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DEVELOPMENTAL PSYCHOLOGY | RESEARCH ARTICLE

Investigating the influence of youth hockey specialization on psychological needs (dis)satisfaction, mental health, and mental illness

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Abstract: The Developmental Model of Sport Participation describes three pathways that youth can follow: recreational participation, late specialization and early specialization. Many competitive sport programmes are promoting early specialization in hopes that their athletes will gain an advantage over others; however, research indicates that youth who wait until adolescence to specialize in a given sport may achieve physical and psychological benefits. The purpose of this study was to investigate the psychological effects of sport specialization by examining relationships between youth hockey players' level of specialization, psychological needs satisfaction (PNS), psychological needs dissatisfaction (PND), mental health and mental illness. Sixty-one youth male hockey players ($M_{\text{age}} = 14.90$) responded to an online survey. Results indicated that PND according to specialization was significant with early specializers reporting the highest PND and recreational athletes reporting the lowest PND ($p = .029$), indicating a large effect size ($\eta^2 = .157$). No other significant differences were found. Bivariate correlations revealed significant relationships between all variables. Moreover, regression analyses showed that PNS positively predicted mental health ($\beta = .47$) and negatively predicted mental illness ($\beta = -.51$),

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PUBLIC INTEREST STATEMENT

Recently, there has been substantial media coverage detailing how organized sport may not always benefit youth in the ways most people would like to believe. This research article explores the psychological effects of sport according to three separate sport pathways in youth hockey players. Results from this study found that youth who specialized in hockey before the age of 12 had greater psychological needs dissatisfaction than youth who participated in hockey recreationally. Since psychological needs dissatisfaction is a predictor of mental illness, these results suggest that participating in high level sport at a young age may result in negative psychological consequences. Within North America, hockey has been considered an integral part of the culture for over a century. Given the popularity of hockey participation among youth, it is important for parents and coaches to understand the sport context before making important decisions that could impact the well-being of youth.

while PND positively predicted mental illness ($\beta = .71$) and negatively predicted mental health ($\beta = -.44$). Results suggest that PNS is important to promote mental health and avoid mental illness. Future research is needed to fully understand the psychological consequences of early sport specialization.

Subjects: Sport Psychology; Youth Sport; Youth Sports Development

Keywords: sport specialization; mental health; mental illness; psychological needs satisfaction; psychological needs dissatisfaction; developmental model of sport participation; hockey; youth sport

1. Introduction

The importance of adolescent mental health has been well-documented in recent years and current research has highlighted important links between mental health and physical and psychological functioning (Keyes, 2005, 2007). However, Statistics Canada (2015) reported an increase in mood disorders among youth aged 12–19 years old with numbers increasing by 45% from 2011 to 2014. Accordingly, there has been growing interest in investigating strategies that promote well-being in youth. Within the literature, “flourishing” (Keyes, 2002; Seligman, 2012) has been identified as the presence of high levels of mental health and well-being. Keyes (2005) coined this term and proposed a model where mental health and mental illness do not exist on opposite ends of a single continuum. In other words, mental health is more than the absence of a mental illness, it is a complete state. Keyes (2013) has outlined that youth who flourish report the fewest depressive symptoms and the highest levels of global self-concept, self-determination, closeness to others and school integration. Conversely, youth who are languishing report the most depressive symptoms and the lowest levels of global self-concept (Keyes, 2013). It is important to note that there are many different conditions which may be recognized as a mental illness (i.e. general anxiety disorder, bipolar disorder, depression). As depression is reported as the most common form of mental illness among Canadian youth (Statistics Canada, 2015), mental illness was assessed in the present study using a measure of depression.

Adolescence represents a time in one’s life where many changes occur (Forbes & Dahl, 2010; Scales, Benson, Roehlkepartain, Sesma, & van Dulmen, 2006; World Health Organization, 2014); therefore, it is critical for youth to develop sound mental health. In recent years, researchers have been investigating strategies to facilitate well-being in the youth population (Ben-Arieh et al., 2013; Lubans, Plotnikoff, & Lubans, 2012). Compton and Hoffman (2012) suggested that involvement in leisure pursuits such as sport is a promising strategy. There have been a growing number of studies examining how the sport experience promotes mental health in the youth population (Biddle & Asare, 2011; Eime, Young, Harvey, Charity, & Payne, 2013; Merglen, Flatz, Bélanger, Michaud, & Suris, 2013; Ntoumanis & Standage, 2009). However, little published work in this area has used Keyes’ positive psychology perspective to investigate well-being. Indeed, athlete “mental health” has most often been studied in terms of the absence of diseases such as depression or anxiety, which neglects positive mental health (Biddle & Asare, 2011; Brown, Ford, Burton, Marshall, & Dobson, 2005; Rueda, Solà, Pascual, & Subirana Casacuberta, 2011). Although some researchers have argued that properly structured sport environments can promote youth well-being and ease symptoms of psychological ill-being (Danish, Forneris, Hodge, & Heke, 2004; Eime et al., 2013; Gould & Carson, 2008; Ommundsen, Løndal, & Loland, 2014), an increasing number of studies and reviews have also documented negative psychological effects on athletes, such as increased levels of burnout or drop-out and the use of drugs and/or alcohol (e.g. Bean, Fortier, Post, & Chima, 2014; Goodger, Gorely, Lavalley, & Harwood, 2007; Kwan, Bobko, Faulkner, Donnelly, & Cairney, 2014). One way these findings can be explained is by taking into consideration the different pathways of sport participation.

1.1. Developmental pathways of sport participation

The Developmental Model of Sport Participation (DMSP; Côté, 1999; Côté, Baker, & Abernethy, 2007; Côté & Fraser-Thomas, 2007) focuses on the development of children and adolescents in sport between the ages of 6–18 years. Within this model, there are three distinct pathways: recreational participation through consistent sampling, elite performance through early sampling and later specialization and elite performance through early specialization. Each pathway contains a different balance of deliberate play and deliberate practice activities. Within the DMSP, the *recreational* pathway is characterized by high amounts of deliberate play and low amounts of deliberate practice throughout the athlete's development. Around the age of 12, a choice is made in which youth either specialize in one sport, continue to sample sports or play one sport at a recreational level. Those individuals who choose to specialize in one sport before the age of 12 are considered to follow the *early specialization* pathway, where youth engage in high amounts of deliberate practice in a single sport, while youth who follow the *late specialization* pathway wait until after the age of 12 to focus on a single sport. The early specialization pathway is most commonly followed by athletes who participate in sports where peak performance occurs before puberty (e.g. gymnastics), yet is becoming increasingly common in other sports such as hockey and soccer (Gavett, Miller, Coogan, & Burnett, 2013; Soberlak & Côté, 2003). Although there are other existing models of athlete development (i.e. Long-Term Athlete Development; Balyi & Hamilton, 2004), it has been argued that none have been as well developed in the literature or used as extensively as the DMSP (Bridge & Toms, 2013). For this reason, the DMSP will be used to categorize participants within this study.

Based on mounting evidence in this field, it has been argued that not all developmental pathways of sports participation are equally beneficial to young athletes for physical and mental health reasons alike (Bridge & Toms, 2013; Gould, 2010; Jayanthi, Pinkham, Dugas, Patrick, & LaBella, 2013; Jayanthi, Pinkham, Luke, & Jayanthi, 2011). A review by Baker, Cobley, and Fraser-Thomas (2009) on early specialization of elite youth athletes highlighted the physical, psychological and social consequences of early specialization. These findings are in line with a recent review by Bean et al. (2014) which concluded that although there are positive experiences and outcomes of youth sport participation, negative physical and psychological effects have also been identified and need to be addressed. Both reviews suggest the need for further examination of sport specialization as the effects remain unclear. Interestingly, findings from a study conducted by Soberlak and Côté (2003) indicated that early sport specialization was not a necessary element in the development of expertise in hockey, suggesting that early specialization may not be necessary to achieve high levels of performance. In addition to the literature examining specialization in youth sport (e.g. Baker et al., 2009; Bean et al., 2014), there has been substantial media coverage (e.g. Comer, 2015; Farrey, 2015; Reed, 2014) debating the benefits and risks associated with youth sport specialization; however, the majority of this research has focused on physical health outcomes. To our knowledge, no published studies have examined the relationship between sport specialization and mental health. This was one of the innovative aspects of this study.

1.2. Influence of psychological needs (dis) satisfaction on mental health

One important element to consider when examining youth athlete mental health is the role of basic needs. Researchers are increasingly using the self-determination theory (SDT) to understand psychological functioning within the sport context. A sub-theory of SDT is basic needs theory (BNT; Ryan & Deci, 2000a), which posits that autonomy, competence and relatedness are basic needs possessed by all human beings that are essential for optimal functioning (Ryan & Deci, 2000a, 2002). Autonomy is concerned with individuals having the ability to make choices and act in accord with their sense of self (Adie, Duda, & Ntoumanis, 2008). Competence is an individual's need to feel a sense of mastery within their environment (Deci, Ryan, & Williams, 1996). Relatedness refers to having a sense of belonging; caring about and being cared for by others (Ryan & Deci, 2002). The extent to which these needs are met, called needs satisfaction, has been found to influence personal, social and psychological development and well-being (Hodge, Danish, & Martin, 2013; Reis, Sheldon, Gable, Roscoe, & Ryan, 2000; Weiss & Amorose, 2008). Conversely, when these needs are thwarted, known as needs dissatisfaction, negative outcomes result (Bartholomew, Ntoumanis, Ryan, Bosch, &

Thøgersen-Ntoumani, 2011; Bartholomew, Ntoumanis, & Thøgersen-Ntoumani, 2011; Deci & Ryan, 2000). Research utilizing BNT conducted within the youth sport context has examined the mechanisms linking dimensions of the coach-created environment to positive and negative indicators of youth athletes' welfare in the sports domain (Gagné, 2003; Gagné & Blanchard, 2007; Reinboth, Duda, & Ntoumanis, 2004). For example, Adie, Duda and Ntoumanis (2008; 2012) found that coach autonomy support positively predicted athletes' satisfaction of the three basic needs and that basic needs satisfaction led to greater subjective vitality when engaged in sport. Indeed, most research examining psychological needs satisfaction (PNS) in sport has focused on the effect that needs satisfaction has on measures of vitality. To our knowledge, within a sport context, the relationship between needs (dis)satisfaction and overall mental health (including emotional, psychological and social well-being) has not been considered. Since previous research in a variety of health contexts have suggested a strong correlation between PNS and mental health/well-being, further investigation of this relationship within a sport context should be considered (Edmunds, Ntoumanis, & Duda, 2007; Gonzalez, Swanson, Lynch, & Williams, 2014; Ng et al., 2012). Therefore, the present study investigates the effect that psychological needs (dis)satisfaction has on mental health and mental illness specifically within a youth sport context.

Within Canada, ice hockey (hereafter referred to as "hockey") has been considered an integral part of the culture and national identity for over a century (Dawson, 2014; Gruneau & Whitson, 1993; MacDonald, Côté, & Deakin, 2010), with over 630 000 youth in Canada registered in organized hockey (Hockey Canada, 2014). Recent media coverage and peer-reviewed research has called attention to the youth hockey environment, highlighting a need to change the high-pressure sport context (Ackery, Tator, & Snider, 2012; Gillis, 2014; Robidoux & Bocksnick, 2010). Given the importance hockey has in Canada, and that no study has specifically explored the perceptions of psychological needs (dis)satisfaction and how these play a role in well-being within the context of youth hockey, the current research aims to examine the links between youth hockey players' needs (dis)satisfaction and their mental health and mental illness using Keyes' model. Moreover, the majority of studies that have examined the level of specialization among athletes have investigated physical health outcomes (e.g. Fransen et al., 2012; Jayanthi, Dechert, Durazo, Dugas, & Luke, 2011; Jayanthi et al., 2011), while much less research has been conducted on the psychological health of athletes as it relates to specialization (Baker et al., 2009). Finally, no studies to our knowledge have examined how sport specialization influences needs (dis)satisfaction. Therefore, the present study sought to answer the following three research questions: (1) Are there differences between three different specialization groups (recreational, late specializers or early specializers) on PNS, PND, mental health and mental illness within youth hockey players?; (2) What are the relationships between PNS, PND, mental health and mental illness?; (3) Does youth's PNS and/or PND predict mental health and mental illness, and if so, does specialization level play a role? Based on these three research questions, it was hypothesized that there would be differences between the three specialization groups, with early specializers scoring lower on PNS and mental health, and higher on PND and mental illness compared to late specializers and recreational athletes. Secondly, it was hypothesized that PNS would be positively related to mental health and negatively related to mental illness and that PND would be positively related to mental illness and negatively related to mental health. Last, it was hypothesized that PND would positively predict mental illness and PNS would positively predict mental health and that the specialization would play a role.

2. Methods

2.1. Context and participants

This project was part of a larger study which focused on the well-being of male youth hockey players and their parents. The inclusion criteria were as follows: English speaking and a dyad that was comprised of a male youth hockey player between the age of 13 and 18 and one of his parents. Participants for this part of the study were 61 male Bantam and Midget hockey players between the ages of 13–18 years old ($M_{\text{age}} = 14.90$, $SD = 1.41$) from various hockey organizations in south-eastern Ontario, Canada. There were approximately 525 potential subjects asked to participate in the study,

which corresponds to a response rate of 11.6% (Figure 1). This is consistent with the typical response rate of 10–25% for detailed online web surveys (Sauermann & Roach, 2013). The level of hockey that youth participated in ranged from house league (recreational participation) to “AAA” (the highest calibre of minor hockey in Canada). Fifty-four per cent of our sample played “AA” or “AAA” hockey, while 20% of our sample played hockey at the house league level. Youth were also asked about their involvement in other leisure activities (e.g. sport, clubs, leadership, religious, volunteer and other) and if they spent a significant amount of time (10 or more hours) engaged in any other activities (sport or non-sport) to gauge a more comprehensive understanding of their current leisure involvement. Twenty-two youth responded that hockey was their only leisure activity, while the remaining 39 participants identified engaging in various leisure activities (36 identifying that they engaged in another sport). However, only three youth identified that they spent a significant amount of time engaged in other activities, yet these participants identified a combination of leisure involvements and therefore were not dedicating a significant amount of time to one specific leisure pursuit. Table 1 provides additional participant information by specialization group in which participants were classified accordingly from information provided in the parent questionnaire (see below). Of the parents who responded to the online questionnaires, and provided information related to the relationship with their child, 63% were mothers while 37% were fathers.

Figure 1. Participant recruitment flow-chart beginning with questionnaire distribution from the president of the Hockey Organization (7 organizations) to the coaches of all Bantam and Midget teams within that organization (average 5 teams per organization), to the parents and players of each team with levels ranging from house league to “AAA” (approximately 15 players per team). *One youth within the sample had just turned 18 years old, but was still playing within the Midget age group.

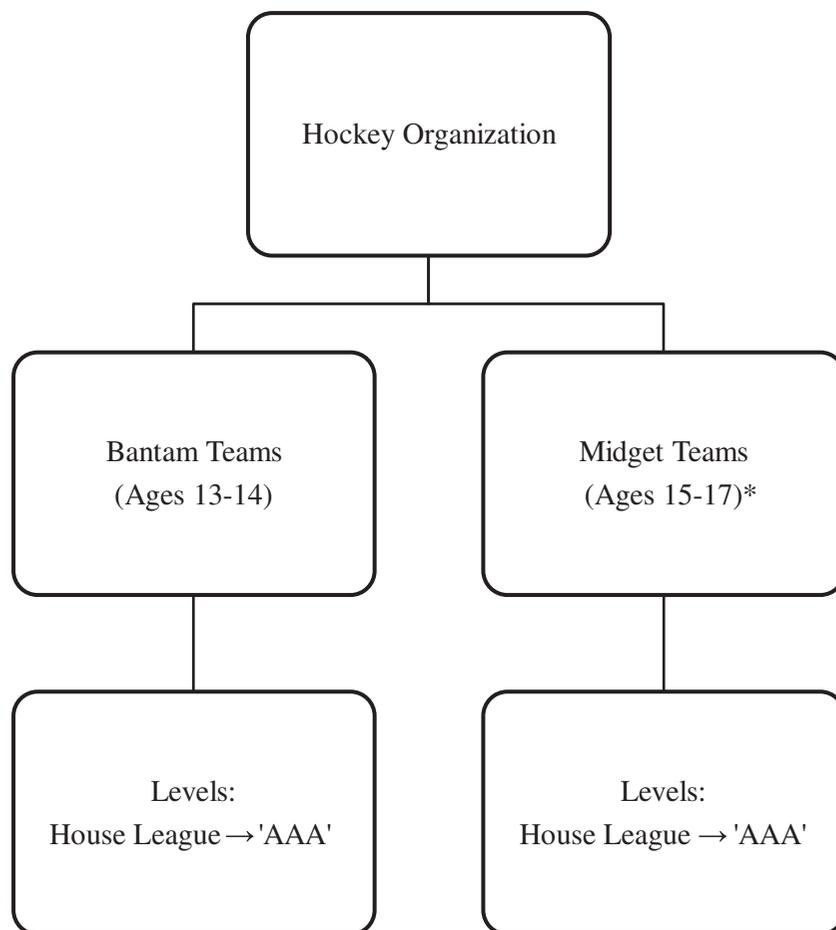


Table 1. Demographic information on youth participants organized by level of specialization

	Early specialization (n = 26)			Late specialization (n = 15)			Recreational (n = 20)		
	M	SD	Range	M	SD	Range	M	SD	Range
Age	15.08	1.44	13–18	14.40	1.50	13–17	15.05	1.28	13–17
Total hours of hockey per week	8.65	1.92	5–13	8.27	3.90	3–17	6.32	3.82	2–13

2.2. Procedure

Following ethical approval from the affiliated institution’s Office of Research Ethics and Integrity, recruitment began which involved contacting various youth hockey organizations in South-Eastern Ontario, Canada and attaining support for this research project. The supporting organizations then provided survey links to parents within their organization via email or organizations’ website. If parents and their sons decided to participate, they were asked to complete separate online questionnaires through FluidSurveys, an online platform. The online questionnaires began with either a consent form, within the parent survey, or an assent form, within the athlete survey. Participants were required to check a box stating that they were willing to participate before they were able to begin the survey. Then, if the youth athlete met the inclusion criteria, the dyad was asked to complete the questionnaires. Data were collected between 1 January and 31 March 2015. Data collection ended at this point in order to control for changes in mental health due to weather. Both parent and youth online questionnaires took approximately 10–15 min in length to complete. The parent survey involved questions related to the developmental pathway of their child (i.e. specialization). The youth questionnaire involved demographics and questions regarding their perceived levels of PNS, PND, mental health and mental illness.

2.3. Measures

2.3.1. Parent questionnaire

2.3.1.1. Developmental pathway. The Sport Specialization Scale (Jayanthi et al., 2011) was used to classify youth athletes into the three categories of specialization (recreational, late specializers, early specializers) and was completed by one parent of each youth athlete (n = 61). This scale includes six questions including: (1) whether athletes trained more than 75% of the time exclusively in one sport, (2) whether athletes train to improve skill or misses time with friends, (3) whether participation in other activities was discontinued in order to focus on one sport, (4) when the athlete considers one sport more important than other sports, (5) whether participation involved extensive travel and (6) whether participation (practices, games, etc.) involved training for more than eight months in a given year or has a competition season that exceeded six months per year in duration. Parents were asked to complete this questionnaire via recall starting at the age of 6 years old and in subsequent two year increments until the age of 18. Parents were only to complete the questionnaire up until the current age of their child. For example, if their child was 14 years of age, the parent would complete the specialization scale for ages 6, 8, 10, 12 and 14 years of age. Based on this scale, youth were classified as recreational, late specializers or early specializers. Those who scored a three or above on the six-point scale were considered specialized, while others were considered recreational. Those who scored a three or above at the age of 12 or younger were considered early specializers, while those who scored a three or higher after the age of 12 were considered late specializers (Loyola University Health System, 2011).

2.3.2. Youth questionnaire

2.3.2.1. Demographic questionnaire. Participants completed questions including basic demographic information (gender and age), level of hockey involved, total number of sport hours per

week and involvement in extra-curricular activities outside of hockey, as previously outlined. This was used to assess whether youth were sampling or if they specialized in a single sport.

2.3.2.2. Mental health. Mental health was measured using the Mental Health Continuum-Short Form (MHC-SF; Keyes, 2002, 2005, 2006). The MHC-SF is derived from the long form (MHC-LF), which consisted of 7 items measuring emotional well-being, six 3-item scales totalling 18 items, that used Ryff's (1989) model of psychological well-being and Keyes' (1998) model of social well-being. This 14-item questionnaire uses the stem: "during the past month, how often did you feel the following ways" and represents three facets of well-being: (1) emotional well-being (three items; e.g. happy, satisfied with life); (2) psychological well-being (six items; e.g. that you had warm and trusting relationships with others; that your life has a sense of direction or meaning to it); and (3) social well-being (five items; e.g. that you had something important to contribute to society; that people are basically good). Analysis of this scale has revealed good internal consistency (>.80) and discriminant validity. Additionally, CFA supported the hypothesis that mental health and mental illness are separate yet inversely related constructs, which demonstrates discriminant validity (Lamers, Westerhof, Bohlmeijer, ten Klooster, & Keyes, 2011). Finally, positive mental health is an indicator of mental well-being that can be assessed reliably with the MHC-SF (Lamers et al., 2011). With the current sample, all factors showed good internal consistency, with Cronbach's alphas ranging from .83 to .85.

2.3.2.3. Mental illness. Although there are many different conditions which may be recognized as a mental illness, the present study quantified mental illness according to a measure of depression using the Center for Epidemiological Studies Depression Scale for Children (CES-DC; Faulstich, Carey, Ruggiero, Enyart, & Gresham, 1986; Weissman, Orvaschel, & Padian, 1980). This 20-item questionnaire uses the stem "During the past week..." anchored on a 4-point Likert Scale from "Not At All" (0) to "A Lot" (3). Sample questions included "...I was bothered by things that don't usually bother me", "...I felt like I was too tired to do things" and "...It was hard to get started doing things". A total score is generated with higher scores representing increasing levels of depression. A score of greater than 15 represents significant depressive symptoms. With the current sample, all items showed good internal consistency, with Cronbach's alphas ranging from .84 to .86. This measure was chosen based on recommendations by Gunnell, Crocker, Wilson, Mack, and Zumbo (2013) to use depression as a measure of ill-being as it relates to PNS.

2.3.2.4. PNS and PND. Basic needs satisfaction and dissatisfaction was measured using the Balanced Measure of Psychological Needs (BMPN). Sheldon and Gunz (2009) developed this scale through extensive pilot testing of relevant candidate items, prior to using the 18-item version in their three reported studies. The scale is based on Deci and Ryan's (2000, 2002) three basic psychological needs: autonomy, competence and relatedness. Each need is assessed via six items each and has three positively worded and three negatively worded questions. Satisfaction is defined as the salient presence of certain experiences ("I felt close and connected with other people who are important to me", "I did well even at the hard things"), whereas dissatisfaction is defined as the salient absence of the experiences ("I felt unappreciated by one or more important people" or "I struggled doing something I should be good at"). Although psychological needs (dis)satisfaction measures are comprised of three subscales (autonomy, competence, relatedness), the present study combined these subscales and obtained a total score for both PNS and PND, which has been used in previous research (e.g. Standage, Duda, & Pensgaard, 2005; Standage & Vallerand, 2014). Prior studies using the BMPN have indicated acceptable to good instrument reliability ranging from .69 to .85 (Sheldon & Gunz, 2009; Sheldon & Hilpert, 2012).

2.4. Data analysis

Data from the online questionnaires were analysed using SPSS 23.0 for Windows. First, as mentioned, youth were classified into the three categories (recreational athletes, late specializers, early

specializers) based on the data provided by the parents. Descriptive statistics (means and standard deviations) were calculated for each measure and corresponding subscales. To address research question 1 concerning group differences, several one-way between groups analysis of covariance (ANCOVA) tests were conducted to compare the mental health, mental illness, PNS and PND across the three groups of youth hockey players by specialization (recreational, late specializers, early specializers). Participants' total sport hours and level of hockey were used as covariates in these analyses. Normality was tested and dependent variables were found to be close to normal with skewness and kurtosis values between -2.0 and +2.0. Due to the small sample size within this study resulting in low power, effect sizes were calculated and are reported with eta-squared (η^2). Bonferroni procedure was used for *post hoc* analyses, as it has been argued to be the best option when the number of comparisons are small (Field, 2009). To address the second research question, bivariate correlation was run to determine the Spearman rank-order correlation coefficients which were used to describe the strength and direction of the relationship between mental health, mental illness, PNS and PND. Lastly, to address the third research question, examining if PNS and PND predicted levels of mental health and/or mental illness, four hierarchical linear regression analyses were performed where specialization, hours of hockey per week and level of hockey played were used as covariates.

3. Results

Several ANCOVA tests were conducted to compare the differences in mental health, mental illness, PNS and PND between specialization groups. Preliminary checks were conducted to ensure there were no violation of the assumptions of normality, linearity, homogeneity of variances, homogeneity of regression slopes and reliable measurement of the covariate and there were no violations. After controlling for total sport hours and level of hockey, the results revealed a significant difference across the three groups related to PND ($F(3, 52) = 3.24, p = .029, \eta^2 = .16$). After adjusting for the effects of covariates and using a Bonferroni-adjusted alpha level (.017), the mean PND for early specializers ($M = 2.83, SD = .39$) was significantly higher than both late specializers ($M = 2.58, SD = .17$) and recreational players ($M = 2.49, SD = .16$) as hypothesized (see Table 2). The effect size calculations revealed a large effect size for PND (Cohen, 1988). No significant differences were found across groups related to PNS, mental health or mental illness.

Table 2. Estimated marginal means of the dependent variables, according to specialization, after controlling for the effect of hockey level and total sport hours

Dependent Variable	Specialization	Mean	Std. error	95% confidence interval		F	Sig.	η_p^2
				Lower Bound	Upper Bound			
Mental health	ES	5.05	.14	4.76	5.34			
	LS	4.93	.16	4.61	5.26	.162	.921	.009
	REC	5.04	.16	4.72	5.35			
Mental illness	ES	1.50	.09	1.33	1.67			
	LS	1.60	.10	1.41	1.79	1.138	.342	.062
	REC	1.47	.09	1.29	1.66			
Psychological needs satisfaction	ES	3.84	.11	3.61	4.07			
	LS	3.88	.13	3.62	4.14	.770	.516	.043
	REC	4.00	.13	3.75	4.25			
Psychological needs dissatisfaction	ES	2.83	.39	2.04	3.62			
	LS	2.58	.17	2.24	2.93	3.237	.029*	.157
	REC	2.49	.16	2.16	2.82			

Note: ES = Early specializers, LS = Late specializers, REC = Recreational athletes.

Table 3. Spearman’s rank-order correlations between psychological needs dis(satisfaction), mental health and mental illness

Scale	1	2	3	4
(1) Mental health	-	-.575**	.396**	-.425**
(2) Mental illness		-	-.464**	.676**
(3) Psychological needs satisfaction			-	-.405**
(4) Psychological needs dissatisfaction				-

**Level of significance at $p < .001$.

Table 4. Summary of hierarchical regression analyses controlling for specialization, total hockey hours and level of hockey

Dependent variable	Independent variable	B	SE B	β	t	Sig
Mental health	Psychological needs satisfaction	.608	.161	.471	3.765	.000**
	Psychological needs dissatisfaction	-.387	.110	-.443	-3.528	.001*
Mental illness	Psychological needs satisfaction	-7.89	1.89	-.509	-4.17	.000**
	Psychological needs dissatisfaction	7.428	1.047	.708	7.096	.000**

*Level of significance at $p < .05$.

**Level of significance at $p < .001$.

Findings of correlation analyses revealed a positive medium correlation between PNS and mental health ($r = .39, p = .002$) and a positive strong correlation between PND and mental illness ($r = .65, p < .0005$; see Table 3). There were also medium and negative correlations between PND and mental health ($r = -.42, p = .001$) and between PNS and mental illness ($r = -.48, p < .0005$). These results suggest that youth’s PNS positively influences their mental health and negatively influences their mental illness, while youth’s PND positively influences their mental illness and negatively influences their mental health.

Four hierarchal linear regression analyses were conducted (see Table 4). In all four regression analyses specialization, total sport hours and level of hockey were entered at Step 1 followed by the independent variables, PNS and PND, at Step 2. The total variance in mental health, as explained by PNS, was 21.7%, $F(4, 53) = 3.68, p = .010$. The total variance in mental health, as explained by PND was 19.7%, $F(4, 53) = 3.25, p = .019$. PNS, as indicated by its β value of .47, was shown to have the strongest relationship with mental health. The total variance in mental illness, as explained by PNS was 25.5%, $F(4, 53) = 4.54, p = .003$, while the total variance in mental illness, as explained by PND was 49.3%, $F(4, 53) = 12.88, p < .0005$. PND, as indicated by its β value of .71, was shown to have the strongest relationship with mental illness. It should be noted that in the final step (Step 2) of the two regression models, specialization, number of hockey hours per week and level were not significant predictors of mental health of mental illness.

4. Discussion

The purpose of this study was to determine the associations between sport specialization, PNS, and PND and mental health and mental illness in male youth hockey players. PND was significantly different across groups and had a large effect size, with early specializers reporting the greatest PND and recreational athletes the lowest PND. There were significant relationships between all four variables: PNS, PND, mental health and mental illness. Results also revealed that both PNS and PND significantly predicted mental health and mental illness; however, specialization did not significantly contribute to these predictions. It should be noted the majority of athletes in the present study reported high levels of mental health and low levels of mental illness. Therefore, according to Keyes (2002), these individuals are considered to be “flourishing”. One reason for this may be, in part, because over half of participants in the sample were within the sampling phase (e.g. engaging in

more than one sport) based on youth reporting involvement in other leisure, including sport. However, as there was a large effect size outlining differences across groups related to PND according to specialization, and since PND significantly predicted mental illness, research is needed to further investigate the impact that early specialization has on PNS, PND, mental health and mental illness.

Several strengths are associated with the present study. One strength of this paper is that it explores a new area of research which examined the psychological effects that the level of specialization in hockey has on youth. Much research has been done on specialization, yet most has focused on the physical effects of young athletes. To our knowledge, no study has looked at specialization as it relates to needs satisfaction and mental health. The present study measured mental health using an evidence-based positive psychology perspective on mental health. This positive psychology perspective could significantly contribute to answering the critical question of whether sports participation overwhelms or enhances youthhood. Additionally, the use of the Sport Specialization Scale, while relatively new, provides promise as a strong tool to categorize youth athletes' specialization level. Moreover, as stated, the sport of hockey has critical cultural significance and popularity within Canada, making it an important sport context to understand.

Study results revealed significant differences and a large effect in PND between the three specialization groups and no significant differences in the other variables were revealed. However, the significant findings should be considered. The structure of the early specialization pathway may not fully satisfy the three psychological needs of autonomy, competency and relatedness. For instance, early specialization is often a decision made by the parent or coach rather than the athlete, which can cause youth to lack motivation and become less committed to their sport (Bean et al., 2014; Côté, Lidor, & Hackfort, 2009). This demonstrates a lack of autonomy. Once the decision to specialize at an early age has been made, many young elite athletes continue to sense this lack of autonomy as adults control many aspects of their life within sport (i.e. scheduling of practices/games, travel arrangements) and outside of sport (i.e. diet, time spent on schoolwork; Winsley & Matos, 2011).

Further, athletes who specialize early are usually performance-driven; they are expected to strive for perfection and often times their efforts are not rewarded along the way. This lack of positive reinforcement might make them feel as though they are inadequate. This demonstrates a lack of competency. Finally, athletes who specialize early may be missing out on other leisure activities outside of sport. In fact, 36% of the youth in the current study indicated that they did not participate in other leisure activities outside of hockey. It might be argued that youth athletes gain this need for relatedness with their teammates, and this might be true in some cases, but in high-level sport there is constant competition even within a team. Athletes might feel as though they are being judged and compared against their teammates which may take away from the connection they make with each other (Reinboth & Duda, 2006). This competitive climate in which athletes are being evaluated and compared against others, referred to as an ego-oriented climate, is also linked to performance anxiety and negative affect in young athletes (Sebire, Standage, & Vansteenkiste, 2009). Within this study, the majority of youth who fell within the category of early specializers were currently playing at "AA" level; the competitive environment may have contributed to early specializers reporting the highest PND. For these reasons, a sport environment which emphasizes fun, enjoyment and social interaction (such as recreational sport) might result in greater PNS and less PND of young athletes.

There were no significant differences found between PNS, mental health or mental illness according to specialization groups. Consequently, the first hypothesis was falsified. There are many potential reasons for this. For instance, the sample size was quite small ($n = 61$) and the number of participants in each group were not evenly distributed; there was an over-representation of youth involved in house league and "AA" which can limit generalizability. Moreover, it has been argued that current sport programmes have been promoting early specialization in sport in hopes that athletes will gain an advantage over others and perform at an elite level earlier (Ericsson, 2006; Ford, Hodges,

Williams, Kaufmann, & Simonton, 2013), which may be why early specializers were also over-represented in the present study. Although the hypotheses for the first research question were not completely supported, differences did exist between PND according to specialization which shows the need for further investigation in order to fully understand the consequences of early specialization.

The findings of the study supported the hypotheses for the second and third research questions. Results of the correlation analysis outlined strong relationships between variables in the direction hypothesized, which suggests fostering needs satisfaction (autonomy, competency, relatedness) may be critical in promoting mental health and preventing mental illness of youth. Such findings support previous research which suggested that promoting autonomy, competency and relatedness in a sport environment predicts positive psychosocial outcomes and overall well-being among athletes (Felton & Jowett, 2015; Gagne, 2003; Gillet, Vallerand, Amoura, & Baldes, 2010; Reinboth et al., 2004).

The results of the hierarchical linear regression analyses revealed greater PND predicted higher mental illness, while lower PND predicted higher mental health. Similarly, greater PNS predicted higher mental health, while lower PNS predicted higher mental illness. This is consistent with Gunnell et al. (2013) who found that PND (thwarting) predicted ill-being (measured by negative affect), while PNS predicted well-being (measured by positive affect and subjective vitality). Previous research investigating PNS has suggested a relationship between PNS and well-being (Ryan & Deci, 2000b). Within a sport context, higher perceived needs satisfaction has been shown in research to predict well-being (i.e. greater vitality and positive affect), while lower perceived needs satisfaction has been shown to predict ill-being (i.e. emotional/physical exhaustion and negative affect; Adie et al., 2008; Gunnell et al., 2013; Reinboth & Duda, 2006). However, although it was posited that specialization, number of hours involved in hockey or the level of play would act as predictors within the regression models, none of these variables significantly contributed. If there is in fact higher PND in youth who specialize early, as indicated by this study, future research should explore these implications on mental health and mental illness.

4.1. Limitations and future directions

As with any study, there are limitations. In addition to the previously mentioned limitations of a small sample size and over representation, the study was also limited by self-report measures, lack of generalizability, selection bias, the age of participants and a cross-sectional design. First, the results in this study are based on self-report measures of youth and parents as opposed to observational data. More specifically, the classification of specialization was done based on parent recall for up to 12 years, highlighting an increased risk of error. In order to reduce recall bias, future studies should attain both youth and parent perceptions of the child's specialization level and compare the responses to make sure they are in line with one another. Moreover, the study sample was derived from Ontario, Canada, limiting generalizability to other geographic locations, such as the rest of Canada or the United States. Future research should utilize a similar design within samples in other geographic locations. Selection bias may have been represented in the results, as youth who took the time to respond to the online questionnaire were likely those who were highly interested in and happy with their sport, while those who were unhappy with their sport and who may have been experiencing PND and/or mental illness may not have been as motivated to respond to the online questionnaire. Furthermore, there were many youth who participated in this study at the age of 13, indicating that they were just beginning to specialize in hockey; therefore, they may not have experienced the risks and/or benefits associated with early specialization. Future research should look to target strictly an older sample of youth athletes that have been involved in their sport pathway for a longer period of time and may be more cognizant of the effects such a pathway has on mental health and needs satisfaction. Finally, the cross-sectional design of the study does not allow for interpretations of causality. It is possible that mental health or illness influenced perceptions of PNS or PND and not vice versa. Future research should consider using a longitudinal research design to follow participants over time and measure their PNS, PND, mental health and mental illness to

examine how these variables change according to the time of specialization and in the years following specialization. Future research should also consider adding in a measurement of self-determination (e.g. Sport Motivation Scale-II; Pelletier, Rocchi, Vallerand, Deci, & Ryan, 2013) as it is a major component of the SDT and might be a mediator between specialization, PNS, PND, mental health and mental illness. Additionally, future research should consider adding socio-demographic and psychometric measures of parents, as these parameters may have an influence on the study variables, including mental illness (Knopf, Park, & Mulye, 2008). Finally, since depression is only one type of mental illness, future research should consider using additional measures (such as anxiety or mood) to quantify mental illness.

The results of the present study have several practical applications. The age group of athlete's participating in the present study represents a critical age for youth development. It represents a time of drastic change and transition from childhood to youth and from youth to adulthood. In many cases, these changes might cause stress and lead to youth experiencing mental health issues. The Mental Health Commission of Canada (2015) report that over two-thirds of young adults with mental health issues say they first experienced symptoms as a child. With mood disorders in youth on the rise, it is becoming especially critical to understand the determinants of these disorders, how they can be prevented and how mental health can be promoted (Statistics Canada, 2015). Hockey represents one avenue, in which a large number of Canadian youth participate (Hockey Canada, 2014). Research supports that sport has the potential to promote mental health in youth (e.g. Eime et al., 2013; Merglen et al., 2013), and the findings of the present study suggests that PNS and PND may play a critical role in this. The results of the present study provide practical information which may help adults (i.e. coaches, parents, stakeholders) facilitate mental health among youth athletes. Determining if one's PNS in sport has an impact on mental health and mental illness will perhaps steer the sport culture away from early specialization in youth sport. Felton and Jowett (2015) recommended that future sport programmes emphasize to coaches, parents and stakeholders that it is imperative to satisfy psychological needs in order to ensure positive well-being of youth athletes. Parents and coaches play a substantial role in satisfying these needs through the motivational climate they create for their youth within the sport context (Bean et al., 2014). In order to create a positive motivational climate, parents and coaches should focus on providing encouragement and support (Bean et al., 2014; Lavoie & Stellino, 2008). Therefore, future studies could also integrate a measure of parent and/or coach climate, (e.g. Parent-Initiated Motivational Climate Questionnaire-2 by White, 1998; Perceived Motivational Climate in Sport Questionnaire-2 by Newton, Duda, & Yin, 2000) to further understand the relationships and interactions within the youth sport context. Ultimately, it is our hope that the study findings provide initial evidence for future research which may help contribute to changes in athletic programming to ensure the positive developmental experiences of youth athletes, a critical goal of youth sport participation (Felton & Jowett, 2015; Lavoie & Stellino, 2008).

5. Conclusion

Sport participation has been widely accepted as an activity which can facilitate positive physical and psychological benefits (Fraser-Thomas, Côté, & Deakin, 2005; Merkel, 2013). Despite this, research has documented potential negative effects of sport participation on youth (Bean et al., 2014; Jayanthi et al., 2013). Researchers have suggested the specific developmental pathway that an athlete leads might be crucial in order for them to obtain these positive physical and psychological benefits (Jayanthi et al., 2013; Merkel, 2013). Early specialization has become increasingly popular among young athletes because some parents and coaches believe it provides a competitive edge, allowing youth to reach an elite level at a younger age (Bean et al., 2014; Ericsson, Krampe, & Tesch-Römer, 1993). However, early specialization may result in both physical and mental detriments (Côté et al., 2007); therefore, it has been suggested that waiting to specialize in a given sport after the age of 12 may be favourable without compromising performance (Epstein, 2013; Jayanthi et al., 2013), and more specifically in hockey (Soberlak & Côté, 2003).

Findings of the present study showed that early specialists reported the greatest PND compared to late specialists and recreational athletes. Moreover, PND negatively predicted mental health and positively predicted mental illness, while PNS positively predicted mental health and negatively predicted mental illness. These findings, in line with previous research, suggest that it is important to promote PNS and prevent PND in youth hockey players. This can be done by ensuring youth do not specialize too early in their lives and by ensuring coaches and parents offer a positive, supportive and empowering motivational climate that will lead to low levels of mental illness, high levels of mental health and ultimately well-being. This is a new avenue of research and, although this study presents initial findings, more research is required on this important topic.

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