Wrong: Ideas for Teachers (Canadian Psychiatric Research Foundation, 2005). These symptoms include: increased irritability or agitation, lack of concentration, frequent complaints, sleep disturbances, eating disturbances, decrease in grades or missed assignments, social withdrawal, voiced helplessness, addictive behaviour, and suicidal writings. More specific depressive disorders include dysthemia, a mild but chronic form of depression, lasting at least two years, but usually much longer. People with dysthemia may develop an episode of Major Depressive Disorder (Brosse, Sheet, Lett & Blumenthal, 2002). Major Depressive Disorder (MDD) is described as an affective disorder characterized by depressed mood; it can be so severe, enduring, and pervasive that it disturbs virtually all daily activities such as eating, sleeping, and personal hygiene (Ernst, Olsen, Pinel, Lam, & Christie, 2006).

Pharmacological intervention and drug treatment are terms that are used interchangeably in this thesis referring to a program of antidepressant medication prescribed by a physician to alleviate symptoms of depression.

Within the context of this study, learning is a general term that refers to an increased level of performance in cognitive tasks over time. More specifically, academic achievement refers to learning measured by teachers using specific
assessment tools recommended by the school, school board, or Ontario Ministry of Education, as well as by the Ontario Ministry of Education Curriculum Guidelines.

The argument being presented in this thesis is that exercise is an effective intervention for the relief of depressive symptoms in adolescents, and that exercise may also improve learning in these depressed adolescents. Chapter two presents a review of the literature to support this argument.
CHAPTER 2
REVIEW OF THE LITERATURE

Overview

The rationale that guides the focus of this study is that an aerobic exercise program may have positive effects on the learning and academic achievement of adolescent boys who exhibit symptoms of depression in addition to having positive effects on their mood and well-being. As very few studies have concentrated on adolescent populations, I am reviewing literature involving mainly adults with depression.

There is a body of research which suggests that aerobic exercise has the potential to be as effective as pharmacological interventions, and may also prevent as well as reduce the severity of depressive symptoms in adults suffering from depressive disorders. I review the literature which addresses: (a) the medical basis of depression, that is, the neurological links to depression and the effects of drug treatment; (b) the physiological effects of exercise on the symptoms of depression—the neurological changes as a result of exercise, the reduction of symptoms, and the potential prevention of symptoms in order to evaluate the efficacy of treatments; (c) the affective changes as a result of exercise focusing on the psychosocial mechanisms of depression, and exercise as a social, emotional protective factor for depression; and (d) the potential positive effects of exercise on learning and its implications for educators linking the reduction of depressive symptoms to positive outcomes for learning. I review each category below.
Medical Basis of Depression

*Neurological Links to Depression*

The purpose of this section is to review the literature on the neurological mechanisms that may account for depression in adults. As early as 1996, Nash proposed that the serotonin metabolism is disordered in a variety of medical and mental disorders. An individual’s serotonin set point may be disordered by environmentally induced events leading to altered sleep, dysthymia (a mild, but chronic form of depression), and depression. This imbalanced neurochemistry sets off autonomic nervous system hyperactivity causing any number of physical and affective symptoms. Serotonin can be altered by diet, exercise, sound, light, and selective serotonin reuptake inhibitors (anti-depressants). This paper is significant because it introduced the neurological basis for depression.

In a recent literature review, Hill and Gorzalka (2005) outlined a number of neurobiological theories of melancholic depression (MD), a subtype of depression characterized by hyperarousal, heightened anxiety, insomnia, reduced appetite, impaired behavioural flexibility, and a predominance of aversive memories (Gold & Chrousos, 2002; Rush & Weissenburger, 1994).

The monoamine theory of depression proposed by Schildkraut (1965) suggested that depression was a disease characterized by the reduced synaptic levels of monoamine (enzyme) activity in the brain. Hill and Gorgalka found that while antidepressant medication elevated monoamine levels in patients diagnosed with MD, major depression was not likely caused by reduced levels of monamine alone. If depression were due to a reduction in monamines, one would expect to
see a rapid reversal following pharmacotherapy which is not often documented (Nelson, et al., 2004). Hill and Gorzalka implied that findings in most studies supporting this theory could not be considered conclusive due to inconsistent methodologies and little corroboration from other work.

A second theory focuses on the stress system that is composed of the hypothalmo-pituitary-adrenal axis (HPA) which releases hormones which then stimulate the synthesis and release of glucocorticoids, primarily cortisol (a steroid) in humans. The HPA-axis dysfunction theory proposes that elevated glucocorticoid receptor levels and numerous disturbances in the stress axis inhibit the release of the hormone corticotrophin, exerting negative feedback thus forming a self-regulating closed circuit system. Long term treatment with antidepressants was used to support the functional relevance of HPA-axis disturbance in depression (Budziszewska, 2002). All classes of antidepressants re-stabilize the HPA-axis and the therapeutic lag, the researcher hypothesized, which is due to the required duration for these drugs to normalize the HPA-axis functioning. The support for this theory, however, lies mainly in a limited population of depressed patients, those with the most severe symptoms.

The final theory discussed in the paper by Hill and Gorzalka (2005) is rooted in the similarity between melancholic depression and an endocannabinoid (eCB) deficiency based on animal studies where the endocannabinoid (synaptic receptor) system is blocked either genetically or pharmacologically. The authors propose that the eCB system is an “on demand” neuroprotectant system that is activated during neurotoxic events to minimize damage. Human studies were also
cited showing a link between melancholic depression and an apparent deficiency in the eCB system. The authors further hypothesized that the deficiency in eCB activity would lead to increased adrenal output which would in turn lead to impairment of tropic activity and down-regulation of hippocampal atrophy. “It must be emphasized that this theory is entirely speculative at this point and has no clinical data to support it.” (Hill & Gorzalka, p. 346)

The reference list for this review is extensive and varied, and the argument reasonably clear. Very little information regarding individual studies was provided, however, making it difficult to substantiate the claims made by other literature reviews that methodologies and populations (e.g. small versus large sample size, clinical versus outpatient, melancholic versus major depressive disorder, short term versus long term) are generally inconsistent across this body of research.

In a second literature review, Ernst, Olson, Pinel, Lam, and Christie (2006) provided support for the hypothesis that a decrease in the synthesis of new neurons (neurogenesis) in the adult hippocampus might be linked to major depressive disorder (Duman, 2005). The hippocampus is a bilateral limbic structure that plays a role in learning and memory processes (Milner & Penfield, 1957; Penfield & Milner, 1958). MDD is an affective disorder characterized by depressed mood which can be so severe, enduring, and pervasive that it disturbs virtually all daily activities such as eating, sleeping, and personal hygiene (Ernst et. al., 2006).

In the section entitled, “The adult-neurogenesis hypothesis of MDD,”
Ernst and his colleagues cited three lines of support for this theory. First, the hippocampus, which is one of only two sites of adult neurogenesis in the mammalian brain, has been found to be smaller in some depressed patients (Campbell, Marriott, Nahmias, et al. 2004). Second, using laboratory animals, adult neurogenesis is increased by treatments for MDD such as antidepressants and electroconvulsive shock treatment (Duman, 2004). Third, new neurons take four to five weeks to become functional (van Praag, Schinder, Christie, et al., 2002), which is consistent with the onset of relief of depressive symptoms from most antidepressants. The authors hypothesized that this relief may be dependent on the maturation of new neurons into the existing neural network, but also pointed out that no direct links between adult neurogenesis and depression have yet been demonstrated. The lines of indirect evidence suggest that further investigation is warranted.

In this section, five mechanisms were described: the deficiency of the serotonin metabolism, monoamine theory, HPA-axis dysfunction, endocannabinoid deficiency, and neurogenesis. As much of the research is based on laboratory animal studies, results must be viewed with caution, as findings may not generalize to human populations.

In all three papers, the line of argument is clear. Results were explicitly stated with comments on directions for future research; however, there was very little description of the studies’ participants, methodology, or limitations. The challenge in drawing conclusions from this group of studies is the combination of animal and human participants with differing types of depression. The
significance of these papers lies in their pursuit of understanding the underlying mechanisms of depressive disorders in order to provide effective treatment.

Physiological Effects of Exercise

The purpose of this section is to demonstrate a link between exercise and the reduction of depressive symptoms in adults. In their literature review, Brosse, Sheets, Lett, and Blumenthal (2002) provided a clear concise line of argument supporting the position that exercise reduces depressive symptoms in both healthy and clinical populations outlining the possible mechanisms to explain this phenomenon. Their review clearly defined terms, outlined diagnostic criteria (clinician and patient rated scales), and drug treatment. The authors summarized 12 studies relating to exercise training and depression, hypothesized physiological and psychosocial mechanisms and addressed limitations clearly throughout the paper. The reference list was extensive at 191 citations.

Many of the research findings, when put together, provided considerable evidence for the benefits of exercise in reducing depressive symptoms in clinical populations, but stressed that limitations in research methodologies must be taken into consideration. At the time of publication, the authors found only three randomized clinical trials of exercise treatment for depression and only one having both adequate sample size and sufficient follow up with its participants. The direction for future research suggested by the authors was to determine what kinds of exercise, over what duration, and at what intensity, for which individuals, could support prevention of depressive symptoms.
Exercise and Neurological Changes

This section reviews research on neurological changes in the brain observed as a result of exercise. This is necessary to establish links between neurological changes due to exercise and similar changes as a result of pharmacological intervention.

Kubesch, Bretschneider, Freudenmann, et al. (2003) sought to determine if a short, 30 minute, individually customized endurance exercise program had the potential to enhance executive functions in adults with MDD. Using a randomized within-subject study design, 24 participants (aged 19-60) with MDD as diagnosed on the DSM-IV and 10 healthy individuals (aged 21-41) performed 30 minutes of aerobic exercise at two different workload levels (40% and 60% of the predetermined 4-mmol/L lactic acid exercise capacity). Participants were then tested with four standardized computerized neuropsychological paradigms measuring executive control functions. Performance was measured by reaction time. The results found no significant alterations in reaction time for the control group, but a significant decrease in mean reaction time for depressed participants in two of the four tasks. The authors concluded that a single 30 minute aerobic exercise program had positive effects on executive processes controlled by the anterior cingulate cortex. The authors argued that the results could not be solely explained by the explanation that exercise may increase oxygen saturation in brain areas crucial for task performance (Kramer, Hahn, Cohen et al., 1999). Rather, Kubesch, et. al. suggested that the increased synthesis of serotonin (5-HT) might directly lead to an increase of the serotonergic tone and thereby facilitate
information processing (Chaouloff, 1997). Indeed, the authors of the current study found no significant changes from pre to post exercise in the healthy population. They concluded that only deregulated brain systems benefit from short periods of endurance exercise. As well, the authors hypothesized, if longer periods of exercise lead to increased rate of oxygen consumption, short intervals may lead to central serotonin up regulation. Healthy adults have no evident serotonergic dysfunction, thus the beneficial effects are restricted to subjects with dysregulated serotonergic tone (depressive patients). The one inconsistency appears to be that all depressed participants received drug treatment during the trials. If, as Nash proposed, antidepressants regulate serotonin levels, one would not have expected a significant difference between groups. These results suggest that the complexity of MDD may involve more than serotonin levels.

A second study by Bartholomew, Morrison, and Coccolo (2005), set out to determine if a single bout of moderate intensity aerobic exercise would improve mood and well-being in individuals receiving treatment for MDD. Participants were 40 adults aged 18-55 years (15 male, 25 female) who were randomly assigned to either the exercise group (walking on a treadmill for 30 minutes at 60%-70% of maximum heart rate using heart monitor) or to 30 minutes of quiet rest. Participants completed Profile of Mood States (POMS) and Subjective Exercise Experiences Scale (SEES) as indicators of mood 5 minutes before and 5, 30 and 60 minutes following the experimental session. The POMS is a 30-item questionnaire scored on a five point Likert-type scale anchored with “not at all” and “extremely.” The POMS uses six subscales: (1) anger; (2) confusion; (3)
depression: (4) fatigue: (5) tension; and (6) vigor. The SEES is a 12-item questionnaire scored on a seven point Likert-type scale anchored with “not at all” and “very much so”. The three subscales are: (1) psychological well-being; (2) psychological distress; and (3) fatigue. Both groups reported similar reductions in measures of psychological distress, depression, confusion, fatigue, tension, and anger. Only the exercise group reported a significant increase of positive well-being and vigor scores. The authors note limitations of survey instruments (wording, variability of baseline score, and instruments); results may not generalize to clinical populations as patients were diagnosed without co-morbid disorders. Also, exercise intensity measurement as a scale of perceived exertion is subjective, giving a less accurate report of actual aerobic exertion.

While the difficulty in comparing the two studies is that subjective versus objective measures were used as well as different instruments to measure exertion (lactic acid versus heart rate), the implications of both studies are that the positive effects of exercise appear to be immediate as opposed to antidepressant therapy which may take two to four weeks to produce change in emotional state. Hence, the theory of neurogenesis would not completely explain the reduction of depressive symptoms.

In their literature review, Ernst, and colleagues (2006) investigated the mechanisms that could mediate the positive effects of exercise in alleviating symptoms of MDD. To do this, the authors searched for molecules whose levels were affected by exercise and had an effect on growth of new neurons (neurogenesis). Four molecules were selected and evidence reviewed. First, B-
Endorphins can influence neurogenesis and other hippocampal functions in adult animals (Persson, Thorlin, Bull, et al., 2003). Exercise leads to a surge of β-endorphins released into the bloodstream, resulting in short term mood improvement. Second, Vascular endothelial growth factor (VEGF) is a molecule that may link exercise and adult neurogenesis (Fabel, Fabel, Tam et al., 2003). VEGF is known to increase when humans exercise (Schobersberger, Hobisch-Hagen, Fries, et al., 2000). The third molecule investigated was brain derived neurotropic factor (BDNF). Exercise might be an effective method for increasing BDNF, and in turn enhance survival of newborn cells in hippocampus. The fourth molecule cited was Serotonin. Exercise seems to elevate levels of tryptophan hydroxylase in the raphe nucleus (Min, Chung, Lee, et al., 2003) an area of the brain stem that is densely populated in serotonergic cells (Vertes & Crane, 1997) which can influence hippocampal activity (Viana Di Prisco, Albo, Vertes et al., 2002) in animals.

The line of argument is clear in this section of the paper by Ernst et al. (2006) and the reference list extensive. The authors concluded that the literature supports the claim that exercise does increase adult neurogenesis and that exercise can be an effective treatment for MDD. However, they point out the major weakness in the empirical support is that research has been conducted on a non-human species (rodents). What still needs to be determined is whether neurogenesis can play a therapeutic role in alleviating MDD or whether this phenomenon is merely an unrelated event.
Depression and Drug Treatment

The research reviewed in this section provides support for the argument that exercise has comparable effects on depressive symptoms to the effects of drug treatment.

In their literature review, Brosse, et al. (2002) found only one randomized controlled trial design to compare the effects of exercise with antidepressant medication. Using 156 randomly assigned middle aged and older adults with MDD as diagnosed using DSM-IV, Blumenthal et al. (1999), compared three treatments—aerobic exercise, standard pharmacotherapy, and a combination of exercise and pharmacotherapy. At 16 weeks, groups did not differ significantly on percentage remitted, self-reported depression survey (Beck Depression Inventory—BDI), or clinician-rated depression severity (Hamilton Rating Scale for Depression—HRSD).

The Beck Inventory of Depression consists of 21 groups of statements (focusing on symptoms such as agitation, irritability, loss of concentration, pessimism, guilt, suicidal thoughts, etc.) and asks patients to choose the statement that best describes how he/she has been feeling during the past two weeks. The Hamilton Rating Scale for Depression asks the clinician to rate the severity of the patient’s symptoms in 21 categories from both spontaneous verbal and non-verbal communication and through direct questioning.

In the study by Blumenthal and colleagues, while little detail was provided regarding the type, intensity, and duration of exercise, it does provide sufficient reason to hypothesize that exercise is at least as effective in alleviating
depressive symptoms as drug treatment.

If exercise can be linked to the reduction of depressive symptoms in adults with MDD and can potentially be as effective in reducing those symptoms as drug treatment, it would follow that exercise should be investigated further as a treatment option for depression in both adults and adolescents, especially considering the finding by Thase (2003) that no class of antidepressant leads to sustained remission of symptoms in the majority of depressed patients.

Exercise: Reduction and Prevention of Depressive Symptoms

The research in this section demonstrates the value of exercise not only as an effective treatment for depressive symptoms, but also a preventative measure for at-risk individuals. Concerned that while pharmacologic and psychotherapeutic treatments for MDD are available but not adequately accessed by those in need (US Department of Health and Human Services, 1999), Dunn, Trivedi, Kampert, et al. (2005) proposed that exercise should be considered as alternative treatment because it does not carry a negative social stigma. Their study used 80 adults aged 20-40 years who were diagnosed with mild to moderate MDD in a 2X2 factorial design, plus placebo control. Participants were randomized to one of four aerobic treatment groups that varied in total expenditure (“low dose”-7.0 kcal/kg/week or “public health dose”-17.5 kcal/kg/week) and frequency (3 days/week or 5 days/week) or to a placebo control (3 days/week flexibility exercise). The outcomes were measured on the Hamilton Rating Scale for Depression from baseline to 12 weeks. The results indicated that aerobic exercise at a dose consistent with public health
recommendations was an effective treatment for MDD of mild or moderate severity. A lower level of exercise was comparable to placebo effect. The authors also note that response and remission rates (42%) were comparable to other treatments such as antidepressant medication (42%) and cognitive behaviour therapy (36%) (Blumenthal, Babyak, Moore, et al., 1999). This study uses sound design, although with increased numbers of statistical analysis measures, the likelihood of accepting the results as significant increases while they are actually due to chance. The importance of this study lies in the demonstration of the minimum energy expenditure required to alleviate depressive symptoms and the implications for treatment.

In a six month follow up study to their earlier work, Babyak, Blumenthal, Herdman et al. (2000) found that patients in all three treatment groups exhibited a clinically significant reduction in depressive symptoms at the end of four months of treatment and, in most cases, these improvements persisted for at least six months after the termination of treatment. Individuals who remitted with exercise alone exhibited significantly lower relapse rates than remitted individuals in the medication or combination groups. Limitations were outlined by authors: the participants were patient volunteers who may have believed exercise to be a credible treatment; “cross-over” treatment, that is, after completion of the four month period, almost half of the participants in the medication group switched on their own to an exercise program. Other limitations were the lack of a control group and that exercise was conducted in a supervised setting rendering social support as a possible mediating factor. In spite of the limitations, the significance
of the results is in the degree of the depressive symptom reduction and the persistence of positive effects after the termination of treatment. The potential for exercise as a preventative measure against the onset of depressive symptoms merits further investigation.

Dimeo, Bauer, Varahram, et al. (2001) also noted that exercise could have several advantages as treatment for depression as well as have potential for prevention of future episodes. In their brief study, the authors sought to evaluate the short term effects of a training program on patients with moderate to severe major depression. They used a relatively small sample size, twelve patients (five men and seven women aged 28-64 years); ten patients suffered from refractory depression defined as lack of improvement with at least two antidepressants of different mechanism for at least four weeks. Training consisted of walking on a treadmill with interval training (short bursts of intense exertion followed by an active recovery period) for 10 days beginning on Monday with breaks on Sundays. The severity of depression was clinician rated using the Hamilton Rating Scale for Depression. At the end of the training program, there was a clinically relevant and statistically significant reduction in depressive scores. The authors concluded that aerobic exercise could produce substantial improvement in mood in adult patients with MDD in a very short period of time.

The purpose of the study conducted by Bartholomew, Morrison, and Ciccolo (2005), as cited earlier, was to determine if a single bout of moderate intensity aerobic exercise would improve mood and well-being in individuals with MDD. Their results found immediate reduction in symptoms. Both studies
together suggest that exercise has the potential to provide immediate relief of depressive symptoms. In spite of the limitations, the evidence demonstrating both the reduction of depressive symptoms and the reduction of symptom re-occurrence provides a strong case for further research in this area.

The conclusions that can be reached from this section are as follows: exercise periods of at least 30 minutes may provide effective treatment for depressive symptoms in adults; the relief appears to be not only immediate but long lasting even after treatment has ceased; exercise may serve to prevent the reoccurrence of symptoms.

Affective Changes as a Result of Exercise

The studies in this section investigate factors other than physiological changes in the brain that may affect the reduction of depressive symptoms as a result of exercise.

Psychosocial Mechanisms and Depression

In their review, Brosse and colleagues (2002), cite a number of links between depression and negative self-evaluations including low self-esteem (Leary, 1995) and low self-efficacy (Bandura, Pastorelli, Barbaranelli, et al., 1999; Maciejewski, 2000), suggesting that antidepressant effects of exercise may be mediated by improved self-evaluations. A response style that favours distraction from negative emotion rather than rumination is associated with a more favourable prognosis. Exercise may be a means of distraction (Just, 1997; Nolen-Hoeksema & Morrow, 1993). These psychosocial mechanisms can be integrated using the Transtheoretical Model of Behavior Change (Prochaska,
Velicier, Rossi, et al., 1994). In this model, individuals move back and forth through five stages of change before establishing a stable pattern of changed behaviour: pre-contemplation, contemplation, preparation, action, and maintenance. Attitudes of self-efficacy, resilience, and self-esteem can facilitate movement between stages. Exercise may mediate this process by enhancing positive attitudes.

Exercise and Social Emotional Protective Factors

Sanders, Field, Diego, and Kaplan (2000) sought to investigate the relationship between sports involvement and social and psychological well-being in adolescents. Based on previous research, they hypothesized that adolescents who engaged in higher levels of sports involvement would be less depressed, have more intimate relationships with parents and friends, and have a better grade point average. The authors, using 89 suburban high school seniors (37 male and 52 female participants) administered a questionnaire with a 5 point Likert scale to gather data on the above factors. After statistical analyses were performed the results indicated that the low sports involvement group (2 hours per week or less) had significantly higher mean depression scores compared to the moderate involvement group (3-6 hours per week). This study as presented had significant limitations. Very little rationale was provided for the purpose, measures were not adequately described, and there was virtually no discussion of findings or statement of limitations.

Gore, Farrell, and Gordon (2001) also investigated the effects of team sports involvement to determine if positive outcomes on mental health in
adolescents was independent of the effects of other known protective factors (parental and peer support) and whether it moderated the depressive effects of family, peer, and school based risk factors. The data used for this study consisted of the first two of five waves of a longitudinal study examining stress, protective factors, and mental health in adolescence, using over 1,000 participants. The results indicated that sports involvement represented a fairly distinct protective factor for adolescents.

A Canadian study by Boone and Leadbeater (2006) sought to test the hypothesis that positive team sports involvement mediates the effects of low levels of social acceptance and elevated body dissatisfaction as risks for depression. The data were collected from 455 high school students (Grades 8-10) during required physical education classes. Data on social acceptance, body dissatisfaction, physical self-concept, total team sports involvement, and positive team sports involvement were collected using a series of checklists, Likert scales, and self-reports. Depressive symptoms were assessed via self-report using the Beck Depression Inventory. The results suggested that the benefits of team sports resulted in positive experiences enhancing perceived social acceptance and reducing body dissatisfaction through skill development and peer support. The authors noted the homogeneous sample and the un-validated measures as limitations and suggested that information from qualitative data would provide greater insight as to how team sports operate to reduce risk.

The research reviewed in this section suggests that exercise enhances self-evaluation factors generally linked to depression. Thus exercise may be
beneficial in reducing depressive symptoms both from a physiological and a psychological standpoint.

Positive Effects of Exercise on Learning

The intent of this section is to link the reduction of depressive symptoms as a result of exercise to increased performance on cognitive tasks.

The study by Sanders, Field, Diego, and Kaplan (2000) was replicated a year later by Field, Diego, and Sanders (2001). All of the limitations discussed above were addressed in this second study. This time, the results included findings that the high exercise group had higher grade point averages. The authors hypothesized that an increase in neurotransmitters, such as serotonin, was responsible for increased performance on cognitive tasks.

The study described earlier by Kubesch, Bretschneider, Freudenmann, et al. (2003) used four neuropsychological tests to assess cognitive function based primarily on the integrity of lateral prefrontal cortices. The task switch test can be seen as tapping into the cognitive domain of planning that is based on working memory resources. Here the participants were presented with two alternating cues (digit value and element number) and then asked to indicate whether the values of the subsequently presented digits were higher or lower than five, and whether the number of digits was higher or lower than five. The flanker test was selected to measure the ability to suppress stimulus-related affinity to interference. On this test, participants responded to a small centred square indicating whether it was red or blue. Targets were simultaneously flanked by rectangles that were of the same or different colour. Computerized versions of the Stroop task and GoNoGo task
were used to measure the ability to inhibit inadequate response tendencies in the verbal and nonverbal domains which involve the anterior cingulate. In the Stroop task, participants were presented with three conditions where colour words were congruent with the colour of the rectangle they were presented in, where the colour words were incongruent with the colour of the rectangle, and where a neutral word “xxx” was presented. Participants were asked to match the colours presented with the appropriate response key. In the GoNoGo task, during the Go condition, participants were asked to press a response key when the central fixation cross disappeared while the black dot was on the screen. Participants were asked not to respond when the fixation cross remained on the screen while the dot was present.

The authors observed no significant pre-exercise to post-exercise alterations for the task switch test or the flanker test. The GoNoGo task, however, revealed significant exercise effects with comparable rates of acceleration of reaction time in both exercise conditions. For the Stroop task, only the exercise procedure at 60% of workload led to a significant decrease for the congruent condition. With the incongruent condition, the exercise benefit was significant at 40% of workload, although the decrease was numerically larger after exercise at 60% of workload. The authors explained their findings by hypothesizing that only those cognitive functions mediated by the anterior cingulate can be modified. Since the anterior cingulate plays a key role in the inhibition of inadequate responses, it would follow that response conflict monitoring is more impaired in depressive patients than functions relying on working memory.
A recent Ontario study conducted to investigate the relationship between the Living School framework (providing programs involving daily physical activity, healthy eating, health education, character education, and anti-bullying) and Education Quality and Accountability Office (EQAO) scores found that students having 20 minutes of daily exercise performed significantly better on the Grade 3 reading and math tests and on the Grade 6 reading test (Guertin, 2007). After two years using the LS framework, EQAO scores further increased on Grade 3 and 6 reading, and Grade 3 math, in addition to improvements to the Grade 6 math. The results of this study indicate that there may be positive effects from daily exercise on academic performance for all students—both children and adolescents, and for those with and without symptoms of depression.

The evidence in this section indicates that exercise has a positive impact on some but not all cognitive processes. However, only one study was found that probed the effects of exercise on specific cognitive functions. Further research in this area is needed.

Summary

The research reviewed in this chapter supports the suggestion that moderate aerobic exercise may be an effective treatment for depression. First, aerobic exercise was shown to provide immediate relief from depressive symptoms commonly attributed to lazy or unmotivated individuals: increased irritability or agitation; lack of energy or excessive fatigue; lack of concentration, forgetfulness; physical complaints including headache, stomach ache; social withdrawal (Canadian Psychiatric Foundation, 2005). Educators who recognize
these characteristics as depressive symptoms can provide exercise interventions for individuals or groups of students as needed. Secondly, exercise as a treatment intervention is simple, well tolerated, cost effective, and invisible. There are few side effects of exercise, unlike pharmacological interventions. As well, there is little or no cost for most school activities, while cost is often an impediment for initiation and adherence to drug treatments in low income families. In addition, unlike taking medication, there is no negative social stigma associated with exercise. Third, research presented here suggests that exercise is linked to the prevention of relapse occurrences of depressive symptoms leading to better academic and social adjustment. Finally, emerging research is indicating that there is the potential for exercise to improve performance on cognitive tasks in particular those requiring inhibition control.

In chapter three, I provide not only the research methodology but also the context. As the former teacher of the participants, I share my rationale and my unique insights into the community, the school, and the participants, in order to describe this study effectively for purposes of replication.
CHAPTER 3
RESEARCH METHODOLOGY

Overview

This chapter provides an outline of the methodology and includes subsections that describe the participants, procedures, intervention, data collection, and data analysis. The intervention program that I provided consisted of daily 30-minute three-on-three basketball scrimmages. In these scrimmages, I included four at-risk boys aged 10-13 who, in my assessment, had exhibited symptoms of depression. I also included two not at-risk boys of the same ages in order to optimize the athletic and social make up of the activity group. The program ran from the last week in October 2007 through the first week of January 2008, five days per week for a total of eight non-consecutive weeks. Prior to, throughout, and following the basketball program, the at-risk boys were asked to describe their experiences (thoughts, feelings, and actions) relating to their social and academic life. Their mothers and teachers also shared their perspectives through questionnaires, interviews, and informal conversations.

I attempted to immerse myself in the world of these four at-risk boys as presented to me in the data. In seeking to know and understand these students and the perspectives of their families and their teachers, I wondered, “could we find a support that fits, that would allow these adolescents not only to stay afloat, but to swim capably and confidently into the future?” Because the majority of my professional experience as an educator with adolescents with depression over the last two years has been with males, I chose to include only males in this study.
Participants

Using purposeful sampling methods, I chose participants whom I judged would provide the best and most representative information (McMillan & Schumacher, 2006) about adolescent depression. This judgment was made based on my past knowledge and understanding of the students from contact over the past two years. I used convenience sampling and selected participants who were readily accessible (McMillan & Schumacher, 2006) within the school where I work in order to facilitate the implementation of the intervention.

The participants were chosen by me in consultation with the teachers of Grades six to eight from a list of male students whom we knew well through our work with them in the school. Using the publication When Something’s Wrong: Ideas for Teachers (Canadian Psychiatric Foundation, 2005), a set of descriptors and intervention ideas for educators, a potential list of at-risk male students was compiled. I considered male students I felt had three or more of the symptom descriptors for depression. As well, the teachers of the students being considered for participation in this study and I compiled a list of socially compatible not at-risk male students with similar athletic abilities. Beginning with Grade eight students, ranked by me in consultation with teachers by severity of symptoms, progressing to Grade seven and then Grade six, I contacted parents of potential at-risk participants, met with parents to explain the nature and rationale of the study and, upon receiving their permission, invited their child to participate. I sought four at-risk participants to take part in the study.

From a list of students chosen by me, two not at-risk male students were
invited each day to join in the “sports activity group,” as it was referred to among those not involved in the study. The not at-risk participants acted as stabilizers to promote a positive and socially acceptable environment, helping to support the acceptability of the study within the school environment and reducing the focus on the students who had experienced depressive symptoms. The not at-risk students attended based on their willingness and ability to attend during the recess break, as well as the success of the interactions both athletically and socially with the focal participants. No data were collected on the not at-risk participants.

Researcher

I have been a special education teacher for 25 years. My experiences have included teaching in large metropolitan cities, as well as small rural communities throughout central Canada. Prior to conducting this study, I spent three years in the school where this study was conducted. In the past, my role was as a half-time teacher to multiple needs students (social, emotional and academic) aged 10 to 14. The other half of the position was to support these and other “at-risk” students in their age-appropriate classes for non-core subjects. Having worked closely with the students who participated in this study, their teachers, and their families in multiple academic and social contexts and environments for up to three years created a relationship bond of safety, trust, and respect between myself, the at-risk students, their parents, and their teachers. This past relationship facilitated not only the efficiency in conducting the intervention and data collection, but also increased the trustworthiness of the data, as I believed that all the participants would speak openly and truthfully to me.
My teaching role during the course of this study was as a Resource Teacher, supporting classroom teachers with inclusive education practices, as well as providing individual and group support to all students in their own classrooms. The half-time multi-grade program that the boys in this study were previously in no longer existed.

Context

The community that the participants were drawn from consists mainly of working-class families. As affordable housing is limited, single parent families living in units with unique variations of blended families is not unusual. It is a small community, hence availability and accessibility to medical, health, and social services is a challenge for many families. The community has two schools; one providing French immersion programs, and the other one (where I work) provides the special education programs. The school involved in this study has approximately 350 students from Kindergarten through Grade eight, operates a twice weekly breakfast program, a before and after school program and houses an independent daycare.

Procedures

In this section, I describe the procedures I used to collect data in the study with parents, teachers, and students.

Parents

I met with the parents of potential participants to provide information regarding the study (See Appendix A), to answer questions, and to obtain consent for participation. Upon my receiving their consent, I asked parents of the at-risk
participants to participate in an interview process and fill out the same parent survey prior to the start of exercise intervention, during the course of the eight-week exercise intervention (at approximately four weeks), and after the exercise intervention had been completed (See Appendix B). The focus of the interview questions and the survey was to reflect the parent’s perceptions of the thoughts, feelings and actions of their child in relation to social and academic adjustment. The length of each interview and questionnaire session was completed within 30 to 45 minutes, with each parent individually.

The interview questions were designed to allow parents to provide as little or as much information as they were comfortable disclosing, but also to provide them with the freedom to elaborate in multiple and possibly unanticipated directions. In attempting to capture the uniqueness of each adolescent in order to understand and feel his experience, it was important to allow for flexibility within the interview process. I asked questions about the following characteristics: (a) Sociability—cooperation, tolerance, adaptability; (b) Responsibility—willingness to comply with rules and routines; (c) Self-regulation—ability to inhibit inappropriate responses; (d) Self-efficacy—personal belief that an individual can achieve given outcomes; (e) Self-esteem—personal belief that an individual has purpose and value to self and others; and (f) Academic Achievement—demonstrated learning outcomes (Boone & Leadbeater, 2006). A sample interview question about self-esteem would be, “Describe how your son feels about life at school.”

In order to maximize the trustworthiness of the data and of the collection
process, I recorded interviews using an audio-cassette and transcribed them verbatim. I wrote field notes to accompany the interview immediately following the interview, if I thought it was necessary.

The survey questions asked parents to rate how accurately they felt the statements described the mood or behaviour of their son while at home. The areas of focus for the questionnaire were based on six components from the Profile of Mood States (POMS): anger, confusion, depression, fatigue, tension, and vigor. Two statements from each category were presented in random order. The statements were rated on a scale of one to five, one being “not at all” and five being “very much so.” A sample question from the parent survey was, “______ is often irritable at home.” Parents were invited to fill these surveys out independently or with my support in reading and transcribing the responses.

**Teachers**

Upon receiving their consent, I asked the teachers of the at-risk participants to participate in an interview and fill out a survey prior to the start of the exercise intervention, during the course of the eight week exercise intervention (at approximately four weeks), and after the completion of exercise intervention (See Appendix C). The focus of the interview questions and the survey was the teacher’s perceptions with respect to the thoughts, feelings, and actions of the student toward both social and academic adjustment.

The interview questions were designed to encourage teachers to provide as much information as possible, through prompted elaboration and employing flexibility within the interview process. As in the parent framework, above,
questions were based on (a) Sociability; (b) Responsibility; (c) Self-regulation; (d) Self-efficacy; (e) Self-esteem; and (f) Academic Achievement (Boone & Leadbeater, 2006). A sample interview question in the category of sociability was, “Describe the participant’s social interactions with peers, and teachers… Please elaborate as to why you think this is the case.” As noted in the parent section, information from interviews was either recorded where written permission was provided or written in field notes as close to the words used as possible.

The teacher survey questions were very similar to those in the parent survey and asked teachers to rate how accurately they felt the statements described the mood or behaviour of their student in all environments while at school. The areas of focus for the questionnaire were based on six components from the Profile of Mood States (POMS): anger, confusion, depression, fatigue, tension, and vigor. Two statements from each category were present in random order. The statements were to be rated on a scale of one to five, one being “not at all” and five being “very much so.” A sample question from the teacher survey was, “Student often appears anxious, worried, or nervous.” Because of the multiple environments in which teachers observed students, I hoped that the survey questions would elicit further discussion. Teachers were asked to complete the survey independently. In consideration of the time commitment involved, the interview and questionnaire session was completed within 30 minutes (for each student participant).

Informal discussions sometimes took place between teachers, the Child and Youth Worker (CYW), and the researcher. When the conversations in such
casual meetings focused on the issues under study, for the focal students, the data were recorded as field notes as soon as possible after the discussion had taken place.

Student Participants

Upon receiving parental consent and the agreement of the focal participants, I invited these at-risk participants to participate in an interview process prior to the start of the exercise intervention, at the mid point, and after the exercise intervention had been completed (see Appendix D). In order to maximize the willingness of the students to remain in the program, it was important to tailor the questions and the interview time to the unique strengths and needs of each student. Due to multiple factors such as mood, physical or emotional distractions, and self-regulatory capabilities, some students required shorter interview times or interview questions presented in chunks. Other students relished the opportunity to spend time with the researcher. Thus I tried to be adaptable and flexible while conducting these interviews. Knowing the students well and being involved in their day at school allowed me not only to optimize times for interviews, but also to decide which questions students would be willing to answer and elaborate on, and when students had given as much response as they were either willing or able to do at a given time. All focal participants completed an interview; however questions were frequently reworded and in some cases omitted in order to reduce anxiety and to optimize the depth of the information. It proved valuable to allow the student to direct the interview, allowing me to probe as much or as little as I felt able to in order to maximize the
information provided while ensuring the emotional safety and security felt by the
participant. The interview questions were designed to provide students with the
freedom to elaborate in multiple and possibly unanticipated directions.

The focus of the interview questions and the survey reflect the at-risk
participants’ perceptions with respect to their thoughts, feelings and actions
toward both their social and academic confidence. Considering the potential for
increases in positive outcomes, questions were based on the following areas—
potential factors that might affect changes in mood and state of well being: (a)
Physical Exertion; (b) Competition; (c) Skill Development; (d) Social Interaction;
(e) Self Image; and (f) Confidence. A sample interview question was “How do
you feel after the games?” This is an open question that elicited reflection
relevant to many of the above categories. Follow up questions were necessary to
allow the participant to elaborate within any of the above categories and to
expand reflections into other areas. As noted in the parent section, information
from interviews was recorded when written permission was provided.

Since there was already a relationship between myself and the at-risk
participants, I anticipated informal discussions throughout the day. I recorded
these discussions as field notes as closely as possible following the discussion.

The survey questions asked at-risk participants to rate how accurately they
felt the statements described their mood or behaviour while at school. The areas
of focus for the questionnaire were based on six components from the Profile of
Mood States (POMS): anger, confusion, depression, fatigue, tension, and vigor.
Two statements from each category were present in random order. The statements
were to be rated on a scale of one to five, one being “not at all” and five being “very much so.” A sample question from the participant survey was, “I don’t want to do anything right now.” At-risk participants were asked to fill out one of these surveys prior to the first exercise session, and then again at the end of the exercise intervention. Surveys were either completed independently or with my support in reading and transcribing the responses.

Intervention

Participants took part in an eight week program consisting of a 30-minute scrimmage of three-on-three basketball. Whether we used indoor or outdoor facilities was determined by weather (precipitation and temperature) and gym availability. I created the teams (in consultation with teachers) in efforts to ensure optimal social compatibility, game flow, and exertion levels.

My participation focused on fostering a safe and emotionally secure environment in which the participants could engage in physical activity without the fear of social judgment or repercussion. I attempted to provide clear expectations, consistent supervision, and a climate characterized by fun and enthusiasm to minimize the anxiety of participants and to maximize participation.

Due to participant illnesses, and my inability to run the program on two days due to lack of available space and inclement weather, the intervention program extended an additional week past the originally scheduled eight weeks. The program ran for seven consecutive weeks (October-December 2007), with a two week break (Christmas Holiday), and then the final concluding week (January 2008).
Data Collection

Data were collected for the four at-risk participants although, for the final case study, I planned to describe the two at-risk participants who proved to be the best informants (those who answered freely, and with full thought, who felt comfortable telling their story, and who elaborated). This design also allowed for the possibility of two at-risk participants withdrawing without compromising the data reporting and the design of the study. While all four at-risk participants completed the intervention, one of the at-risk students moved to another school prior to the completion of the final interviews with him and his parents.

Data were comprised of (see Appendix D) my daily research field notes before, during, and after the basketball sessions; regular informal observations in classroom, on the yard, and in other locations within the school; regular informal discussions with participants, teachers, the child and youth worker assigned to one of the at-risk participants and the school principal. In addition, I conducted formal interviews and surveys prior to the exercise intervention session, after the fourth week of intervention (at the mid point), and after the eighth week (end of intervention) with students, teachers, and parents. Due to a two-week teacher illness (of Ellen), the mid-intervention teacher interviews for Connor and T.J. were not completed. Field notes were used to document conversations during the middle phase of the intervention.

The areas of focus for the data collection were based on two profiles. The first profile uses the six components from the Profile of Mood States (POMS): anger, confusion, depression, fatigue, tension, and vigor. The second profile uses
the potential for increases in positive outcomes, based on the following characteristics: (a) Sociability—cooperation, tolerance, adaptability; (b) Responsibility—willingness to comply with rules and routines; (c) Self-regulation—ability to inhibit inappropriate responses; (d) Self-efficacy—personal belief that an individual can achieve given outcomes; (e) Self-esteem—personal belief that an individual has purpose and value to self and others; and (f) Academic Achievement—demonstrated learning outcomes (Boone & Leadbeater, 2006).

Using information from participants, teachers, and parents, in addition to the researcher’s knowledge and understanding of the participants’ affective and academic strengths and needs both past and present, I developed a descriptive narrative. Two at-risk students became the focus of the analysis which uncovered the perceptions of the students, of their parents, and of their teachers (and child and youth worker) regarding affective and academic changes that occurred during the exercise intervention period.

Data Analysis

Using pattern recognition, the ability to see patterns in random information (Boyatzis, 1998), and through the process of inductive analysis, I looked for any patterns that emerged from the data rather than making an assumption that the data would fall into specific patterns that might exist in other similar contexts (McMillan & Schumacher, 2006). In this particular study, it meant being open to the responses provided by all participants (students, parents, teachers, and child and youth worker) without assuming that adolescent data
would conform to that of previous adolescent or adult studies. I was also guided by the six components of the Profile of Mood States and the areas of potential growth that I have described above. I used open coding (Strauss & Corbin, 1998) to analyze the content of the data into patterns or themes.

Given the nature of the participants (those for whom mood and state of emotional well being is a factor), and the fact that I wished to use my two year immersion to enhance reliability of the data rather than as a limitation, it was important to use a multiple perspective approach. I wanted to reveal how the exercise intervention might impact not only the lives of the boys, but also their classmates and teachers (as described by the teachers) as well as their peers and their families (as described by their mothers).

The process of analysis involved a thorough rereading of the transcripts and the coding of transcripts chronologically within the two general areas of mood and well-being, and learning and academic changes. Other themes did emerge and were coded separately. I developed detailed descriptive accounts of two students, prior to, during, and following participation in the intervention. These accounts used data from the sources described above, and while written as narrative accounts, follow closely the words and actions of the participants expressed in the interviews and questionnaires, as well as field notes and observations. I then compared these detailed accounts for the two students to discern what qualitative and quantitative changes were evident that might be related to each student’s experience of the intervention. I analyzed the data from the other two focal participants in less detail to look for corroborating or
contradictory evidence of the accounts based on the two most informative cases. Other themes that emerged were coded separately. Individual descriptive case study profiles were prepared and used to uncover patterns. Once patterns and possibly themes had been established through inductive analysis, then a cross-case analysis was used to compare the two individual cases (Patton, 2002). The final theoretical proposition was derived through interpretation and deductive analysis (Strauss & Corbin, 1998).

Trustworthiness of the Data

To ensure the trustworthiness of the data, a number of systematic steps were taken. I used audio-taped interviews and transcribed them verbatim and I recorded my observations and informal discussions as field notes as soon as possible after their occurrence during the school day. I used the multiple perspective data (students, teachers, parents, and researcher) in order to support the findings from each individual group. Multiple passes through the data during the narrative and cross-case analysis ensured a consistent and detailed account of the information provided through the interviews and through field notes.

The following chapter details the results in narrative form. The stories of Devon and Connor are told from multiple perspectives. Individual comments from T. J. and Jordan are included to provide additional insight into the thoughts, feelings and actions of the adolescent boys before, during, and after the exercise intervention.
This chapter is written in six sections using narrative analysis to tell the stories of the two of the focal participants from multiple perspectives. Supporting commentary from the other two focal participants is included. I used narrative analysis to uncover the thoughts, feelings, and actions of the two focal participants from the perspectives of their teachers, their mothers, and the boys themselves, to understand the social, emotional, and academic challenges faced by the boys before the exercise intervention. Then I pieced together the changes described in the accounts of the participants after the boys’ participation in the eight-week basketball program. The first two sections, Prologue and Epilogue, provide two brief accounts written from the researcher’s perspective before and after the exercise intervention, contextualizing the complexity of the adolescent depression puzzle. The third section recounts Devon’s story, chronologically told from four perspectives: first, that of Devon—before the intervention, during the early stages, and then in concluding stages of the intervention; second, told by his teacher Rae—before and after the intervention; third, told by Marie, the child and youth worker assigned to Devon—she provides her views of the early, middle, and late stages of the intervention as she accompanies and supports Devon in all environments at school; and finally, by Cherrie, Devon’s mother—before, during, and after the intervention. The fourth section is Connor’s story, from October to January, as told from his own perspective; from the perspective of his teacher
Ellen; and from his mother Dean’s perspective. In Connor’s story, Connor, Ellen, and Dean describe their thoughts, feelings and experiences before, during, and after the intervention. The fifth and sixth sections provide only brief student perspectives, the thoughts and feelings and experiences, of T. J. and Jordan before, during, and after the intervention. T. J. and Jordan are the two focal students who have demonstrated the characteristics associated with depression who provided less robust accounts of their experiences throughout the study.

Prologue

Six boys arrive at the gym door in anticipation of the moments and days to come—the new basketball program. What lies ahead? What will it mean for them?

First, Connor, tiny but agile, bursts through the door, full of energy and enthusiasm... “What are the teams? I’ve got the ball. Are we ready to start?” Devon, solid and strong, is already waiting, anxious and apprehensive. He watches intently, trying to envision how things will play out for him. Jordan, like a big teddy bear, arrives casually under a veil of apathy—his aloof demeanor hiding the social and athletic insecurity I have observed. Finally, T. J., average in size and ability, but portraying a picture of confidence and control, saunters in and announces his plan for the teams and the game. Eyes look to me, voices collide. The floor is set and ready to go.

Game on. Connor explodes off the dribble, focused and intent on his game. Devon handles the ball with ease. To his surprise, Devon’s soft hands slip the ball effortlessly into the net. Again and again, the ball drops in, nurturing
Devon’s confidence. Relieved and rejuvenated, Devon passes the ball to his team mate, selflessly seeking to put points on the board. To his own surprise, T. J.’s not the top dog, and he knows it. His snipes, like daggers, pierce the air of congeniality, re-opening wounds forgotten between old adversaries. The mood is tainted, and the game shifts from athletic skill to emotional strength.

The repercussions begin to take hold. Jordan, still coughing from bronchitis, is easily convinced this is no place for him—who needs it (or them for that matter). He’s “outta here.” Words are exchanged, tempers flare, the pushing begins.

The aura of hope and anticipation, the awareness of possibility and potential that was fleetingly present—would these boys ever be able to feel that again? What would it take for that to happen?

Epilogue

Only half a gym and expensive so und equipment everywhere…”This is not going work,” I think to myself. “Okay guys, we need to play half-court, two-on-two. When you steal the ball, you have to bring it back over half to change the possession. One, two, three, four—on the floor. You two have to sub in. Any questions? Okay, let’s go.”

With little direction, it’s game on. The play is fast-paced and intense. The boys have to run fast to keep the ball inbounds—there are sound boards, speakers, microphones, and wires to worry about. The air is charged with energy. Hands are out, ready for the pass. Names are called, signaling the play. Hands are slapped and cheers of encouragement reverberate everywhere.
Instinctively, with no direction, the players sub on and off at one minute intervals. The play is so fast and so intense; they can’t stay on for the usual six minutes. Still panting, the subs cheer from the side, congratulating their opponents for plays well executed, efforts well made. The emotional bond is tightening, but the teams are blurring. Who is on what team? Who is against whom?

“Devon, I’m with you.”

“T. J., it’s you and me, okay?”

Now, it was just about playing the game, working together, giving everything you had, physically and emotionally. The barriers had disappeared—the athletic and social differences didn’t matter anymore. They were on a physical and an emotional high.

Devon’s Story

_Devon—Grade seven student_

_October: I’m ready..._

Devon is anxious. After four years of special programs, he has returned to a regular classroom. He just wants to be a regular twelve year old, but that’s easier said than done when you have Tourette Syndrome. It is hard to overcome years of teasing and taunting by both children and adults in the community, but Devon knows he has worked hard. The constant intrusion in his life of doctors, counselors, and teachers has helped him to finally accept his condition. Now, he’s ready to come back to school, ready to try again. But, he wonders and worries, "Are the other kids ready? Will they give me a chance?" Cautious, Devon is
taking things one step at a time. Watching, watching, watching—everyone and
everything—trying to gauge what is expected of him completely absorbs his
focus. Having Ms. Mills (the Child and Youth Worker) assigned to help him only
irritates Devon. He doesn’t want to be centred out in class. He doesn’t need her. If
everyone would just give him a chance, he’d be fine. Take sports for example.
Big and strong, Devon loves sports. Mr. North took him along on the
intermediate boys’ soccer team this September. He gave Devon a chance. It was
great. The other kids could see that he was a respectable player. At last, he could
show them, there's something he's good at...something, so they would accept him.
All he needs is a chance.

*Just give me a chance*...

Devon knew from the outset what physical activity could do for him. It
made him feel good. He was strong and coordinated. He liked to play sports.
Hockey was his favourite sport, but he also liked soccer and basketball. Although
before this year, Devon had never played organized sports (his mother was
worried that he would have trouble keeping his aggression under control), team
sports are his favourite because he likes to play with his friends.

He is excited about the basketball program. Devon likes feeling included
in the planning and the organization and he trusts that his interests are being
looked after. Full of suggestions about how to set the teams up, he’s been talking
non-stop. He knows who he likes, and who he works best with. He also is
concerned that the teams are fair. That’s important. The added bonus of the
program is that it is being held at recess, so he doesn’t have to worry about the
kids in his class who bother him on the yard. He’ll stay out of trouble and have fun too.

Finally, it’s time to play. Day one: Devon is both excited and anxious. His adrenaline is running high. Focused and determined, he's up for the challenge. The game is on, and it is intense. It feels good. Within a few minutes, Devon is at home on the court. Basket after basket comes with concentration and a soft touch. "Yes!" He can do this. The other players pass to him and he passes back. Teamwork—it’s about the game. Exhilarated and out of breath, Devon is on top of the world. As the basketball group meets for a snack and some social time, with the music on amid happy and relaxed conversation, Devon watches, relaxed and content, yet still wondering what tomorrow will bring. But today, he felt good. “I liked playing,” he remarked afterward. “It was fair teams and I like the guys. . . [Now, I feel] ready to go back to class.”

Day Two: Devon is more confident today. He is physical and plays with intensity. The stakes are high and the game competitive. T. J. is starting to snipe. Devon tries to ignore him, but his demons are re-emerging. Devon begins to slip into the "tough guy" persona of his past, one of control and intimidation. He pushes another player down. Immediately, Devon is escorted out of the gym. "No wait!" he cries. "I didn't mean it. I'm sorry." He is sincere, really sincere. "I just got angry. Can I please go back and apologize? Please. Just give me another chance." He wanted to play, to show them he could. He wanted to get along. And belong. He wanted to feel good. Devon returns to the class early with the realization that it's still hard. During the post game activity, Devon is quiet.
November: It's still hard...

Day Four: Devon understands today just how hard it is, but he knows what he needs to do and knows he can do it. Once again, the energy level is high and the game is intense. Emotions are running high, and again the kids are arguing. There's body contact, but this time it is part of the game—not about retaliation or intimidation. Nevertheless, Devon immediately blurts out an apology. He does not want to be misunderstood. Physical contact—it’s part of the game. This time it meant nothing. The opposing player seemed to understand this. Somehow, everyone seemed to understand—the post game banter was full of energy and acceptance. Today, Devon joined in the conversation.

Back in his own class, the kids were still bothering Devon, but he was trying so hard to turn things around. He realized that Ms. Mills (his CYW) was right; it was best to get out of a bad situation and work in the library. There, he could get his work done, and have some time on the computer. He wanted to be in the class, but there, things just didn’t go well. He couldn’t tune out all the distractions, deal with the teasing, and stay out of trouble. In the library, he could relax and not worry about his tics. He was making the best of a bad situation.

December: It's okay now...

As the program progresses over the next couple of weeks, Devon focuses his energy outwardly now on team play. Two players from his class had been asking to join the group, ones that he normally had problems with. But surprisingly, during basketball, the two new kids didn’t bug him. It was okay. They call to him, pass to him, congratulate him. Everyone is working together.
Devon can't help but get caught up in the on-court encouragement. He is focused yet relaxed. His brain knows this and his body is responding. Out there, he's just a basketball player, a good basketball player. Now kids are asking to have Devon on their team. This is Devon’s world and now they want to be a part of what is his. Finally, he is one of them. He belongs.

After playing basketball, Devon is “ready to work.” He is relaxed and able to concentrate. Ms. Mills (his CYW) has his assignments and tasks organized for him, and he knows it's best if he works away from all the distractions. He's focusing on making good choices, like asking to work in the library to get away from students who are off task. Ms. Mills is tough, she makes him work. But that's okay. He's doing pretty much the same work as the other kids, and getting it done. (Yea, sure, he still tries to get off a bit easy, but Ms. Mills makes it fair.)

By the end of the intervention, Devon is spending more time in the classroom. Now, he is okay in a group. He listens mostly. But there aren’t any problems. It feels good. And when it comes time to do his own work, he isn’t always sure at first, but with a little help, it usually isn’t as hard as he thought. Actually, it isn’t that hard at all. Everything will be okay.

About the other kids...he's ignoring the comments from certain students that are intended to catch his attention in class, in the halls, outside. Making better choices, that's what Ms. Mills (his CYW) is always saying. "Walk away," is what he tells himself. Like the day we had to play outside because of an assembly. Our basketball time ran into recess, so a few students came over to watch. When he saw Sean walking toward him, Devon quickly left on his own, and disappeared.
into the school. No discussion. No repercussion. Devon knows he's handling those situations where someone is trying to get him into trouble. "It's better with Sean, definitely. We're not friends. We don't talk. [And with Keith] We're not friends or anything. But we're okay."

January: What’s next?

Now that the intervention is over, Devon wants to continue playing, but this time, he’s not worried about who is on his team. "Oh, yea, I don't care who plays…whoever wants to play.” He even has plans for another program, a road hockey tournament in the spring. “You know I like hockey. Hockey is really my sport."

Summary

From Devon’s perspective playing with intensity for 30 minutes just made him “feel good.” Physically, he felt “energetic…a bit tired.” Devon had come to believe that he not only had individual skill, but also that he had something to contribute to the team, “I’m a play maker–I don’t take all the shots.” Then after the game, he was in “a good mood.” He could relax, socialize, and then be “ready to work.” He could concentrate better he said, because it “helps you to get some exercise.” Basketball didn’t solve all his problems—the tics were still there—but by the end of the intervention, Devon was able to articulate that things had improved for him—socially, emotionally, and academically.

Rae, Devon’s Grade 7 classroom teacher

October: What's going on with him?

Devon’s teacher, Rae is apprehensive. She’s heard the stories about
Devon and they linger in the periphery of her thoughts. Even though the resource teacher tries to reassure her, “He’s ready. He’s come a long way...He wants to be back at school...” she’s still unsettled. It is a relief that Marie Mills, the Child and Youth Worker has been assigned solely to support Devon. She’ll be responsible for his behaviour. Yet, Rae wonders, what effect will he have on the rest of the class?

Devon’s first few weeks, however, weren’t quite what she had imagined. Devon would come in late everyday. He would just look around and stare at people. That’s all he would do. Why does he do that? Rae wonders. “Is he trying to intimidate them—be the Big Shot? Or, is he worried about the other kids?” thinking that they are talking about him? “Maybe it’s just his face—his tics.” What Rae did know was that the staring bothered the other students. They were complaining to her. And they were starting to tease and taunt Devon. Things were turning around on him. “Maybe he just can’t keep up and is trying to find something else to do.” Rae just couldn’t get a feel for what was going on.

Rae recognizes that Devon has missed a lot of school. As a teacher trained in special education, she knew academic re-entry would be a challenge. So she has tried to find activities and topics that will interest him, and give him tasks that she knows he is capable of doing. She tries to support Devon without centring him out. When Rae asks if he understands the task, Devon usually replies that he does. When she offers help, he usually declines. Rae just can’t seem to engage him. “He just won’t produce anything. I don’t know if it’s necessarily his motivation...It may be his mood.”
On the other hand, Devon is no saint. “Often, he’ll walk around the class and he’s always making...negative comments toward everyone else. He’s just always mouthing something, trying to intimidate them.” Devon watches Rae. He watches Rae watch him. “He’s thinking about something, trying to get away with something...just the way he looks out of the corner of his eyes...he’s making sure I’m not watching if he’s going to do anything…”

As the intervention is about to begin, Rae’s greatest concern, however, is Devon’s social and emotional well-being. When he started in September, he seemed pretty confident to her. He wanted to be at school, with his friends, just like a regular kid. When Rae sees him after school on the street, he seems happy to be with his friends, but, here in school, the students in the class see his tics and they are starting to bully him. Talking about her concerns seems to clarify Rae’s understanding about what is going on with Devon. “He is very distracted. He is worried about something else, I think. It just seems that he’s just always looking around and always thinking, rather than focusing on [his work].” Even with respect to the aggression, Rae is getting a better feel for what is precipitating Devon’s behaviour in the classroom. “He tries to put up a front. He tries to be the tough guy. But now it’s turning back on him. He probably doesn’t know how to react.”

While Rae is the classroom teacher, it is Marie Mills who spends her days closely watching Devon, interacting with him, and accompanying
him in his activities in all school environments.

Marie Mills, Child and youth worker (CYW) assigned to Devon

October: He's really trying to control things...

Marie knew Devon did not want to have anything to do with her. He made sure she knew it. It wasn't personal, he just didn't need anyone. He had everything under control...that was just the problem. Marie knew Devon's behaviour was creating a problem in the classroom and she couldn't help if he wouldn't let her. He didn't listen to her, or follow her directions. He just did what he wanted. He was trying to control everything and everyone. Marie knew the problems were escalating not only in the classroom, but also in the community. Something had to change.

November, December: He's handling it!

One-on-one as Devon’s CYW since the first day of school, in the classroom, and with the group during the basketball intervention program as well, Marie notices changes in Devon’s social and emotional demeanor very early on. “I can’t believe how well Devon handled his aggression [day two]. He was so apologetic. He really wanted back in the game, but also I think he realized that it was the wrong choice, that he just acted on impulse.” To her it is very apparent that not only does Devon want to play, but also that he is very motivated to do what it takes to continue playing. Beyond increased motivation to participate in an activity of choice, she is also noticing something unexpected. By the second week of the
intervention, in the classroom, Marie is observing that Devon now often appears less anxious and is clearly trying to ignore some of the other kids in the class. “I think it really helps that he is able to have that time in the gym in the morning. It really seems to relax him, and I notice too that his tics aren’t really coming out in that situation.” She sees Devon becoming more relaxed, more focused.

By the six week mark, Marie notes that Devon is trying to make the best choices for him. He is beginning to understand that it’s more important for him to get what he needs, rather than equal treatment.

Devon is doing well. There are still some tics in class, but he is handling it. The other kids still look at him, but he is ignoring any comments. He doesn’t think it is fair if I suggest that we leave; he thinks the other kids should leave...but he is handling it well.

Devon is making good choices. He is willing to leave the class when the other kids are bugging him so it doesn’t turn confrontational.

As a result of Devon’s willingness to adapt to situations that are distracting or upsetting to him, Marie (CYW) sees that he is making progress academically. “He’s working really well for me. He doesn’t always like it, but he comes and he’s productive.”

For Marie (CYW), however, it is the changes in the social interactions that are the most significant. As the intervention enters its last couple of weeks she is surprised at how dramatically Devon’s social interactions have improved.

I can’t believe how well he gets along with the other kids. Even [with] the ones that bug him in class—it doesn’t seem to be an issue when
they play here. He’s pretty accepting to have them play, and they work well with him. I find that so interesting.

The proof of progress for her is in Devon’s ability to deal with conflict. “I was so impressed with the way Devon handled that incident with Connor [focal participant]. He was so controlled. He wants to have better self-regulation. He’s really trying. He’s much more mature about dealing with conflict among peers.”

What was even more impressive to Marie (CYW) was how the non-focal participants from Devon’s class (the one’s who had previously bullied him) took the lead in de-escalating the conflict between Devon and Connor. “Wasn’t that amazing? They would normally have joined right in.” The positive changes in social interactions were extending beyond just the focal participants. The next day, there was no evidence a conflict had ever taken place.

December, January: Summary

Marie knows that the basketball intervention was more than just a game for Devon. Not only could she see significant social and emotional changes in Devon, but also academic changes as well. She describes Devon as being more relaxed and confident and she can see the difference in all environments, in the gym, in the classroom, and when he is on his own with her. “He’s really making good choices, he’s getting better about following directions, and he’s asking for help.” Now Devon is taking responsibility for his behaviour and his learning.
Rae, Devon’s Grade 7 classroom teacher

January: Self-esteem—Big improvement there!

As the formal basketball program concludes, Rae sees a real change in Devon, academically, socially, and emotionally. Now, in the classroom, Devon is more focused. “He listens, he tries to. You can tell he’s really thinking about it.” Devon is also much more compliant. “He follows directions. He doesn’t push the limits any more. He tries really hard.” As a result of these improvements, Devon is making academic progress. “He’s moving forward, definitely. He can follow the steps of what we are doing. He demonstrates some understanding of what is being presented. It’s coming.” Improved focus, increased compliance, and increased learning all seem to be interconnected with positive changes in social interactions with both teachers and students. “I can come over now, and he’ll talk to me, not just try to get me away.” As well, Devon is now willing to try to tackle new or challenging tasks rather than avoiding them. “He was a little timid at first, but when he got going, it was fine. He was doing it [the math survey] on his own, asking other students questions. The interaction was positive.”

Social interaction, especially peer interaction, is the area where, as his teacher, Rae sees the most dramatic change, both in terms of how Devon relates to others, as well as how his peers relate to him. Students who used to criticize or make fun of him, the ones he plays basketball with in particular, will now help him out if they see he’s having trouble. “I think they are seeing him in a whole different light. I think they are much more empathetic. And for Devon… he might have picked on them before, now he has the confidence that he can relate to
them.” Rae believes that playing basketball with them has really helped Devon’s social skills develop. “[Now] He can see how they might feel.” The emergence of tolerance, empathy, and confidence are highlighting to Rae that Devon’s self-esteem is improving.

Emotionally, Devon has come a long way. He is visibly more relaxed, and more confident. Rae sees this positive influence in both his academic and social skills. “He seems much calmer now—more accepting, more understanding. Change doesn’t seem to cause him the same anxiety as it used to.” He’s more productive in class, and Rae sees a link between reduced anxiety, increased self-efficacy, and self-esteem. “I think he wants to succeed rather than worrying about everything else. It’s like a greater motivation toward himself, and getting things done.” She also describes an apparent link between reduced anxiety, and improved social interactions and self-esteem. “He seems to be worrying a lot less about the other kids, what they think; maybe it’s because he sees them treating him better and he’s more confident.” Rae believes that the most significant results of the basketball program are that Devon’s self-efficacy, self-confidence, and self-esteem have risen. “Oh, it’s definitely increased from what it was! He feels really good after a job well done...He’s seeing both academic and social success, maybe that’s why he is willing to work, willing to try.”

Summary

In the accounts of both Rae (Devon’s teacher) and Marie Mills (Devon’s CYW), daily physical activity is seen as a key factor in reducing Devon’s anxiety level and thus improving his mood. Calmer and more self-regulated, Devon was
able to tolerate and even ignore the actions of others, reducing dramatically the opportunity for conflict, confrontation, and aggression. Instead of escalating a potential conflict, Devon consciously sought to avoid problems. At the same time, his social interactions improved dramatically. He forgave those who had bullied him. In turn, others treated him with a greater degree of kindness, empathy and respect. With fewer social worries, it seemed to Rae that Devon could focus on the task at hand, and get his work done. Not only was he productive, he was successful. Thus, Devon was developing an intrinsic desire to try. Rae saw the sense of pride Devon displayed in his accomplishments.

Participation in the daily basketball program seemed to precipitate a complex interplay of elements for Devon—improved mood, reduced anxiety, increased self-regulation, improved focus, improved social interaction, academic improvement, increased self-efficacy and self-esteem. These social, emotional, and academic transformations were ones that could clearly be seen by both the teacher, Rae, and the CYW, Marie Mills.

Cherrie, Devon’s mother

October: He has such low self-esteem...

Devon’s mother, Cherrie, is optimistic. She wants things to work out for Devon this time. “He loves school. He loves it. [It’s] the social aspect–he likes to be like the other kids, you know, going full days again. It helps his self-esteem a lot.” But her happy demeanor and positive words can’t hide the worry she carries with her. “He seems pretty happy at home...actually, he’s pretty quiet.... He holds everything in.... That’s the thing with depression.” Like Rae [Devon’s teacher],
talking in a safe environment, allowing her thoughts to gradually trickle out, giving her mind time to sort out what she really wants to convey, seems to give Cherrie the strength she needs to deal with the enormous burden she has been carrying for the last four years. “I’m going to talk to Dr. Sands about the depression. It’s getting worse since he started back to school.” Cherrie knows she has a receptive and understanding ear. “Sometimes, he seems annoyed...He’s really moody, you know...It’s hard.... He has such low self esteem...”

At home, Devon is usually avoidant when she asks him do small chores or to complete a task. Cherrie continually has to “be on him to do something. If you want it done at that moment–forget it. [It’s] just him being defiant.” Cherrie says that he understands what is being asked. It’s simply that he doesn’t want to do it. While Cherrie says it’s about defiance, she indeed has a much deeper understanding of what is influencing her son’s behaviour. “It really just seems to be whether he’s in the mood. That’s the funny thing. It really seems to be timing. Timing is everything.” She has an inherent understanding that Devon needs to be in the right frame of mind before he can deal with any type of perceived stressor—change, daily tasks, or challenges.

Cherrie believes, however, that physical activity helps with the depression, and with Devon’s mood. So Cherrie is looking forward to the daily basketball program. She knows Devon is keen to get started, and she hopes this will make a difference for him both at school and at home. School, academically and socially, is a worry for her. “He has down time at home. Now [at school] it’s very structured. There are more constraints, demands, more rules. There’s more
anxiety. I’m going to talk to Dr. Sands about the anxiety too...” She knows how anxious Devon is in class, not only about the tics and what other kids are saying about him, but also that he’s already a couple of years behind. With all of this to worry about, how is he supposed to concentrate? And there are his peers, the students who may not provide the best social role model for him, but those are the kids he gravitates toward. The ones he seems to be able to connect with. “He worries about what you know—he gets very anxious. He assumes everything I want to talk about is bad news...especially when it is pertaining to school. It has a lot to do with his friends. They’re always up to something that’s not very good.”

As well as his moodiness, there are his tics to deal with. “He’s crying over them. I think he’s just realizing now he can’t control them and he just doesn’t know what to do...Now he wants to go to Dr. Sands. Before, he was always in denial.” Devon has so much to deal with emotionally. She has so much to deal with emotionally. And she is alone. Neither her husband, nor his family is really accepting the diagnosis of Tourette Syndrome. They are still convinced it’s about defiance. So how can they possibly understand Devon’s issues with anxiety, his depression?

*November: He’s so much happier! He’s so much easier to get along with!*

Devon took part in the basketball program for two weeks and then was off school for two weeks just prior to and then immediately following his appointment with Dr. Sands. During the first two weeks, Cherrie has already seen positive changes in Devon’s mood and sense of well-being that she has attributed to the daily basketball program. “It helps the tics. And he knows he feels better.
with the activity...I know the activity is good for him. It makes a huge difference. He’s so much happier when he is active every day.” Cherrie sees a definite improvement in the way Devon deals with her comments, directions or rules. He’s less irritated, and more in control. “He’s easier to get a long with. He’s not as argumentative. He’ll ask why I’ve said something instead of just blowing up, yelling. He may not be happy, but it’s not as big an ordeal.” He’s talking more, too. “He’ll tell me what he and his friends did and what he wants to do at school. He talks a lot about playing basketball. You know, that’s been so good for him. He really looks forward to it.” Devon is more open and relaxed; less agitated about sharing information and any potential repercussions. Cherrie also talks about positive changes in his willingness to take initiative and responsibility at home. “He’s really trying to help out more around the house. He cleaned his room the other day. I didn’t even have to ask him.”

There appears to be a more relaxed atmosphere with his friends as well, less conflict. “They play video games or watch movies. Devon really seems to be happy with them...They ride bikes or go to the skate park. He’s gone for a long time. He likes being active.” She is not mediating arguments or sending kids home anymore. The interactions just seem more positive, more respectful.

Cherrie also feels that Devon is making better decisions about his work at school, and that he is considering more carefully the consequences of his actions. “He knows he is behind...Before, he didn’t want to leave the class (to work), you know, be centred out. But now, he really wants to escape. I think it just gets too
much for him in the class...” It is clear to her that Devon is beginning to think about what is best for him, and act in his own best interest.

January: It's amazing! I can't believe it!

By the end of the intervention program, Cherrie has seen some dramatic changes. Devon has become more relaxed, more confident, more motivated. “You know, he’s been so cooperative. It’s amazing!” Devon is not only taking the initiative around the house, doing the dishes in the afternoons and picking his clothes up and putting things away, he’s becoming more responsible about locking the doors and supervising his friends’ activities in the house. “Isn’t that amazing? I’m really proud of him. I can’t believe it.”

Peer interactions, as well, have improved substantially. He is more relaxed, more tolerant, and more self-controlled. “There don’t seem to be any more problems. He deals with them (peers) differently. You know, the kids that teased him, he really doesn’t seem to be bothered by it. He told me, ‘Mom, it’s just not worth getting into trouble over.’

Cherrie sees how differently Devon handles all the challenges of his Tourette’s. “His tics are still bad. He tells me how much they upset him. He cries now at night. They’re really bad between 6 and 8 p. m.” But now, he’s talking more to Cherrie—about the Tourette’s, about his friends, about school. “You know, he talks to me about basketball all the time. He really loves it. He’s always talking about it. I think the physical activity must help at school too.” And what does Devon tell her about school? “He’s feeling pretty good about school right now.”


**Summary**

From Cherrie's perspective, the change in mood was the tipping point. "He's so much happier when he's active every day. He knows he feels better with the activity." More relaxed, with more self-control, Devon is definitely easier to get along with and his relationships with his family and peers have improved. He is motivated and more responsible both at home and at school. Cherrie repeatedly spoke about Devon's desire to play basketball. "He talks about it a lot." Cherrie knows it is more than a matter that "he feels safe and he can just play and have fun." In her view, it’s making a difference for Devon physically, emotionally, socially, and academically. Considering what Devon has gone through and how far he has come, for Cherrie, "It's amazing!"

**Connor’s Story**

*Connor, Grade 6 student*

*October: They just don’t get it. Nobody gets it...*

Connor is a guy who likes to have fun. Always the class clown, he likes to tell jokes, and be the centre of attention. Because of his size, however, he knows he has to go the extra mile to make a name for himself. Strong, tough, and scrappy, he can always settle a score—any score, and he never walks away. It’s usually his fists and feet that get him into trouble at school, and oh, yea, probably his mouth. That’s okay, because he doesn’t back down. Everyone knows it. That’s the way it is. It’s just that it’s always him in trouble, never the guys that really deserve it. It’s not his fault, he’s just taking care of things, making things right,
making them fair. He stands up for himself and for his friends. People just don’t
get that. He gets blamed for everything. They just don’t get it. Nobody gets it.

Now, there are all these people he has to talk to and answer questions for–
the Crisis Team—all because of some things he said and things he’s done. His
parents are upset. His teachers are watching him like a hawk. He’s fine… He just
wants to forget about it. He just wants to forget about everything.

*November: I feel kinda good... kinda happy...*

A new basketball program has started at recess. Connor knows that this
program is a good plan for him. He can’t go out on the yard anyway, and he loves
playing sports. He can even help pick the teams. It actually sounds pretty fun.

Connor is enthusiastic. He arrives at the gym the first day, happy and
talkative and full of energy. He can’t wait to get going. He’s ready, so bring it on!
He loves handling the ball, deking around his opponents, always moving, always
turning, driving to the net. He lives for the moment. He feels it immediately...the
adrenaline rush ... it’s like a high. He loves to be moving, handling the ball,
challenging himself. It’s not about the game, the score, or who he plays with. It’s
about him—about making the moves, controlling the ball, how the movement
makes his body feel.

In the background, Connor can hear T. J. sniping—he’s always
complaining. Connor, as usual, tries to ignore him, to tune him out. But T. J. just
doesn’t stop. Then, almost without warning, T. J. has gone too far. That’s it. “I
quit.” Connor walks off the court and sits alone on the side of the gym. He’s not
playing. He doesn’t care...
But no one notices that he isn’t playing. The game is still going on and it looks so fun. In a flash, Connor is up again, on his feet, with the ball, deking and driving, like nothing happened at all. Before you know it, 30 minutes is over, everyone is having snack and Connor is happy and energetic, and chatting with all the kids—even T. J. Everyone is happy.

Connor arrives everyday in a good mood and ready to play. It’s competitive and physical out there on the court, but that’s the way Connor likes it. He likes to work hard, to push his body. It feels good. But T. J.’s constant sniping everyday is just so hard to take. Occasionally, Connor shoots back a few remarks of his own, you know, to put T. J. in his place, but it never works. Sometimes, he just gives up and sits on the side. But unlike last year, he just can’t leave, he can’t. Something keeps drawing him back to the game. The action is on the floor, the excitement, the adrenaline. He needs it. His body needs it. He can’t resist coming back...He can’t say no.

For Connor, it’s all about how physical exercise makes him feel. “It’s fun. I like being active...My body feels better–like I have more energy...I feel kinda good. I feel kinda happy.”

*December: Yea, Exercise really helps you out...*

As the program continues, school is getting better for Connor. For a boy who has difficulty concentrating in class, and staying out of trouble with his peers, he thinks basketball helps. “I feel ready to head back to class.” He knows physical activity improves his mood, his frame of mind. After playing basketball, he is able to relax—“It helps you get stuff off your chest.” As a result, Connor’s
ready to take on the stresses of the day. He can ignore little irritations. “I don’t get so pissed off with the teachers or other kids. I just feel better. I don't act stupid.” Connor can relax, and focus on the task at hand. “Yea, I can concentrate better. I feel good, so I can get my work done.” It shows in his report card. “It’s pretty good. I got a few B’s.” Connor is proud.

At school and at home, Connor is finding that his day is better. He is getting along with his teachers, his peers, and his family. He can relax and deal with all the little things that used to bother him, get in his way, and make his day miserable. He can work in groups with other kids and he can concentrate on his own. Now he can get his work done and feel good about his accomplishments. “I feel better. Basketball everyday helps.” Connor knows basketball works for him and he believes it can help other kids too. “Yea, exercise really helps you out. It helps you get stuff off your chest, enjoy a fun game and make friends with people that maybe you don’t know.”

January: I just feel better!

For Connor, it’s all about how basketball makes him feel. How he feels affects every part of his day, every part of his being. Connor knows that his mood influences everything he does—that there is a connection between how he feels (his mood), and his ability and desire to control his temper and his actions. He can engage in more positive social interactions, concentrate on specific tasks. He knows that when he is able to exert more self-control, he is able to work to his potential. And that feels “pretty good.” It’s all interconnected, like a puzzle. For him, the missing piece was feeling happy. With that in place, everything else in
his life fits together. Now, he is pleased and proud with the whole puzzle...his puzzle, like the ones he does to relax when he is stressed or upset. Connor has found the missing piece. It's complete. And he knows what it takes to keep it together. “I like basketball. I like being active. It helps me. I just feel better.”

*Ellen, Connor’s Grade 6 classroom teacher*

*October: Sometimes he's so depressed and withdrawn...*

Connor’s teacher, Ellen is worried—she knows he is a high risk student, but she can also see the happy-go-lucky spirit within and a soul with a lot of potential. “He can be very eager to learn sometimes, very willing to work [but] there’s other times when he can be quite disruptive in the class....[and] days when he fluctuates so much.” It is these mood swings—the highs and lows that Ellen is so very concerned about—especially the lows. At times, Connor can be “quite depressed and withdrawn.” At other times, he demonstrates “aggression, especially toward himself.” There are even days, Ellen finds, where Connor seems to hate himself, and makes comments like, ‘Why don’t you just shoot me?’

The other students seem to sense that Connor has differences in temperament depending on his mood.

They can tell when he’s not going to work well...If he’s having a good day, they want him to be in their group. They want to participate with him. But if he’s not having a good day, they want nothing to do with him, and that really frustrates him.

As a result, Connor’s relationship with peers is somewhat different from the norm. Most of her students have one or two friends that they hang around with all the time. It’s different with Conner, depending on his mood. "He can be very much a loner at times, or if he’s having a good day, he can fit into playing
sports…, he can fit right into the group.” The students in the class have come to know Connor’s moods and they are used to them changing. “Some of them, they really feel for him, but there’s no one that will say [when he is down], ‘Come on, Connor, you can do this’…it’s almost like they’ve given up on him.” Connor, too, is ready to give up.

For Connor, dealing with his mood swings, and the fluctuations in peer acceptance is such a daily burden. It affects him socially, emotionally, and academically. “He’s quite bright, and his understanding … is quite high. Yet Ellen believes that what is essential for Connor is “the social/emotional support” of his peers. “When that support is there, Connor is okay.” When his frame of mind is positive, Connor can accept a challenge—“he will tackle it.” If he’s on his own, he can become easily frustrated, so prefers to be in a group setting where he can be quite “calculating”—he’ll watch for a few minutes and then jump in with some really good ideas. If he’s in a group with positive support, he really quite enjoys the challenge. On a good day, Connor can follow instructions and work independently, too. On a bad day, “forget it!” The key is for Connor to be in a positive frame of mind.

Connor has so much to contribute, so much potential, but Ellen worries that he can’t see it. “He doesn’t have a lot of self-worth…Many times, he does not find himself valuable at all as a person, and he has made some very shocking statements to that effect, that he would be better off dead…He has very low self-esteem.” Connor’s mood and behaviour fluctuates unpredictably. “But on a good day, I think he can mask it…He has those depressive signs, but he’s more aware of
them and can hide them from other people.” Ellen knows Connor has been dealing with depression for a long time, and is just doing the best he can to cope.

Ellen is very much aware of how Connor’s mood affects both his life at school and in the community. It affects his willingness to participate in activities, his temperament towards himself and towards others, his level of aggression. Changes in his mood governs his behaviour, and his behaviour either promotes or interferes with his ability to learn. But of most concern to Ellen is not the aggression, but the depths of despair that Connor is sinking into. That point of crisis only a few days earlier illustrated all too graphically how close Connor is to drowning in that despair.

*November: He’s seems happier!!*

Within a week of the daily basketball program beginning, Ellen was noticing a difference in Connor. There was an almost immediate and discernable shift in Connor’s mood. “He is remarkably settled. He seems happier. I am so relieved.”

*December: I’m amazed at the difference in him! He’s just so much more into things!*

By the six week mark, Ellen was “amazed at the difference in him.” He seemed so much more “relaxed in class and happy—he just seems so much more into things now, engaged.” Connor led the class presentation in the December Concert: “He loves the singing and the dancing and is very good at it. It really gives him a chance to shine.” Within a very short period of time, Connor appeared to be a much happier person.
January: He’s feeling much more positive about his own self-worth!

With the intervention program drawing to a close, when Ellen talks about Connor, she is describing a very different boy now. “He’s much calmer, much more relaxed...He has shown less aggression all across the board...In general, his temper just seems more even...he just seems happier.” The dramatic change in mood, being happier, more relaxed, less agitated, coincided with visible changes in social interactions. “He’s able to work better in groups, especially in less structured environments, without getting into an argument and having it turn into a major incident. He doesn’t up the ante. He shrugs a lot off...”

Not only could Ellen see a positive change in Conner’s social interactions, but because so much of their classroom work was co-operative group work, she could see the positive impact on his learning. “He likes sharing his ideas, and he works hard...He can take a lot of initiative when it’s something he is capable of and confident.” Connor’s ability to focus and complete his work had improved significantly. Ellen felt there was a link to the daily basketball program. She could see that Connor really looked forward to the basketball each day. “I think it seems to motivate him. He really needs the physical activity to be able to concentrate, and I think he feels better physically...I think he’s just more relaxed, happier when he is active. He’s ready to work.” During class lessons, Connor is able to attend and participate in a positive manner. He could listen appropriately even if he didn’t take part. “He’ll take part if he feels he has something to contribute. But he’s not disruptive. That’s a change too. He used to try to distract other students in subtle ways. But now, he’s pretty quiet.” So Ellen is both pleased and
optimistic about Connor’s academic achievement. “He’s coming. He has a lot of potential, but because of past behaviours, he has a long way to catch up. But we’re making progress.”

To Ellen’s relief, she notes that the high risk behaviours that were so evident before the intervention program began have disappeared. She sees a dramatic improvement in his self-esteem.

We haven’t seen the behaviours of him wanting to hurt himself or others for that matter—the talk about wanting to kill himself, or the head-banging on the lockers. Those are very noticeable, very significant changes. He used to have such a sense of helplessness, hopelessness, defeat. I really think now he is feeling much more positive about his own life and his own self-worth, and what he has to contribute.

For Connor, the positive changes in his emotional well-being were dramatic. Ellen attributes those differences to the daily basketball program. “Certainly the basketball has made a difference. He really needs the physical activity.”

Summary

There was no doubt in Ellen’s mind that Conner was just happier. Calmer and more relaxed, less agitated, Conner seemed better able to manage the daily stressors of any adolescent boy, social, emotional or academic. She observed improvements in concentration and focus, impairments which can often accompany depression (DSM-IV, 2000). Ellen also noted improvements in Connor’s level of engagement and participation in both academic and social activities. Now that Connor seemed happy, his life seemed to be turning a corner—socially, emotionally, and academically. The sunshine in his soul has returned.

Dean, Connor’s mother
October: He seems fine...

Connor’s mother, Dean is cautious and reserved. What is going on with Connor? It’s so hard to tell. At home, there aren’t really any signs, no indications to his parents that he is in crisis. Connor doesn’t appear worried or depressed. “Everything seems fine.” His general demeanor and relationship with both parents and his brother is “okay, I guess.” There’s some “back-talk” once in awhile and he argues with his brother (age 14). “He generally seems happy at home, though.”

It seemed to Dean (Connor’s mother), as it did to most people, that Connor avoided doing things, because he was “just lazy”—a character flaw that either needed to be accepted or re-adjusted, depending on the situation. But deep down, as his mother, Dean knew that it was Connor’s mood that affected so many facets of his life. His motivation, for example, “You can’t get him to do anything unless he is in the right frame of mind...you just have to catch him that way... I guess it just depends on how he is feeling at the time... It just depends on his mood.”

His moods were unpredictable, and as a result, he was often in trouble at school. Dean (Connor’s mother) knew it was these intense moods that caused problems with relationships. With peers, there was a predisposition for aggression. At home, his relationship with his older brother was often volatile. “He argues with his brother. The kids are always fighting.” Yet at other times, Connor would appear to be quite social, “out playing with his friends...He seems to get along with the neighbourhood kids.” His relationships were unpredictable, just like his moods.
Not only could Connor be task avoidant, but also communication avoidant. Regarding academic and social matters at school, “I don’t hear anything. He doesn’t talk about it.” Connor was just quiet sometimes. That’s just the way he was...“He doesn’t seem worried at home...He seems fine.” So Dean (Connor’s mother) didn’t really see anything out of the ordinary.

But something was wrong, very wrong. After a series of meetings with the Crisis Team: doctors, counselors, teachers, and the principal, Dean and Stewart, Connor’s father, were both grateful and relieved to have Connor participate in an intervention that could potentially turn things around for him.

December: There haven’t been any fights…

A little more than four weeks into the program, Dean, (Connor’s mother) was describing a definite change in Connor’s sense of well-being. “He seems happy at home. He’s usually in a pretty good mood.” Connor is more relaxed, more communicative, more open. He talks about things that he likes, basketball, for example. “He talks about it a lot.” He’s also less agitated. There seemed to be fewer arguments both with Dean and with his older brother. The Connor Dean described was more motivated. “He can’t wait to get out the door.” As far as Dean knew, Connor was also more self-controlled at school. “I don’t hear any bad stories about school.” His social relationships seemed more relaxed, less turbulent. “He’s pretty social...There haven’t been any fights... He doesn’t seem to have any problems with friends.” As for academic achievement, Connor’s report card revealed some progress. “His reading and his math are good. He is proud of that...” Her last school interview with Connor’s teachers was positive—he wasn’t
in trouble, his marks were good. Things were definitely better.

*January: We're sure not hearing anything about wanting to die.*

By the final interview, Dean's comments about Connor are optimistic. "He seems pretty happy at home. He is usually in a pretty good mood." He is talking more at home. “He talks about basketball all the time. He really loves it. He wants to come to school and play. He looks forward to going each day...”

From what Connor says, and how he behaves at home, it seems to Dean (Connor’s mother) that things are going better at school both from Connor's perspective and from the school's. That’s an improvement. Connor looks forward to his day at school. “He’s up early, often he gets us up. He’ll be up and out the door at 7:45. He can’t wait to get out the door.” Connor still “doesn’t really say much” about homework or what he is learning at school on a day to day basis, but Dean senses that he’s “doing okay and he feels pretty good. His reading and math are good. He’s proud of that especially because he’s now in a regular class.”

As far as Dean (Connor’s mother) can see, Connor’s personal relationships right now are less volatile, more relaxed. He and a couple of friends go out and play in the snow or they play video games or foosball in the basement. “He doesn’t seem to have any problem with friends.”

By the end of the intervention program, Dean knows Connor is feeling better about himself. Life seems to be better for Connor, at school, at home, and out in the community. The most dramatic change for Dean since the basketball intervention started however, wasn’t about Conner. It was about her. She was finally able to say out loud, “We’re sure not seeing any head-banging or hearing...”
anything about wanting to die.” Now it is safe to say it. Conner is safe.

Summary

From Dean’s perspective, the positive changes in Conner’s life, in her life, are directly a result of the dramatic improvement in Connor’s mood and sense of well-being. He is happier and has a reason to try—emotionally, socially, and academically. Physical activity, she knows, makes Connor feel better, happier, more relaxed. He talks more. He is able to control his temper and his behaviour to a much higher degree. She sees improvements to both his peer relationships as well as to his desire to do well at school. It is like the ray of sunshine that she knew was there behind the dark clouds, and it is finally breaking through. It was always there. She knew it. But now, Connor can see the light. She can see the light.

T. J.’s Comments

T.J., Grade 7 student

October: I’ve been having rough times...

It is T. J.’s first year back in a regular program after three years. He’s where he wants to be, with his friends, but still, the pressure is on to conform to expectations and timetables that are beyond his comfort zone. His mom has started working twelve-hour shifts so he doesn’t have the same freedom at home to relax and do homework on his schedule. He has to fit into everyone else’s. It’s been stressful.

He’s looking forward to the basketball program. He likes to play (even if it is with some of the guys from his previous class). But he’s worried that he
needs time off at recess to relax with the kids in his regular class. He needs to establish his place with the rest of the grade seven students. He needs to make sure everyone knows he is capable.

November: *It just feels good to get some of the stress off*...

As soon as the basketball intervention began, T. J. knew immediately that the activity was having a positive effect. “It makes me feel good.” He not only felt better physically and emotionally, but playing basketball everyday provided a distraction from all the worries and anxiety he was dealing with. “I think it’s (the daily basketball intervention) really helped me out, it’s making my day go faster, so I don’t really have to sit in class all day...Time flies right by.”

He likes the social aspect of the game. He likes to play with other players who are competitive—who try their best out there on the court and who want to win. That’s what it’s all about. He’s annoyed by players who don’t take the game seriously, or who cheat. Since T. J. sees himself as a leader, it is important those players know what they need to work on. T. J. needs rules, structure and order. It has worked for him to get where he is. Since last year, he’s taken an active part in providing input for this program and he believes it is his role, his contribution to the program, to be that leader.

January: *Basketball makes my day better*

At the end of the eight week program, T. J. has a very clear idea of how physical exercise positively impacts his life, at home and at school. Playing basketball everyday, “helps keep you in shape—helps you mentally and physically. I’m in a pretty good mood afterward.” T. J. not only recognized that
the exercise helped improve his mood, but he also knew it improved his emotional control and his ability to self-regulate his behaviour. “I’m ready to go back to work [where] I have to hold everything in. Physical activity, playing the basketball makes my day better. It helps you with cooperating with other people... It helps me stay on task.”

He clearly understood that being in a better mood and being more focused meant that he could make more positive choices regarding his comments and his actions toward others. When he wasn’t as irritated with the other people around him, he could concentrate on his own work, and he could do a pretty good job. “I’m pretty proud of myself. There’s room for improvement. But for the first time, I got an E for class participation and a 71, above average, first term. So I think I did pretty good.” Not only were things working out better at school for T. J., “Things are pretty good at home.”

What was it about playing that helped make T. J. feel better? “It just feels good to get some of the stress off...just to take the anger out on the ball.”

Summary

T. J. knew from the outset that physical exercise made him feel better physically and emotionally. Physical activity helped him manage his stress. Being in a good mood made all the difference when it came to the desire and ability to self-regulate, and T. J. clearly understood that being in control made it easier for him to interact socially in a positive manner with both adults and peers; as well as to concentrate and focus on his work. Once T. J. could focus and think clearly, he believed he was an intelligent individual and could do the work that was being
assigned. The key was to be relaxed and not under stress. He could be productive and successful academically. He needed to be in a good mood, to recognize his strengths—socially, emotionally and academically. With the stress out of the way, T. J. could genuinely say, “I feel pretty proud of myself.”

Jordan’s Comments

*Jordan, Grade 8 student*

*October:* I like fighting...I like throwing people to the ground...I like getting hurt...

Jordan, too, is returning to a regular class after two years in a specialized program. He’s in the class with his best friend, and that’s what’s important. They’ll have fun together. Big and strong and Jordan likes physical contact. “It’s fun.” Physical contact, however, is a problem for him at school, which is in part, why he is joining the basketball program. He can’t go outside with the other students during recess.

Jordan played basketball with his class everyday last year, the same group of boys that would be playing this year. He liked to play and could score, but because he also liked to fool around, the other kids didn’t appreciate him or the distraction. He didn’t care. He doesn’t care. He doesn’t like basketball anyway. “I don’t like basketball, I like football—tackle, tackle is best.”

*November:* I feel hyper, a little bit, but good...

Jordan joined the basketball intervention and played for the full eight weeks. He was surprised at how it made him feel both physically and mentally. “I think I’m getting in pretty good shape, makes me feel good. I like being active. I like being with people.”
Jordan didn’t think basketball was his game, but he was pleased with how well he picked it back up. “My shooting is improving. I feel good, proud. I like the shoot-outs. It helps you improve your skill...It gives you confidence for the next game...It makes me feel good to score.” Finding success and developing confidence made him “feel good.”

*December: You don’t get weird stuff in your head*

After playing basketball, Jordan was ready to head back to class, and “Yup,” he was able to follow instructions. He felt “Good. I get my work done. Playing basketball makes me concentrate.” Being able to concentrate translated into better marks. “I passed this term. I feel good. I’m not switching classes.”

Being active, Jordan knew, was good for him. “Yea, it is good for kids. It lets you let go of your anger.” Being active not only gave him an outlet for his frustrations, it made him feel good, excited, motivated, and successful. Now he could focus on following directions, getting his work done. Being able to focus on his game or his work, he found that other thoughts didn’t creep in. “You don’t get weird stuff in your head, you just focus on the ball.”

*Summary*

Jordan knew that physical activity made him feel better, more relaxed and put him in a good mood. He also knew that being in a good mood allowed him to manage his anger and aggression much more readily. He was able to self-regulate to a greater degree and better control his impulses. It meant he didn’t get into trouble as much in class with the other students. He could concentrate, too. He could recognize that he could do things he didn’t think he could before. “I know
my strengths.” Now, Jordan was finding success both athletically and academically. Being physically active made Jordan feel good. He was relaxed. He could be himself and not act in socially inappropriate ways because he was nervous or felt socially out of place. It made him feel capable and valuable on the court and in the classroom—exactly what he needed to feel accepted into the regular Grade 8 class.

Reflections

The stories of Devon and Connor uncover unique insights into the lives not only of the boys themselves, but also shed light on how changes in their lives affected those closest to them, their mothers and their peers. The story accounts of T. J. and Jordan also provided valuable data, but not as rich nor as informative. Therefore, only the student perspectives were reported. The following chapter, the discussion, uses a cross-case analysis to link the common themes from the data to the literature to help us understand how exercise affects the mood and well-being of these adolescent boys and its potential impact on their learning.
CHAPTER 5
DISCUSSION

Overview

This chapter is written in three sections: the cross-case analysis, the researcher’s reflections, and the conclusion. In the cross-case analysis, I uncover common themes that have emerged from the multiple perspective accounts, as well as themes that were unique to individual participants, using open coding and inductive analysis. I then compare the current results with findings from the literature. The researcher’s reflections emphasize the rationale for this study, provide thoughts and impressions about adolescent depression, and include both limitations of the current study and thoughts regarding directions for future research. Finally, the conclusion frames the results in the context of the Ontario Ministry of Education’s commitment to “reach all students.”

Cross-case Analysis

The six main themes that emerged from the cross-case analysis were the significant benefits as a result of the daily exercise intervention. These benefits were improvements in: (a) mood and sense of well-being; (b) self-regulation; (c) social relationships; (d) self-efficacy (athletic and academic); (e) academic achievement; and (f) self-esteem. Other related benefits within the above six themes included: (a) reduced levels of anxiety, and aggression; distraction from worry; sense of happiness; and increased levels of motivation and cooperation; (b) increased concentration; (c) increased patience, tolerance, and empathy; and increased motivation; (d) risk-taking; (e) tenacity; and (f) sense of optimism. I
discuss each theme, and compare these findings from this study to the literature within each theme.

Improvements to Mood and Sense of Well-being

Improved Mood and Physical Well-being

The most robust theme that emerged from every perspective—student, teacher, parent—is that there was a distinct improvement in each boy's mood. On the first day of the intervention, each of the four boys described an immediate physical (and for some) mental exhilaration following the 30 minute intense workout. Devon told me that the 30 minutes of playing tough—“felt good.” Similarly, Connor said, "My body feels better—like I have more energy." A short while later, T. J. noted that playing basketball "makes me feel good…really worn out but I still have some energy left." As for Jordan, after playing basketball he felt “excited…a little bit hyper, but good.” It was also evident by their demeanor, facial expressions, tone of voice and its cadence that the mood of the boys was positive. The above descriptions by the boys, combined with researcher observations thus provide support for the findings that a single 30 minute bout of moderate exercise with peers and a supportive teacher improved the mood and sense of well-being, similar to the findings of increased vigor or energy in adults with Major Depressive Disorder (Bartholowmew, Morrison, & Ciccolo, 2005).

Improved Mood and Emotional-Well being

Both the teachers and parents of the boys noticed that initial sense of physical and emotional exhilaration very quickly translated into longer lasting improvements in emotional well-being. Within a week, Ellen, Connor's teacher...
observed, "He seems happier. I'm so relieved." Ms. Mills, Devon's CYW, observed that playing basketball "really seems to relax him." Within a couple of weeks, Devon's mother Cherrie reported, "He's so much happier when he's active...He knows he feels better." Looking in from the outside, people close to the boys could see an increasing sense of emotional well-being, a sense of relaxation and contentment.

Then, gradually, the boys too recognized that their overall sense of emotional well-being throughout the day had significantly improved. Five weeks into the program, Connor's comments were, "I feel good...I feel better.” Jordan, as well, noticed the physical and emotional link—“I think I'm getting in pretty good shape, makes me feel good.”

By the end of the intervention period, all the boys were acknowledging changes to their sense of well-being as a result of playing basketball everyday. Devon replied that he felt "energetic... a bit tired, [in] a good mood.” At the close of the intervention, after playing basketball, Connor responded that he felt "Good. I feel happier." Clearly articulating the connection, T. J. summed it all up: "I'm in a pretty good mood, afterward... Physical activity, playing the basketball makes my day better...[it] helps you mentally and physically."

The comments and descriptions from the boys, their teachers, and their parents are similar to the findings that moderate exercise (in this case, with peers and a supportive teacher) provides effective reduction of depressive symptoms in adults with Major Depressive Disorder, often in a very short period of time, and with lasting effects (Blumenthal et al., 1999; Babyak, et al., 2000; Dunn, et al.,
and with the potential to prevent future episodes (Dimeo et al., 2001).

**Reduced anxiety.** From the teachers’ perspective, the most noticeable component of the improved mood and emotional well-being was a general reduced level of anxiety. Connor's teacher, Ellen, observed, "He's much calmer, much more relaxed...overall he seems happier...I think he's just more relaxed, happier when he's been active." Rae, Devon's teacher, noted that "He seems so much calmer, more accepting, more understanding. Change doesn't seem to cause him the same anxiety that it used to." Ms. Mills, Devon's CYW, also noticed "I think it really helps to have that time in the gym in the morning. It really seems to relax him."

**Reduced aggression.** Being calmer and more relaxed, from the teachers' viewpoint had the positive spin-off of reduced levels of irritability, frustration, and aggression. Ellen found that with Connor "his temper just seems more even...little things... irritations, don't seem to set him off as much...He doesn't up the ante, he just shrugs a lot off." With the added component of improved self-regulation, (which will be discussed further in the next section), the resultant outcome, as described by Ellen, was "He has shown less aggression all across the board."

**Distraction from worry.** T. J commented that he had been experiencing "tough times" and that basketball had really helped him out, "...when I play, it makes the day go by fast, so it makes it easier for me...so I don't have to sit in class all day. That's what it feels like. Time flies right by." Nolen-Haeksmema's (1990) response style to depression suggested that males could immerse
themselves in activity to avoid rumination on conditions that sustain or exacerbate depressive symptoms. Females, on the other hand, were more likely to engage in ruminative thinking that served to perpetuate the depressive conditions. For T. J., there was some understanding that competitive physical activity allowed him to focus his thoughts on positive goal attainment rather than obsessing over real or perceived anxiety evoking situations. Used proactively, playing competitive basketball seemed to allow T. J. to compartmentalize his anxiety, and turn fear of failure into the realization of success.

*Sense of happiness.* At home, Devon's mother Cherrie noticed a remarkable change. "I know the activity is good for him. It makes a huge difference. He's so much happier when he is active every day." She could see the difference. Devon was more relaxed and communicative. "He's talking to me more. He'll tell me what he and his friends did and what he wants to do at school." He wasn't as irritable, either. "He's not as argumentative. Things don't seem to be so much of an ordeal." As for Dean, she was relieved. "He [Connor] seems pretty happy...No problems."

Very little adolescent research exists to compare with the findings of the present study. Saunders, Field, Diego, and Kaplan (2000) found that high school students involved in a moderate level of sports activities (3-6 hours per week) reported fewer symptoms of depression, using the Centre for Epidemiological Studies Depression Scale. Similarly, the current study found that the adolescent boys exhibited fewer signs of depression (Canadian Psychiatric Foundation, *When something's wrong*, 2005) as described from multiple perspectives—the boys
themselves, their mothers, and their teachers. Gore, Farrell, and Gordon (2001) found that physical activity acquired during team sports provided a protective factor against depression distinct from other social protective factors (e.g., family and friends, collegiality from team members). Although the current study did not investigate the relationship of protective factors, it is interesting to note that Connor did not have any specific requests for individual team-mates while Devon originally said that he liked to play with certain boys. By the end of the intervention, however, Devon remarked that he didn't care who played. Indeed, both boys played well (in terms of ability and sportsmanship) regardless of whom they played with. By the end of the eight week program, both boys described experiencing the sense of physical and emotional well-being derived from playing basketball everyday. Because the social composition of the group changed from day to day (depending on which non-focal participants attended, and occasionally due to focal participant absences), it appeared that specific social protective factors were secondary to the positive physical and emotional sense of well-being described by the boys, their teachers, and their mothers. However, the exercise was always experienced in a social context with peers and in the presence of a supportive teacher.

*Increased motivation.* In addition to reduced levels of anxiety, irritability, frustration and aggression, another component that surfaced from the intervention was an increased level of motivation and a willingness to cooperate with others—the element of desire. Devon's teacher, Rae, described this motivation in detail, wondering what had precipitated it. Was it the increased social acceptance or self-
efficacy? Or was it due to Devon's improved mood and sense of well-being? Rae wondered about a cause and effect relationship. "I think he wants to succeed rather than worrying about everything else. It's like a greater motivation toward himself..." Cherrie, Devon’s mother, spoke constantly about Devon being happy and displaying his new found cooperation, initiative, and responsibility. "It's amazing! I can't believe it!" Being happy, it appeared that Devon had recognized a desire within—a desire to get along, a desire to try—a desire which would significantly change his emotional, social, and academic outcomes.

With Connor, his teacher, Ellen, sensed that there was a link between his being happy and being more motivated. He seemed to have a greater desire to engage more both socially and academically.

Overall, he seems happier. He wants to be with the other kids. He wants to be included in the group activities...He seems more motivated, more ready to try. [Before the intervention] he would say that he couldn't do things, especially tasks he had to do on his own. He would talk about how dumb or stupid he was. Now, he just gets down to it, or goes to see what the other kids are doing, to see if he can figure it out on his own...I'm amazed at the difference in him. He just seems so much more into things, engaged.

Not only was Connor willing to get involved in the activities and cooperate with the other students, he was becoming proactive in his own learning, initiating the effort to figure things out. It seemed to Ellen now that Connor was happy, he had the desire to engage again with his world.

*Increased Concentration and Improvements to Self-regulation*

For the boys, feeling happy and having the desire to engage positively seemed to correspond with an increased ability to focus and exert emotional and
physical self-control. This was a surprising outcome, but one that was again articulated by all three groups—the teachers, the boys, and their mothers. Marie Mills, Devon’s CYW, noticed it on the second day of the intervention: "I can't believe how well Devon handled his aggression...I think he realized it was the wrong choice; that he just acted on impulse. I am amazed at how quickly the response was [an apology and a plea to re-enter the game]". Marie knew that Devon "really wanted back in the game" but she sensed that he also wanted to exert more self-control. So Devon tried to repair the harm caused by his aggression with an apology and a promise to try to control his impulses. By the second week, Marie was noticing that Devon was trying to ignore comments made by other students rather than reacting either verbally or physically. Being more relaxed and having a desire to improve his social and academic interactions seemed to allow Devon to focus on the task at hand—exerting more self-control by not responding to the inappropriate remarks "He really wants to have more self-regulation." From Marie Mills' perspective, Devon was "handling [the stressors] well...He is making good choices." By the end of the basketball intervention, Devon’s teacher, Rae, too, was seeing an increase in focus and self-control with Devon: "He listens, he tries to. You can tell he's really thinking about it. He follows directions...He doesn't push the limits any more. He's responding a lot better."

Connor’s teacher, Ellen, also noticed an increase in Connor's ability to control both his emotions and his actions. "His temper just seems more even...He doesn't up the ante, he shrugs off a lot..." Now Connor was able to concentrate on
both social and academic activity: "He has shown a little more focus over the last month...He listens usually, even if he doesn't take part...But he's not disruptive. That's a change too." Being in a positive frame of mind, being able to relax and focus his attention, seemed to coincide with the desire to participate and to self-regulate in a way that allowed for positive social and academic interactions.

Like Marie Mills (CYW), within the first few weeks, Devon’s mother, Cherrie could see an increase in Devon's ability to control both his emotions and his actions: "He's not as argumentative. He'll ask why I've said something, instead of just blowing up, yelling. He may not be happy, but it's not as big a deal." By the end of the intervention, Cherrie knew Devon was handling stress in a very different way. Being relaxed meant he was less irritated by stressors. Devon was exerting much more self-control. "You know, the kids that tease him, he doesn't really seem to be bothered by it...He deals with them differently."

Dean, too, knew there was an improvement in Connor's ability to control his emotions and his actions: "I don't hear any bad stories about school...There haven't been any fights." Connor knew there was a connection between how he felt and how he acted. “Yea, I can concentrate better. I feel good so I can get my work done...I can concentrate and do a good job. I don't act stupid...I can get along okay with everyone.” Connor knew his emotional well-being governed everything he did. When he felt good, everything fell into place. T. J. also understood how playing hard and being in a "pretty good mood afterward" helped him "mentally and physically...It helps me stay on task and helps me get along better with people." As for Devon, he knew that being in a good mood meant that
The boys seemed to connect being in a good mood and feeling good with being able to focus positively on both their emotions and their actions. Even Jordan seemed to associate feeling good with being able to concentrate: "[I feel] good. I get all my work done. Playing basketball makes me concentrate."

**Improved Social Interactions and Relationships**

*Increased Patience, Tolerance, and Empathy*

Being more relaxed, less irritable, and more in control of their impulses seemed to provide the boys with the tools needed for improved social relations. Positive social interactions encompass two-way emotional communication pathways. It was taxing on the peers of the boys to be tolerant and forgiving of the boys' impulsive behaviour. For the boys, being relaxed and happy would allow their true character to emerge, and being able to self-regulate would pre-empt some and limit other potential social indiscretions.

Connor knew the impact of "feeling good" on his ability to control his emotions and his temper, "I don't get so pissed off with teachers or other kids...I don't act stupid." Ellen, Connor's teacher, could also see the connection between Connor being more relaxed and happy, having more self-control and improved social interactions, "He is able to work better in groups...without getting into an argument and having it turn into a major incident." From Dean's perspective, (Connor's mother), she was just relieved that "there haven't been any fights."

Devon knew that self-regulation was what he needed to stay out of trouble
with certain students, "It's better with Sean, definitely. We're not friends. [With Keith], we don't talk. We're not friends or anything, but we're okay."

Rae, Devon's teacher, saw this transformation with Devon's relationship to his former adversaries as an emergence of empathy, on both sides, "Now they see him in a whole different light. I think they are much more empathetic...He's [Devon] much calmer, more accepting, more understanding...Basketball has really helped his social skills. He can now see how they might feel." Marie Mills, Devon's CYW, saw this change more in Devon's increased ability to handle stress, and in a greater level of tolerance on his part. He was more relaxed, "making good choices." The positive spill-over into in peer relations was much greater than she had expected, "I can't believe how well he gets along with other kids—even the ones who bug him in the class—it doesn't seem to be an issue when they play. He's pretty accepting to have them play, and they work well with him.” But it was Cherrie who recalled Devon's intrinsic acceptance of the need for self-regulation, "Mom, it's just not worth getting into trouble over."

*Increased Motivation*

As a mother, Cherrie, knew that Devon's desire to belong, "he likes to be like the other kids" was essential to his self-esteem. "He doesn't like to be criticized. He has such low self-esteem." Ms. Mills, Devon's CYW, believed that Devon wanted to be more self-regulated because his desire to belong socially was strong. But too often in the past, Devon's irritability and lack of self-regulation sabotaged that longing, leaving him with a sense of failure, yet again, and his self-esteem slipping away. After physical activity, feeling good for Devon meant that
he could get past the barriers and disappointments set up by his peers, and as Rae, his teacher, concluded, "Now he has the confidence that he can relate to them."

Ellen, Connor's teacher, saw the desire for positive social interactions, "Overall, he seems happier. He wants to be with the other kids...He wants to be included in the group activities, and he likes sharing his ideas.” Self-regulation, however, had always been the problem. Being relaxed and happy just seemed to minimize his stressors, "little things...irritations don't seem to set him off as much."

*Increased Sense of Social Acceptance*

For Devon, now he felt confident in social situations in a way he didn't before. At the beginning of the intervention, Devon focused on the social aspect of the game and the fact that it was secure for him. "It was fair teams, and I liked the guys. I like playing with Nick. He knows the rules. He's a good sportsman. I feel like I play better with Nick....It's nice to be on a team with your friends.” By the end of the intervention, Devon was singing a very different tune. "I don't care who plays, whoever wants to play." Rae, Devon's teacher, believed that he felt confident enough athletically and socially that he could interact positively with peers outside his circle of safety.

Boone and Leadbeater (2006) suggested that the benefits of team sports included positive experiences enhancing perceived social acceptance and reducing body dissatisfaction through skill development. For Devon, there was an observable link between skill development and peer acceptance. Connor, on the other hand, already had athletic and social confidence. He just needed enough
self-regulation in order to keep his interactions positive instead of physically or verbally confrontational.

*Self-efficacy*

*Risk taking*

Rae had tried repeatedly and without success to entice Devon to attempt activities that he would find both interesting and manageable to do. She wanted to develop a sense of academic self-efficacy. He was capable, why wouldn't he try? Once Devon was experiencing athletic success and internalizing that recognition, it would appear that his negative self-perception was diminishing. He could recognize his athletic success (he could shoot, he could set up plays, he could move the ball; other kids were asking for him to be on their team). Athletic success for Devon, clearly changed the social dynamics, allowing not only for ongoing opportunities for positive practice, but also ongoing improvement in his own self-evaluation.

Experiencing success in one area seemed to motivate Devon to try in other areas. Rae, Devon's teacher, concluded, "Now he has the confidence that he can relate to them" (students who had previously bullied him). Rae saw that Devon was not only willing to take social risks but also academic risks, "Well, with math, we were doing a survey. He was doing his own, asking other students questions. He was a little timid at first, but when he got going, it was fine. The interaction was positive." For Devon, he was able to recognize his successes, his self-perception was more positive, and he could now embark on opportunities for positive practice.
Bandura, et al. (1999) suggested that perceived social and academic inefficacy contributed to childhood depression. Prochaska, et al. (1994) suggested that self-efficacy was one of the factors that influenced decision making in adolescents. For Devon "making good decisions" not only allowed him to experience a greater level of social and academic success, it allowed him to feel better about himself.

Connor regularly relied on his long ingrained negative self-perception (that he was "stupid") when he did not want to try. Yet Ellen, Connor’s teacher, noted that Connor needed peer validation in order to reverse that negative self-perception and accept his academic abilities, "It's the social support that he needs. He's quite bright, and his understanding, his comprehension of things is quite high. But…it's that social/emotional support that he needs." Peer validation, however, was tenuous because of Connor's unpredictable behaviour.

Ellen continuously reiterated that during and following the eight week basketball intervention, Connor was visibly more relaxed and happy, his peer relations had improved dramatically allowing him to work more cooperatively in class. He was able to receive that social validation of his academic strengths that he desperately needed to internalize his own academic self-efficacy.

**Academic Achievement**

**Tenacity**

For both Devon and Connor, recognizing the extent of their own abilities, athletically, socially, and academically, seemed to give them the desire to try, and the courage to take academic risks. Improved social support, and improved
personal self-perceptions, coalesced with academic improvement. By the end of the basketball intervention, the teachers were noting increased academic achievement. As Ellen, Connor’s teacher, noted catching up was still a challenge: "He's coming...we're making progress." Even Rae, Devon’s teacher, was optimistic, “He’s moving forward, definitely. He can follow the steps of what we are doing. He demonstrates some understanding of what is being presented. It's coming."

Self-efficacy facilitates achievement, because it enables the individual to take risks, persevere through challenge, recover from adversity, and recognize personal success. "Unless people believe they can produce desired effects by their actions, they have little incentive to act or to persevere in the face of difficulties." (Bandura, et al., 1999, p. 258).

Field, Diego, and Saunders (2001) found that a group of high school students involved in exercise had higher grade point averages hypothesizing that an increase in neurotransmitters such as serotonin were responsible for increased performance on cognitive tasks. Kubesch et. al. (2003), using adult participants with Major Depressive Disorder, found that exercise had a positive impact on cognitive functions involving the anterior cingulate which plays a key role in conflict monitoring and the inhibition of inadequate responses. In the present study, increased patience and self-regulation not only seemed to improve the boys' ability to work cooperatively, but also seemed to facilitate their ability to listen and concentrate, and then analyze, synthesize, and evaluate potential responses. Although Kubesch et al. (2003) found that exercise did not
significantly improve reaction-times, higher cognitive functions now being emphasized in Ontario's curriculum do not focus on reaction time.

The parents noted that these small improvements in academic achievement were resulting in big gains in self-esteem. From Dean's perspective, Connor was "doing okay, and he feels pretty good. His reading and math are good. He's proud of that especially now that he's in a regular class." For Cherrie, Devon was "feeling pretty good about school right now."

Self-esteem

When it comes to self-esteem, the most important perspective is what the boys were feeling about themselves. Without a doubt, the most significant impact of the basketball intervention program was the dramatic shift in self-esteem for Connor. Only days before the program began, Connor's despair was so deep that he wanted to die. Two weeks after the basketball intervention program was complete, Connor completed his final student questionnaire. His responses on a five point scale (one being not at all, five being very much so): I feel happy (five); I want to be left alone (one). Life had truly changed for Connor and he knew it.

For Devon, he had progressed from intimidating his peers, to being one of the guys. Two weeks after the intervention program, his responses on the final student questionnaire were: I feel happy (five); I want to be left alone (one). Both boys now had a sense of optimism that had eluded them prior to the daily basketball program. For Devon knew, "It helps to get some exercise...[because it puts me] in a good mood." As for Connor, he summed it up better than anyone could, "Yea, exercise helps you out, it helps you get stuff off your chest, enjoy a
fun game, and make friends with people that maybe they don't know." When you are happy, you just feel good.

Reflections by Researcher

My reflections address three essential understandings that have been uncovered from my participation in this study: the meaning of depression for adolescent boys, the impact of exercise on the social, emotional, and academic lives of these boys, and the role of social support in the exercise intervention.

Depression and Adolescent Boys

There is a misconception that depression is about sadness. Nothing could be further from the truth—sad is what you feel when your dog dies. For these adolescent boys, depression is about being irritable and angry at the world without knowing why, and feeling completely helpless and unable to do anything about it. To the rest of the world, these adolescents may look lazy and unmotivated, or rude and defiant. In reality, these boys are on a roller coaster of anxiety and frustration which can quickly turn to a sense of apathy, loss of hope, and a sense of worthlessness.

The Impact of Exercise on the Social, Emotional and Academic Lives of Adolescent Boys

The moderate to vigorous exercise experienced within a safe and supportive environment with peers and a trusted teacher, however, made these boys "feel better." There was a definite physical and mental exhilaration described by the boys as occurring during and immediately after the exercise sessions. Once the heart-rate and breathing returned to its resting state, however, a sense of
calm, relaxation and happiness was evident not only to the boys, but also throughout the day to their teachers, and lasted into the evening and observed by their parents. Adult research indicates that exercise produces similar effects in the brain to drug treatment (Blumenthal et al., 1999), and may be as effective a treatment as medication (Brosse, Sheets, & Blumenthal, 2002).

In describing the effects that the improvements to mood and sense of well-being had on self-regulation, focus, social interaction, self-efficacy, academic achievement, and self-esteem, the descriptions from the participants uncovered a complex and dynamic interaction at play. "Feeling good," and "feeling happy," for these boys impacted positively on every part of their lives—physical, emotional, social, academic. The interconnectedness of anxiety, frustration, anger, low motivation, lack of impulse control, poor social skills, low self-efficacy and self-esteem, and underachievement—spilled over and seeped into every part of their being.

Sometimes outside observers believe there is an element of self-sabotage on the part of the boys, but it needs to be clear that these symptoms are not self-inflicted. Nor can these symptoms be addressed by "snapping out of it." What was abundantly evident from all participants, however, was the significant change for each boy as a result of the eight-week exercise intervention. The energy and exhilaration of the physical exercise transformed into a sense of calm and happiness. The onset of this relaxation and contentment, as if flowing through their veins to each part of the boys' affect, seemed to enable them to address the diverse challenges that each of them faced. As each boy had different challenges,
the relationship and the dynamics of how the improvements to mood and sense of well-being were slightly different. This difference was highlighted by the various perspectives of the boys themselves, their teachers, and their parents. While disconnected observers might have a different analysis, the perspectives that matter most at this stage of their lives are the boys themselves, their teachers, and their parents.

Role of Social Support

Context matters. Devon’s mother, Cherrie said that when Devon played basketball during the intervention program, “He feels safe and he knows he can just play and have fun.” I know from my experience as an educator, that in a school setting, social support will always play a role in any academic or behavioural intervention. Therefore it made sense to include it as factor within the research design. Thus, the research design was created to allow for two specific areas of social control. First, my being present and being the leader, was to ensure an overall positive social dynamic interaction between the focal participants themselves, and between the focal and non-focal participants. Knowing both focal and non-focal participants very well enabled me to set the teams on any given day to produce what I believed would be optimum results both athletically and socially, and to pre-empt, guide, or allow social conflict to escalate. Second, it allowed me to encourage individual participants both athletically and socially, as well as to provide verbal and non-verbal cues for self-regulation and self-efficacy. My support as the intervention leader created opportunities for positive practice producing successful outcomes not only for athletic skill but also for social
interaction. In the choice of non-focal participants, I could also include peer
leaders who would initiate and support this athletic and social encouragement.

What I didn’t expect was that the non-focal participants would develop
these inter-social supportive skills to the extent that they did. The evidence of the
development of these skills on the part of the focal participants is that they were
successfully able to accommodate non-focal participants who, in the classroom
and community environment, were not supportive to Devon. Yet, once in the
intervention environment, the non-supportive students were drawn into the
positive social community that had developed. This relationship building was so
effective that it carried on into the classroom environment to the surprise of both
Devon’s teacher, Rae and his CYW, Marie Mills.

For adolescents, while they are experiencing symptoms of depression, it is
important not to leave them alone, even though they may not appear to ask or
appreciate the social support at the time. Connor’s teacher, Ellen, repeatedly
spoke about Connor needing social support to feel capable and valuable in the
classroom. When that support was available to him, his symptoms were less
severe. But she could also clearly connect the impact of exercise on Connor’s
ability to manage his symptoms. It was Connor, however, who summarized the
relationship between exercise and the role of social support so genuinely, “It helps
you get stuff off your chest, enjoy a fun game and make friends with people that
maybe you don’t know.”
Limitations and Directions for Future Research

I am suggesting further research in six areas. First, the current study included only four focal participants, two of whom provided the most robust data and whose narratives were reported fully. It would be interesting to determine if the picture painted here by the perspectives of the two boys, their teachers, and their mothers is similar to the thoughts, feelings and actions of a much larger male adolescent population with symptoms of depression. Participants in my study were similar in ethnicity, socio-economic group, and intelligence. Results obtained from research using a larger and more diverse sample, and a randomized controlled experimental design including both clinician and self-report data would add to the trustworthiness and generalizability of these findings.

Second, measurements of physical indicators using heart-rate monitors, respiration-rate monitors, and blood tests for lactic acid (to determine muscle fatigue) combined with varied time trials (e.g. 20 minute, 30 minute, 45 minute sessions) would help to more accurately determine at what rate and for what time exercise must take place in order to reduce or alleviate depressive symptoms.

Third, this study addressed only male adolescents. Yet there is also a need to consider effective intervention options for girls, as depression is more strongly linked over time for girls than for boys (Bandura et al., 1999).

Fourth, this study examined exercise within a social context, so the degree to which social support played a role in mediating the depressive symptoms of the boys is unclear. An experimental design including individualized exercise programs, as well as social exercise programs would be required to better
understand the effects of social support. However, maintaining adherence to individual exercise programs for adolescents with symptoms of depression may present a challenge for researchers.

Fifth, follow up studies to determine self-adherence to physical activity as a method of self-treatment would not only provide information about prevention and remission but also serve as a model for other youth as a way to exert control over their conditions and their lives.

Sixth, longitudinal studies would provide information regarding the effects of exercise over time and provide potential incentives for on-going life style changes that would have positive effects in areas of both mental and physical health in addition to potential positive effects on cognition and memory.

Implications for Educators

In our schools and in our communities, depressive symptoms are generally perceived to be inappropriate behaviours or undesirable character flaws requiring remedial consequences. Unfortunately, punitive consequences usually exacerbate the depressive symptoms. To change this mis-perception, I believe that depression needs to be understood as a medical condition that responds to intervention. Like most medical conditions, a range of treatment options are available for depression, drug treatment being one of them. However, the side effects of antidepressants for adolescents (increased potential for suicide) are risky, especially if not highly monitored. Often parents do not inform educators of medications being taken by their children due to fear of negative judgment. If the adolescent is taking antidepressants, but not reporting it, this lack of
communication can be deadly. Further, it is unclear whether antidepressant treatment provides safe and effective symptom reduction over the long term (Thase, 2003).

Exercise that is engaging to the youth involved, conducted in a social context with peers with a supportive, knowledgeable teacher, on the other hand is virtually without risk. It can be applied to small groups or an entire class with no implication as to the rationale other than healthy active living, which according to Bill 8, is a required part of the Ontario daily curriculum for grades one through eight. The advantages of daily 30 minutes of moderate activity are not only physical, but, as suggested by the results here, social, emotional, and academic improvements for adolescent boys with symptoms of depression. It is simple, low risk, cost effective, and invisible. Considering the benefits of exercise to both healthy and depressive populations, we need to make it an essential part of the school day, and part of every classroom teacher’s responsibilities.

Conclusion

The symptoms of adolescent depression are frequently misunderstood by both parents and teachers, as well as by the youth in our schools who are afflicted, resulting in a range of potentially devastating social, emotional, and academic barriers to success. Daily 30 minute periods of moderate exercise, with social support, not only provide virtually risk free, cost-effective relief of depressive symptoms, it is relief which is both immediate and lasting. Further, our Ontario Curriculum and Ministry guidelines (Grades One—Eight), encourage daily active living for all students. As educators, we need to make moderate physical daily
exercise a priority rather than relegating it as a fringe subject that is sidelined in efforts to increase literacy and numeracy achievement scores. In the wake of the Ontario Living Schools study linking increased grade 3 EQAO scores by as much as 50% with daily exercise (Guertin, 2008), the benefits of making moderate exercise an essential component of the school day cannot be ignored. Making time for daily exercise is truly a win-win outcome supporting the Ontario Ministry of Education’s focus on success for all.

It seems appropriate to give the last word to the boys. “It helps you to get some exercise,” Devon concluded. Jordan agreed that, “It’s good for kids.” T. J. recommended, “It would be great if we could do it during class time.” Finally, Connor concluded simply, “We should keep playing everyday.” Exercise has benefits for all students, especially those students who experience symptoms of depression. It is my hope that educators will listen to the stories, of the boys, their mothers, and their teachers, and make exercise, a simple, well tolerated, inexpensive, and invisible intervention, a part of the regular school day.
References


Dear ________________,

As a part of my Masters of Education program at Queen’s University, under the supervision of Dr. Nancy Hutchinson, I am interested in conducting a study into the effects of exercise on adolescent boys who display symptoms of depression. I am looking to see if exercise has any positive impact on their mood and sense of well being and whether that impact translates into improvement in academic success.

Students considered for this study will be referred to me by their teachers as being at-risk for depression by displaying three or more of the symptoms outlined in *When Something’s Wrong: A Guide for Teachers* (Canadian Psychiatric Foundation, 2005). Four at-risk male students from grades six to eight will be joined by two male students who are not considered at-risk by teachers. An eight week exercise program will consist of 30 minutes of daily three-on-three basketball or soccer held during first nutrition break (20 minutes) and the first part of recess (10 minutes), and will be supervised by me.

Prior to beginning the exercise program, parents, students, and teachers will be asked to take part in an interview (approximately 15-20 minutes) as well as filling out a short questionnaire regarding the student’s mood and well being, and attitudes toward school work. An audio-taped interview and questionnaire session should take no more than 30-45 minutes at the most. Follow up audio-taped interviews with parents, students and teachers along with completed questionnaires will be requested half way through the exercise program (after four weeks), and again at the end of the eight week session. All information and answers to questions are entirely optional, so if any there is any requested information you do not wish to share, or any questions you would prefer not to answer, that is quite acceptable.

The risks to your child would be minimal, as in any gym class or sports activity. There are unlikely to be any social risks, as in the past, students have enjoyed having the opportunity to participate in small group sports activities with selected students. The benefits however, may be increased physical fitness levels, positive social interactions during nutrition break and potentially improvements in learning.

Participation in this study is completely voluntary. If you initially choose to participate, but later wish to withdraw your child from the study, you may do so with no negative impact on his social or academic standing at school. None of the data collected on your child will be used once he has been withdrawn.
Only parents of the participating at-risk students, the teachers of those students, the principal, my thesis advisors, and I, will have access to information regarding the study. The program will be referred to in the school community as a “sports activity group”. Data collected – my own observations, information collected from interviews (formal and informal), and questionnaires - will be discussed only with my supervisor, Dr. Nancy L. Hutchinson, and committee member Dr. Ruth Rees, however, all names of students, teachers and the school will be changed to protect the identity and ensure the confidentiality of the students and their families. Upon completion, the data and analysis will be written up as a descriptive study, and submitted as a thesis to the faculty of Education at Queen’s University. At the end of the study, any audio-tapes will be erased, transcripts and notes will be shredded, and computer files will be deleted.

As this is a small study for Masters Degree, there will be no payment in any form for participation from students, parents, or teachers. If you wish, upon completion of the study, I would be happy to review the findings with you and provide you with a copy.

Please feel free to contact me (613-475-2814) or Dr. Hutchinson (613-533-3025) at any time if you have questions, comments, or concerns. If you have questions, concerns, or complaints about the research ethics of this study, please contact the Dean of the Faculty of Education, Dr. Rosa Bruno-Jofre, (613) 533-6210, email brunojor@educ.queensu.ca or the Chair of the General Research Ethics Board, Dr. Stephen Leighton (613) 533-6081 or email greb.chair@queensu.ca

Thank you for considering the opportunity to take part in this study. Your time and involvement is very much appreciated.

Sincerely,

M. Lise Van Winssen
CONSENT FORM
For
Participants (parents/students) in the Case Study-Exercise, Depression, and Learning in Young Adolescent Boys: A Descriptive Study

I have read the Letter of Information and kept a copy for myself. I have had the purpose and procedures of this study explained to me and my questions have been answered to my satisfaction. I understand that interviews with my son and me will be audio-taped.

I understand that my child’s participation is voluntary and I may withdraw him at any point during the study. Once withdrawn, I understand that all of my son’s data will be removed without consequences. I understand that during the collection and recording of data, and in the final written case study, pseudonyms will be used for all participants, school and community to ensure the confidentiality of all information.

I understand that if I have questions about this project, I can contact Lise Van Winssen at (613)475-2814 or Professor Nancy L. Hutchinson at (613)533-3025. I am also aware that for questions, concerns, or complaints about the research ethics of this study, I can contact the Dean of the Faculty of Education, Dr. Rosa Bruno-Jofre, (613) 533-6210, email brunojor@educ.queensu.ca or the Chair of the General Research Ethics Board, Dr. Stephen Leighton (613) 533-6081 or email greb.chair@queensu.ca

Please check the appropriate information below. Sign one copy of this Consent Form and return to Lise Van Winssen at Brighton Public School. Keep the second copy for your records.

____ I agree to participate in this research project.

____ I agree to the audio-taping of interviews of my son and me.

____ I would like a copy of the results once the study has been completed.

I have read and understand the terms and conditions of this study. I agree to participate in this research project.

Student’s Name:__________________________________________

Student’s Signature ________________________________________

Parent’s Name:__________________________________________

Parent’s Signature:________________________________________

Date:______________________________________________________
CONSENT FORM
For
Teachers in the Case Study- Exercise, Depression, and Learning in Young Adolescent Boys: A Descriptive Study

I have read the Letter of Information and kept a copy for myself. I have had the purpose and procedures of this study explained to me and my questions have been answered to my satisfaction. I understand that the interviews will be recorded by audiotape.

I understand that my participation is voluntary and I may withdraw at any point during the study. Once withdrawn, I understand that all of my data will be removed without consequences. I understand the procedures that will be taken to ensure confidentiality of all information.

I understand that if I have questions about this project, I can contact Lise Van Winssen at (613)475-2814 or Professor Nancy L. Hutchinson at (613)533-3025. I am also aware that for questions, concerns, or complaints about the research ethics of this study, I can contact the Dean of the Faculty of Education, Dr. Rosa Bruno-Jofre, (613) 533-6210, email brunojor@educ.queensu.ca or the Chair of the General Research Ethics Board, Dr. Stephen Leighton (613) 533-6081 or email greb.chair@queensu.ca

Please check the appropriate information below. Sign one copy of this Consent Form and return to Lise Van Winssen at Brighton Public School. Keep the second copy for your records.

_____ I agree to participation in this research project.

_____ I agree to the audio-taping of interviews.

I have read the information above and understand the conditions of participation in this study. I agree to participate in this research project.

Teacher’s Name: ________________________________

Teacher’s Signature: ________________________________

Date: ___________________________________________
Appendix A: Parent Questionnaire

Please answer the following questions using the five point scale. Circle the number that most closely matches how well each statement describes how your son appears 1) prior to the beginning of the sessions; 2) after 4 weeks of exercise sessions compared to before the sessions began; 3) at the end of the 8 weeks of exercise sessions compared to before the sessions began.

1 = not at all
2 = a little bit
3 = generally
4 = mostly
5 = very much so

<table>
<thead>
<tr>
<th>Statement</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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</thead>
<tbody>
<tr>
<td>1. _____ is generally agreeable at home.</td>
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<td>2. _____ appears anxious, worried, or nervous.</td>
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<td>3. _____ has difficulty focusing on tasks.</td>
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<td>4. _____ usually appears relaxed.</td>
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<td>5. _____ seems to have a zest for life.</td>
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<td>6. _____ often appears lethargic, lacking in energy.</td>
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<td>7. _____ is able to focus and complete tasks.</td>
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<td>8. _____ is often irritable at home.</td>
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<td>9. _____ is energetic when at home.</td>
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<td>10. _____ usually appears happy.</td>
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<td>11. _____ often does not seem to care.</td>
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<td>12. _____ seems to want to be alone.</td>
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</table>

Name:_____________________________
Date:_____________________________
Appendix A: Parent Interview Focus/Questions

Areas of Focus: Potential increase in positive outcomes

1) Sociability – cooperation, tolerance, adaptability
2) Responsibility - willingness to comply with rules and routines
3) Self Regulation - ability to inhibit inappropriate responses
4) Self-Efficacy - personal belief that student can achieve given outcomes
5) Self-Esteem – personal belief that student has purpose and value to self and others
6) Academic Achievement – demonstrated learning outcomes

Sample Interview Questions

Sociability – Describe how your son gets along with peers, siblings, parents and adults. (If there are any changes) Do you have any thoughts or ideas as to why this is the case?

Responsibility – Describe how your son follows instructions and complete tasks. (If there are any changes) Do you have any thoughts or ideas as to why this is the case?

Self-Regulation – Describe your son’s general behaviour at home. (If there are any changes) Do you have any thoughts or ideas as to why this is the case?

Self-Efficacy – Describe your son’s attitudes toward attempting new and challenging tasks. (If there are any changes) Do you have any thoughts or ideas as to why this is the case?

Self-Esteem – Describe how your son feels about life at school. (If there are any changes) Do you have any thoughts or ideas as to why this is the case?

Achievement – Describe how your son feels he is achieving at school. (If there are any changes) Do you have any thoughts or ideas as to why this is the case?
Appendix B: Student Questionnaire

Please answer the following questions using the five point scale. Circle the number that most closely matches how each statement describes how you feel at the moment.

1 = not at all
2 = a little bit
3 = generally
4 = mostly
5 = very much so

<table>
<thead>
<tr>
<th></th>
<th>I feel like talking to my friends.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I feel ready to complete the next task</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>I feel anxious or nervous.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>I don’t want to do anything right now.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>I feel like I have lots of energy.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>I can’t concentrate right now.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>I feel exhausted.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>I feel happy.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>I feel relaxed.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9</td>
<td>I feel like doing something active.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>I want everyone to get out of my way.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>11</td>
<td>I want to be left alone.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12</td>
<td></td>
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</tbody>
</table>

Comments:

Name: _______________________________
Date: _______________________________

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Appendix B: Student Interview Focus/Questions

Areas of Focus: Potential factors that may affect changes in mood and state of well being

1) Physical Exertion
2) Competition
3) Skill Development
4) Social Interaction
5) Self Image
6) Confidence

Sample Interview Questions

1. How do you feel after the games? a) physically; b) emotionally

2. Why do you think that?

3. Are you looking forward to the next session? Why?

4. Do you think other students would enjoy this program? Why?

5. Do you think the program has had any effect on your ability to concentrate or learn in the classroom? Why?

6. Do you think the program has had any effect on your social relationships at school or at home? Why?
Appendix C: Teacher Questionnaire

Please answer the following questions using the five point scale. Circle the number that most closely matches how well each statement describes how the student appears 1) prior to the beginning of the sessions; 2) after 4 weeks of exercise sessions compared to before the sessions began: 3) at the end of the 8 weeks of exercise sessions compared to before the sessions began.

1 = not at all
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4 = mostly
5 = very much so

*********************************************************************

1. Student is generally agreeable at home.  
2. Student often appears anxious, worried, or nervous.  
3. Student has difficulty focusing on new concepts.  
4. Student generally appears relaxed.  
5. Student seems to have a zest for life.  
6. Student is usually able to focus on new concepts.  
7. Student often appears lethargic.  
8. Student is often irritable in class.  
9. Student frequently appears energetic.  
10. Student generally appears happy.  
11. Student often appears apathetic.  
12. Student often appears withdrawn.

Student:_____________________________
Date:_____________________________
Appendix C: Teacher Interview Focus/Questions

Areas of Focus: Potential increase in positive outcomes

1) Sociability – cooperation, tolerance, adaptability
2) Responsibility - willingness to comply with rules and routines
3) Self Regulation - ability to inhibit inappropriate responses
4) Self-Efficacy - personal belief that student can achieve given outcomes
5) Self-Esteem – personal belief that student has purpose and value to self and others
6) Academic Achievement – demonstrated learning outcomes

Sample Interview Questions

Sociability – Describe student’s social interactions with peers, and teachers. Please elaborate as to why you think this is the case.

Responsibility – Describe student’s ability to follow instructions. Please elaborate as to why you think this is the case.

Self-Regulation – Describe student’s behaviour in situations where some impulse control is required. Please elaborate as to why you think this is the case.

Self-Efficacy – Describe student’s attitudes toward attempting new and challenging tasks. Please elaborate as to why you think this is the case.

Self-Esteem – Describe student’s attitudes toward his personal value or own contribution. Please elaborate as to why you think this is the case.

Achievement – Describe student’s overall learning outcomes in language, math, science, social studies, physical education, and the arts. Please elaborate as to why you think this is the case.
### Appendix D: Data Collection Timeline

<table>
<thead>
<tr>
<th>Type of Data</th>
<th>October</th>
<th>November</th>
<th>December</th>
<th>January</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interviews</td>
<td>Information and Consent Meetings with participants (parents, students, and teachers)</td>
<td>Mid-intervention Interviews with participants (parents, students, and teachers)</td>
<td>Post-intervention Interviews with participants (parents, students, and teachers)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pre-intervention Interviews with participants (parents, students, and teachers)</td>
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<tr>
<td>Intervention</td>
<td>Intervention begins (week 1)</td>
<td>Intervention (week 2-5)</td>
<td>Intervention (week 6-7)</td>
<td>Intervention (week 8)</td>
</tr>
<tr>
<td>Researcher Observations</td>
<td>Sports Activity Notes: Anecdotal notes about student participants during intervention (entry, scrimmage, post-activity/snack)</td>
<td>Sports Activity Notes: Anecdotal notes about student participants during intervention (entry, scrimmage, post-activity/snack)</td>
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<td>Sports Activity Notes: Anecdotal notes about student participants during intervention (entry, scrimmage, post-activity/snack)</td>
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<tr>
<td>Interactions</td>
<td>In-school Activity Notes: Anecdotal notes about student participants recorded by period throughout the school day</td>
<td>In-school Activity Notes: Anecdotal notes about student participants recorded by period throughout the school day</td>
<td>In-school Activity Notes: Anecdotal notes about student participants recorded by period throughout the school day</td>
<td>In-school Activity Notes: Anecdotal notes about student participants recorded by period throughout the school day</td>
</tr>
<tr>
<td>Communications</td>
<td>Conversations that occurred</td>
<td>Conversations that occurred</td>
<td>Conversations that occurred</td>
<td>Conversations that occurred</td>
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</tbody>
</table>

In-school Activity Notes:
- Anecdotal notes about student participants recorded by period throughout the school day
- Conversations that occurred
<table>
<thead>
<tr>
<th>Throughout the school day with student participants, throughout the school day with student participants, teachers, parents</th>
<th>Throughout the school day with student participants, throughout the school day with student participants, teachers, parents</th>
<th>Throughout the school day with student participants, throughout the school day with student participants, teachers, parents</th>
<th>Throughout the school day with student participants, throughout the school day with student participants, teachers, parents</th>
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<tbody>
<tr>
<td>Researcher Journal: recorded comments, queries regarding interviews, intervention, observations and conversations with participants throughout school day teachers, parents</td>
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