



Sport participation in high school and anxiety symptoms in young adulthood



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ABSTRACT

The longitudinal associations between sport participation and symptoms of four anxiety sub-types (panic disorder, generalized anxiety disorder (GAD), social phobia, agoraphobia) were assessed. Participants ($n = 781$; 45% male; $M_{age} = 20.34 \pm 0.71$ years) provided data on sport participation over five years of high school and measures of anxiety three years post high school. Sport participation was analyzed both as the total number of years playing sports over five years and the number of years playing team or individual sports. In logistic regression analyses, number of years playing sports was associated with fewer panic disorder and agoraphobia symptoms in young adulthood. Further, number of years playing team sports was associated with fewer symptoms of panic and agoraphobia, while number of years playing individual sports was associated with fewer social phobia symptoms. The results suggest that consistent involvement in sport during high school is beneficial for mental health. Furthermore, this study emphasizes the importance of studying each anxiety symptom subtype as a unique outcome.

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1. Introduction

Anxiety is the most common mental health problem in Canada (Public Health Agency of Canada, 2015) with anxiety accounting for the largest proportion (32%) of mental health-related costs (DuPont, DuPont, & Rice, 2002). Identifying the determinants of anxiety early in life is critical as anxiety symptoms may persist and intensify into adulthood, increasing the risk of clinically-diagnosed anxiety later in life (Copeland, Angold, Shanahan, & Costello, 2014). Considering the high prevalence and burden of anxiety disorders, it is important to identify cost-effective strategies to prevent and treat anxiety and underlying symptoms. Enhancing sport participation during adolescence may be an effective strategy to improve mental health (Eime, Young, Harvey, Charity, & Payne, 2013; Jewett et al., 2014; Sabiston et al., 2016), yet little is known about the association between sport participation and anxiety symptoms specifically.

Extra-curricular sport participation peaks in late childhood and then declines steadily throughout adolescence (Bélanger, Gray-

Donald, O'Loughlin, Paradis, & Hanley, 2009; Zimmermann-Sloutskis, Wanner, Zimmermann, & Martin, 2010). Low rates of sport participation are concerning given the many physical health and social benefits of physical activity including improved self-esteem, increased social interaction and fewer depressive symptoms (Eime et al., 2013). While there is some research on mental health outcomes, little is known about the association between sport participation and anxiety-related outcomes since most of the evidence is focused on depression (Dunn, Trivedi, Kampert, Clark, & Chambliss, 2005). For example, Jewett et al. (2014) found that adolescents who participated in non-obligatory school sport reported less depressive symptoms, lower levels of stress, and higher self-rated mental health in early adulthood. The associations were not observed for sport participation in the community. In an attempt to better understand the sport experience in the same sample of adolescents followed into young adulthood, Sabiston et al. (2016) found that team, but not individual, sport participation was protective of depressive symptoms over time. This finding of unique associations between team and individual sport and depressive symptoms has also been found among children (Perron et al., 2012) and youth (Gore, Farrell, & Gordon, 2001). However, there is limited evidence exploring anxiety symptoms as unique mental health outcomes.

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Extant findings on anxiety predominantly focus on the associations with general physical activity, rather than sport participation specifically (Faulkner & Tamminen, 2016). Further, researchers often restrict the study to one form of anxiety or they group distinct anxiety disorders (e.g., panic disorder, generalized anxiety disorder) together (Pasco et al., 2011) despite differing origins and symptomology and potentially different health implications (Schumacher Dimech & Seiler, 2011; Ströhle, Feller, Strasburger, Heinz, & Dimeo, 2006). Specifically, panic disorder is characterized by panic attacks: an unexpected intense and debilitating physiological response (i.e., heart palpitations, sweating, and trembling) that can arise in a calm or anxious state. This disorder commonly results in fear of reoccurring panic attacks, which can interfere with daily life as people alter their behaviour to avoid the possibility of future attacks (American Psychiatric Association, 2013). Ströhle et al. (2005) reported that 30 min of physical activity on a treadmill has anxiolytic effects in persons with and without panic disorder (Ströhle et al., 2005); and Esquivel, Schruers, Kuipers, and Griez (2002) reported that healthy participants had fewer panic symptoms after a bicycle task (Esquivel et al., 2002). Social anxiety (also referred to as social phobia) is characterized by a persistent fear of social situations (e.g., being judged by others and being embarrassed in front of others). Individuals with social phobia experience distress and impairment in social settings such as at work or school (American Psychiatric Association, 2013). Researchers have shown that physical activity, namely walking or jogging on a treadmill, decreases social phobia by altering perceptions of threat (Heenan & Troje, 2014). Furthermore, generalized anxiety disorder (GAD) is characterized by chronic worry about everyday activities such as money transactions, relationships, and work. These worries tend to be excessive and unrealistic, and persist across situations (American Psychiatric Association, 2013). Herring, Puetz, O'Connor, and Dishman (2012) found a 6-week resistance training program significantly decreased worry in persons with GAD (Herring et al., 2012). Finally, agoraphobia is characterized by a fear of crowds and public places, which results in individuals avoiding these situations and thus not participating in commonplace interactions (American Psychiatric Association, 2013). Based on self-report data, the prevalence of agoraphobia is significantly lower among those who engage in regular physical activity (Goodwin, 2003; Ströhle et al., 2007). Although the protective effects of physical activity for anxiety are emerging, few studies have examined the unique longitudinal associations between sport participation and anxiety subtypes. Specific elements of sport participation may offer unique protective effects from anxiety symptoms including the competitive, structured and organized, and possibly social nature of sport. A review by Eime et al. (2013) summarized that sport participation in childhood and adolescence significantly decreased general symptoms of anxiety (Eime et al., 2013; Ferron, Narring, Cauderay, & Michaud, 1999; Findlay & Coplan, 2008) but only one study with children found sport participation significantly decreased social phobia symptoms specifically (Schumacher Dimech & Seiler, 2011). As such, it is important to explore the associations between sport participation and a range of anxiety symptoms.

Several mechanisms may explain the anxiolytic effects of sport participation. The thermogenic hypothesis suggests the brain senses elevated body temperature during physical activity, which causes a relaxation response and thus reduces anxiety (Lim, Byrne, & Lee, 2008). The distraction or 'time out' hypothesis suggests that sport participation provides a distraction from usual routines and stresses, which allows individuals to distract themselves from worry thereby reducing anxiety (Ströhle, 2009). The mastery hypothesis posits that successes achieved in sport experiences may lead to a sense of mastery that counteracts negative thinking

tendencies of anxious individuals (Asmundson et al., 2013). Improvements in physical self-concept and self-esteem may also explain the anxiolytic effects of sport (Herring, O'Connor, & Dishman, 2014; Izgiç, Akyüz, Doğan, & Kuğu, 2004). Finally, Salmon's (2001) 'resilience derived through dysregulation of the sympathetic nervous system' model (Salmon, 2001) posits that both anxiety symptoms and sport participation activate the autonomous sympathetic nervous system, which involves increased heartbeat, rapid breathing and increased sweating. As such, anxious individuals who participate in sport become sensitized to these symptoms and learn these physiological responses are tolerable and harmless (Antony, Ledley, Liss, & Swinson, 2006). Finally, the social functions of team sports may act as a resilience mechanism to social phobia symptoms (Schumacher Dimech & Seiler, 2011).

The purpose of this study was to examine the longitudinal associations between sport participation during high school and symptoms of panic disorder, GAD, social phobia and agoraphobia in young adulthood (assessed three years after high school). We hypothesized that consistent sport participation throughout high school would be associated with fewer symptoms of all anxiety subtypes in young adulthood. It was further hypothesized that number of years playing team versus individual sport would exhibit differential relations with each anxiety symptom subtype.

2. Method

Ethics approval for this project was received by the Montreal Department of Public Health Ethics Review Committee, the McGill University Faculty of Medicine Institutional Review Board, the Ethics Research Committee of the Centre de Recherche du Centre Hospitalier de l'Université de Montréal and the University of Toronto.

Data were drawn from the Nicotine Dependence in Teens (NDIT) Study. NDIT is a longitudinal investigation of 1294 grade 7 students age 12–13 years at cohort inception in 1999 from 10 high schools in the Montreal, Canada area. All participants and their parents provided informed consent prior to participation. NDIT participants completed self-report questionnaires at school four times (every 3 months on average) in each of grades 7 to 11, for a total of 20 survey cycles during high school. Mailed self-report questionnaires were completed by 858 of 1294 individuals eligible for follow up in 2007 in survey cycle 21 when participants were 20 years of age on average. The current analytical sample included 781 young adults ($M_{\text{age}} = 20.34 \pm 0.71$ years) with complete data on the variables of interest in this study. Group means on total number of years of sport participation ($M_{\text{retained}} = 2.82 \pm 1.54$ vs $M_{\text{dropout}} = 2.14 \pm 1.52$) and participation in team ($M_{\text{retained}} = 2.41 \pm 1.95$ vs $M_{\text{dropout}} = 1.75 \pm 1.69$) and individual ($M_{\text{retained}} = 1.19 \pm 1.43$ vs $M_{\text{dropout}} = 1.59 \pm 1.65$) sport were significantly ($p < 0.01$) higher for participants retained for analysis compared to mean scores for participants who dropped out. A detailed description of the NDIT study design and methods is available (O'Loughlin et al., 2015).

2.1. Measures

2.1.1. Number of years of participation in sport

Participants were asked in each survey cycle during high school if they had belonged to or participated in any of 18 (e.g., soccer, basketball, football) extra-curricular and non-obligatory organized lessons, classes or sport teams in or outside of school. Responses were "yes" or "no" for each sport. A score for number of sports activities was calculated for each year of high school and students were coded "yes" or "no" as participating in any sport during that year. This coding accounted for the different availabilities of sports

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